



Atomic Structure

EXERCISE

- The statements
 - “In filling a group of orbitals of equal energy it is energetically preferable to assign electrons to empty orbitals rather than pair them into a particular orbital.
 - When two electrons are placed in two different orbitals, energy is lower if the spins are parallel” are valid for
 - Aufbau Principle
 - Uncertainty Principle
 - Hund’s Rule
 - Pauli Exclusion Principle
- For the energy levels in an atom, which one of the following statement is incorrect?
 - There are seven principle electron energy levels
 - The second principal energy level can have four sub-energy levels and contain a Maximum of eight electrons
 - The M energy level can have a maximum of 32 electrons
 - The 4d-sub energy level is at higher energy than the 3-d sub energy level
- The Principal quantum number ‘n’ represents–
 - shaped of an orbital
 - spin of an electron
 - size of an orbital
 - shaped of an orbital
- Mass spectrometer helps in the detection of isotopes because they have
 - the same atomic weight
 - the same atomic number
 - different atomic mass
 - none of the above
- Which property of an element is always a whole number?
 - Atomic number
 - Atomic volume
 - Equivalent weight
 - Atomic weight
- In which one of the following pairs of experimental observation and phenomenon, does the experimental observation correctly account for the phenomenon?

Experimental observation	Phenomenon
a. X-ray spectra	Charge on the nucleus
b. α -particle scattering	Quantized electron orbit
c. Emission spectra	the quantization of energy
d. The photoelectric effect	The nuclear atom



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7. The heaviest particle is
- (a) meson (b) neutron
(c) electron (d) Proton
8. The quantum number, which specific the to cation of an electron as well as energy is
- (a) principal quantum number (b) azimuthal quantum number
(c) magnetic quantum number (d) Spin quantum number
9. Which of the following statements is wrong?
- (a) all the mass of chlorine atom is concentrated in its nucleus
(b) all chlorine atoms have the same nuclear charge
(c) some naturally occurring chlorine nuclei contain 18 protons
(d) some naturally occurring chlorine nuclei contain 20 neutrons
10. Illustrting the group displacement law, which of the following pairs is a pair of isotopes?
- (a) $^{211}\text{PO}_{84}$ and $^{215}\text{PO}_{84}$ (b) $^{211}\text{Pb}_{82}$ and $^{211}\text{PO}_{84}$
(c) $^{211}\text{Pb}_{82}$ and $^{211}\text{Bi}_{83}$ (d) $^{211}\text{Bi}_{83}$ and $^{211}\text{PO}_{84}$
11. How many electrons can fit into the orbitals that comprise the 3rd quantum, shell $n = 3$?
- (a) 32 (b) 8
(c) t8 (d) 2
12. Which one of the following has the highest bond order?
- (a) O_2 (b) O_2^-
(c) O_2^{2-} (d) O_2
13. Acertan atom has 26 electrons and an atomic mass of 56. The number of neutrons in its nucleus is
- (a) 26 (b) 56
(c) 30 (d) 36
14. "One gram molecule of a gas at NTP occupies 22.4 litres." This fact was derived from
- (a) law of gaseous volume (b) Dalton's theory
(c) Avogadro's hypothesis (d) Berzelius hypothesis
15. An element has atomic weight 39 and atomic number 19, the number of electrons, protons and neutrons in it will be respectively
- (a) 19, 19, 20 (b) 20, 19, 19
(c) 19, 20, 19 (d) 19, 20, 19



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16. The isotopes of an element have
- (a) different atomic number (b) different number of neutrons
(c) same number of neutrons (d) same atomic weights
17. A and B are two allotropes of an element. One gram of A will differ from one gram of B in
- (a) atomic arrangement (b) chemical composition
(c) total number of atoms (d) oxidation number
18. Chlorine atoms differs from chloride ions is the number is
- (a) protons (b) neutrons
(c) electrons (d) protons and electrons
19. Rutherford experiment of a particle showed for the first time that atom
- (a) nucleus (b) protons
(c) neutrons (d) electrons
20. Bond order is a concept in the molecular orbital theory. It depends on the number of electrons in the bonding and antibonding orbitals. Which of the following statements is true about it? The bond order
- (a) Cannot be a negative quantity
(b) Always has an integral value
(c) Can assume any value, positive or negative, integral or fractional, including zero
(d) Is a non-zero quantity
21. Which characteristic is different for the neutral atoms of the two isotopes of an element?
- (a) Atomic number (b) Atomic weight
(c) Number of protons (d) Number of electrons
22. The spectrum of He is expected to be similar to
- (a) H (b) Li^+
(c) Na (d) He^+
23. The completed L shell of an atom contains
- (a) 2-electrons (b) 6-electrons
(c) 10 electrons (d) 8-electrons
24. Which one of the following species has the maximum number of unpaired electrons?
- (a) O_2 (b) O_2^+
(c) O_2^- (d) O_2^{2-}



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25. The threshold wavelength for sodium is 5000 \AA , its work function is
- (a) $4 \times 10^{-19} \text{ J}$ (b) $2 \times 10^{-19} \text{ J}$
(c) $6 \times 10^{-19} \text{ J}$ (d) $8 \times 10^{-19} \text{ J}$
26. Which of the following does not characterise X-rays?
- (a) The radiation can ionise gas
(b) It causes ZnS to fluoresce
(c) Deflected by electric and magnetic fields
(d) Have wave length shorter than ultraviolet rays
27. Which of the following relates to photons both as wave motion and as a stream of particles?
- (a) Interference (b) $E = mc^2$
(c) Diffraction (d) $E = h\nu$
28. The electronic configuration of an atom/ion can be defined by which the following
- (a) Aufbau principle
(b) hund's rule
(c) Pauli exclusion principle
(d) All the three, namely Aufbau, Pauli and Hund's rule
29. According to Heisenberg's principle of uncertainty
- (a) $E = mc^2$ (b) $\lambda = \frac{h}{mv}$
(c) $\Delta \times \Delta p = \frac{h}{4\pi}$ (d) $E = h\nu$
30. The number of 4d electrons having spin quantum number $= -1/2$ are
- (a) 10 (b) 5
(c) 2 (d) 1
31. If nuclear radius is 10^{-13} cm and atomic radius is 10^{-8} cm , what fraction of the atomic volume is occupied by the nucleus?
- (a) $\frac{4}{3}\pi(10^{-13})^3 + \frac{4}{3}\pi(10^{-8})^3$ (b) $\frac{4}{3}\pi(10^{-8})^3 + \frac{4}{3}\pi(10^{-13})^3$
(c) 10^{-18} (d) 1/1837
32. Elements have been identified by their recurring spectra. This happens when
- (a) protons have definite energy levels (b) electrons have definite energy levels
(c) every element reflects light differently (d) every elements has a fixed ratio of isotopes



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33. Mosley's name is connected with the discovery of
- (a) atomic numbers (b) atomic weight
(c) protons (d) neutrons
34. Planck's constant is expressed in
- (a) joules/second (b) sec^{-1}
(c) joules-second (d) joules
35. The energy difference between two electronic states is 46.12 Kcal/mol. What will be the frequency of light emitted when the electron drops from the higher to the lower energy state? ($h = 9.52 \times 10^{-14}$ kcal/sec mol⁻¹)
- (a) 15.59×10^{15} cycles sec⁻¹ (b) 2.06×10^{-5} cycles sec⁻¹
(c) 4.38×10^{-12} cycles sec⁻¹ (d) 4.84×10^{14} cycles sec⁻¹
36. $E_n = -313.6/n^2$. The value of $E_n = -34.84$ corresponds to which of the following value of 'n'?
- (a) 1 (b) 2
(c) 3 (d) 4
37. The ratio of the radii of the first three Bohr's orbits is
- (a) 1 : 0.5 : 0.3 (b) 1 : 0 : 3
(c) 1 : 4 : 9 (d) 1 : 8 : 7
38. Which of the following energies cannot be possessed by an oscillation?
- (a) 1 hv (b) 1.5 hv
(c) 2 hv (d) 3 hv
39. Photoelectric effect is an example of
- (a) wave nature of light (b) wave nature of electrons
(c) particle nature of light (d) none of these
40. Cathode rays contain
- (a) electrons (b) protons
(c) neutrons (d) atoms
41. In the case of neptunium series ($4n + 1$), the end product is
- (a) ^{206}Pb (b) ^{208}Pb
(c) ^{209}Pb (d) ^{209}Bi
42. Mullikan's oil drop experiment is used to find
- (a) e/m ratio of an electron (b) electronic charge
(c) mass of an electron (d) velocity of an electron



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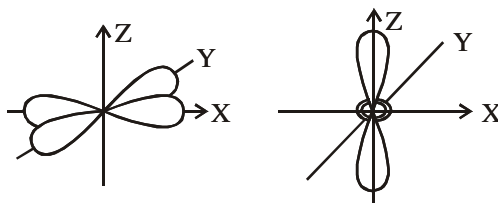
43. A hydrogen molecule at 200°C is moving at velocity 2.2×10^5 cm/sec. The de Broglie wavelength is of the order of (mass of Hydrogen atom = 1.6×10^{-27} Kg)
- (a) 10,000 A° (b) 1 A°
(c) 5000 A° (d) 5 A°
44. The best evidence that electrons are arranged in definite orbits or energy levels is based on the observation that
- (a) atomic spectra consists of discrete lines and not continuous bands
(b) electrons in the beta ray have high kinetic energy
(c) the penetrating power of cathode ray electrons depends upon the voltage used to produce them
(d) electrons revolve around the nucleus
45. The ratio e/m for a cathode ray
- (a) is the smallest when the discharge tube is filled with hydrogen
(b) is fixed
(c) varies with the atomic number of an element constituting the cathode in the discharge tube
(d) varies with the atomic number of the gas in the discharges tube
46. The model of an atom consisting of a dense positively charged nucleus surrounded by electron was given by
- (a) Bohr (b) Plank
(c) rutherford (d) Thomson
47. Two radioactive sources A and B of half lives of 1 hour and 2 hours respectively initially contain equal number of radioactive atoms. At the end of two hours their ratio of their atoms is
- (a) 1 : 4 (b) 1 : 3
(c) 1 : 2 (d) 1 : 1
48. 1 amu is equivalent to
- (a) 139 Mev (b) 39 Mev
(c) 931 Mev (d) 31 Mev
49. A nucleus is stable if it contains equal number of
- (a) electrons and neutrons (b) electrons and protons
(c) protons and neutrons (d) protons and positrons
50. Penetration power of proton is
- (a) greater than electron (b) less than electron
(c) greater than neutron (d) none of these



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51. The following figures show that angular probability distribution of



- (a) dz^2 orbitals and $dx^2 - y^2$ (b) dyz and dxz orbitals
(c) dxy and dyz orbital (d) dxy and dxz orbitals
52. Of the following transitions in hydrogen atom, the one gives an absorption line of highest frequency is
(a) $n = 1$ to $n = 2$ (b) $n = 3$ to $n = 5$
(c) $n = 2$ to $n = 1$ (d) $n = 8$ to $n = 3$
53. A photon in 'X' region is more energetic than in visible region. 'X' is
(a) Infra red (b) U.V. region
(c) Micro wave (d) Radio wave
54. Atoms consist of P, N, E. If mass of neutron were halved and that of electrons were doubled, the atomic mass of $^{12}_6\text{C}$ would
(a) remain approximately the same
(b) be approximately doubled
(c) be approximately halved
(d) reduced by 25%
55. Isotopes were discovered by
(a) Aston (b) Soddy
(c) Thomson (d) Mullikan
56. The wave number of first line of Balmer series of hydrogen is 15200 cm^{-1} . The wave number of Balmer line of Li^{2+} ion is
(a) 15200 cm^{-1} (b) 60800 cm^{-1}
(c) 76000 cm^{-1} (d) 136800 cm^{-1}
57. If ionization potential for hydrogen atom is 13.6 eV, the ionization energy of He^+ will be
(a) 54.4 eV (b) 13.6 eV
(c) 6.8 eV (d) 24.5 eV
58. Which of the following transition required maximum amount of energy
(a) $\text{M}^-(\text{g}) \rightarrow \text{M}(\text{g})$ (b) $\text{M}(\text{g}) \rightarrow \text{M}^+(\text{g})$
(c) $\text{M}^+(\text{g}) \rightarrow \text{M}^{2+}(\text{g})$ (d) $\text{M}^{2+}(\text{g}) \rightarrow \text{M}^{3+}(\text{g})$



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59. For which set of the four quantum numbers the energy will be maximum
- | | n | l | m | s |
|-----|---|---|----|------|
| (a) | 3 | 2 | 1 | +1/2 |
| (b) | 4 | 2 | -1 | +1/2 |
| (c) | 4 | 1 | 0 | -1/2 |
| (d) | 5 | 0 | 0 | -1/2 |
60. The possibility of finding an electron in an orbital was conceived by
- (a) Rutherford (b) Bohr
(c) Heisingerg (d) Schrodinger
61. Which one of the following quantum numbers was not derived from Schrodinger wave equation
- (a) n (b) m
(c) l (d) s
62. What is the ratio of the de Broglie wave lengths for electrons accelerated through 200 volts and 50 volts
- (a) 1 : 2 (b) 2 : 1
(c) 3 : 10 (d) 10 : 3
63. The wave number ratio for two transitions in spectrum of atomic hydrogen is 1087. The transitions are
- (a) first lyman and first paschen transitions
(b) first lyman and first bracket transitions
(c) first lyman and second bracket series
(d) first lyman and second balmer transition
64. Radius of hydrogen atom in its ground state is 0.53 \AA . In the same state, the radius of Li^{2+} will be
- (a) 1.06 \AA (b) 0.265 \AA
(c) 0.17 \AA (d) 0.53 \AA
65. Azimuthal quantum number for last electron of Na atom is
- (a) 1 (b) 2
(c) 3 (d) 0
66. The total number of values of m for a particular value of n is
- (a) $2n^2$ (b) n^2
(c) $2n + 1$ (d) $2n^{-1}$



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67. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$ is the electronic configuration of
- (a) Cu^{2+} (b) Ni^{2+}
(c) Ni (d) Cu^+
68. In lanthanum ($Z = 57$), the 57th electron enters into
- (a) 6p (b) 5d
(c) 6s (d) 4f
69. The maximum number of 4f electrons having spin quantum number $-1/2$ is
- (a) 4 (b) 5
(c) 7 (d) 14
70. If the radius of first orbit of nth orbit of H atom is given by
- (a) m (b) m^2
(c) r/n (d) $r^2 n^2$
71. The ionization energy of H-atom in ground state is 'X' KJ. The energy required for an electron to jump from 2nd orbit to 3rd orbit is
- (a) $\frac{5x}{36}$ (b) 5x
(c) 7.2 x (d) $x/6$
72. Which one is not arranged in the correct sequence
- (a) $d^5 . d^3 . d^2 . d^4$ increasing magnetic moment
(b) MO, M_2O_3 , MO_2 , M_2O_5 decreasing basic strength
(c) Sc, V, Cr, Mn increasing number of oxidation state
(d) CO^{3+} , Fe^{3+} , Cr^{3+} , Sc^{3+} increasing stability
73. The transition in He^+ spectrum from $n = 4$ to $n = 2$ corresponds to which transition in the hydrogen atom
- (a) $n = 2$ to $n = 1$ (b) $n = 3$ to $n = 1$
(c) $n = 3$ to $n = 2$ (d) $n = 4$ to $n = 2$
74. Maxx spectrum was discovered by
- (a) Aston (b) Rutherford
(c) Ramsay (d) Priestly
75. Which of the following are Isomorphs
- (a) $^{16}_8\text{O}$, $^{17}_8\text{O}$ (b) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ and $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
(c) $^{40}_{18}\text{Ar}$, $^{40}_{20}\text{Ca}$ (d) $^{31}_{15}\text{P}$ and $^{32}_{16}\text{S}$



Chemical Bonding

EXERCISE

- Octet rule is disobeyed by
 - CO_2
 - BCl_3
 - H_2O
 - NH_3
- The shape of CCl_4 is
 - linear
 - square planar
 - Tetrahedral
 - Trigonal bipyramidal
- Type of hybridisation in graphite is
 - sp^3
 - sp^2
 - d sp^2
 - $\text{sp}^3 \text{d}^2$
- In SO_4^{2-} ions, number of covalent bonds is
 - 380
 - 2
 - 2 and 2 coordinate bond
 - 4
- Which of the following are not linear
 - CO
 - CO_2
 - H_2O
 - HCl
- The shape of ammonia is
 - tetrahedral
 - linear
 - square planar
 - pyramidal
- Which of the following is paramagnetic
 - O_2^+
 - O_2
 - O_2^{2+}
 - O_2^{2-}
- Ethylene molecule has
 - 1 σ bond and 2 π bond
 - 5 σ bond and 1 π bond
 - 2 σ bond and 3 π bond
 - 3 σ bond and 1 π bond
- Ice is an example of a
 - high melting network solid
 - non conducting solid which becomes a good conductor in the molten state



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- (c) solid with high electrical and thermal conductivity
(d) a low melting solid held together by Van der waal's forces
10. SO_2 molecule is
- (a) linear (b) bent
(c) tetrahedral (d) Trigonal
11. NH_3 molecule is pyramidal due to
- (a) four pairs of electrons
(b) three bond pair of electrons
(c) one lone pair of electrons
(d) three bond pairs and one lone pair of electrons
12. Shape of sp^2 hybrid orbitals is
- (a) linear (b) triangular
(c) bent (d) V shaped
13. In hydrides of group 1A, the melting and boiling points increase as the molecular mass increases due to
- (a) hydrogen bonding (b) metallic bonding
(c) covalent bonding (d) Van der wall's interactions
14. Metallic bonds arise due to
- (a) delocalised electrons (b) positively charged nucleus
(c) both of them (d) Neither of them
15. C_2H_4 is
- (a) Trigonal co-planar (b) pyramidal
(c) tetrahedral (d) square planar
16. PCl_5 is formed by
- (a) sp^3d^3 hybridisation (b) dsp^3 hybridisation
(c) d^2sp^3 hybridisation (d) sp^3 hybridisation
17. The shape of IF_7 is
- (a) Trigonal bi pyramidal (b) Tetrahedral bi pyramidal
(c) Octahedral (d) Pentagonal bi pyramidal
18. Hydrogen bonding occurs due to difference in
- (a) electronegativity (b) ionisation potential
(c) electron affinity (d) inductivity



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19. The more probable formula for the compound formed by atoms x and y both occupying the same period with 2 and 7 electrons respectively is
- (a) XY (b) XY₂
(c) X₂Y (d) (XY)₂
20. The water soluble compound is
- (a) C₂H₅OH (b) CCl₄
(c) CS₂ (d) CHCl₃
21. Dative bonds are also called as
- (a) covalent bond (b) coordinate bond
(c) ionic bond (d) metallic bond
22. The shape of ammonia is
- (a) pyramidal (b) linear
(c) angular (d) tetrahedral
23. An sp³ hybrid orbital contains
- (a) $\frac{1}{2}$ s character (b) $\frac{1}{4}$ s character
(c) $\frac{2}{3}$ s character (d) $\frac{3}{4}$ s character
24. The hybridisation of S in SO₂ is
- (a) sp (b) sp³
(c) d sp² (d) sp²
25. CO₂ is isostructural with
- (a) SnCl₂ (b) C₂H₂
(c) HgCl₂ (d) NO₂
26. Chlorine molecule is formed by the coaxial overlap of
- (a) s – s orbitals (b) p – p orbitals
(c) s – p orbitals (d) none of the above
27. Which has the largest bond angle
- (a) As H₃ (b) Bi H₃
(c) PH₃ (d) NH₃
28. Which of the following compound is covalent
- (a) H₂ (b) MgO
(c) Na₂S (d) MgO



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29. During formation of NaCl, the sodium atom tends to acquire the structure of
- (a) Argon (b) Neon
(c) Krypton (d) Helium
30. Which of the following is ionic nature
- (a) KCl (b) AlCl₃
(c) CHCl₃ (d) CCl₄
31. The bond order for a species with the configuration $\sigma 1s^2, \sigma 1s^2, \sigma 2s^2, \sigma 2s^2, \sigma 2p$ will be
- (a) zero (b) 1
(c) 1/2 (d) 2
32. Acetic acid exists as dimer in benzene due to
- (a) Condensation (b) Hydrogen bonding
(c) Carboxylic group (d) Hydrogen atom at α carbon
33. Which of the following will have strongest hydrogen bonding
- (a) RCOOH (b) RCH₂OH
(c) RCH₂NHCH₃ (d) RCONHCH₃
34. The maximum possible number of hydrogen bonds a water molecule can form is
- (a) 2 (b) 4
(c) 3 (d) 1
35. Which of the following has a bond formed by overlapping of $sp - sp^3$ hybrid orbitals
- (a) CH₃ - C \equiv C - H (b) CH₃ - CH = CH₂
(c) CH₂ = CH - CH = CH₂ (d) HC \equiv CH
36. The hybridisation of Ag in the linear complex [Ag (NH₃)₂]⁺ is
- (a) sp² (b) sp
(c) sp³ (d) sp³d
37. The bonds present in N₂O₅ are
- (a) only ionic (b) covalent
(c) covalent and coordinate (d) covalent and ionic
38. On hybridisation of s and p orbitals we get,
- (a) two mutually perpendicular orbitals (b) two orbitals at 180°
(c) four orbitals directed tetrahedrally (d) three orbitals in a plane
39. The bond between carbon atom (1) and carbon atom (2) in compound N \equiv C - CH = CH₂ involves the hybrids are



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- (a) sp^2 (b) sp^3 and sp
(c) sp and sp^2 (d) sp and sp
40. The CO_2 molecule is isostructural with
(a) $HgCl_2$ (b) $SnCl_2$
(c) $BeCl_2$ (d) $PbCl_2$
41. XeF_2 involves..... hybridisation
(a) sp^3 (b) sp^3d
(c) sp^3d^2 (d) none of these
42. In CCl_4 the four valencies of carbon are directed towards the corners of a
(a) cube (b) hexagonal
(c) prism (d) tetrahedron
43. Hybridisation involves
(a) addition of atoms (b) mixing up of atomic orbitals
(c) removal of an electron pair (d) separation of orbitals
44. Which of the following bonds has the most polar character
(a) C-O (b) C-S
(c) C-F (d) C-Br
45. How many σ and π bonds are there in the molecule of
(a) 9σ and 9π (b) 5σ and 9π
(c) 9σ and 7π (d) 5σ and 8π
46. Which of the following molecule has zero dipole moment
(a) ClF (b) PCl_3
(c) SiF_4 (d) $CFCl_3$
47. Which of the following is electron deficient
(a) BCl_3 (b) PCl_3
(c) PCl_5 (d) NH_3
48. Pick out the isoelectronic structures from the following
- (i) (a) CH_3^+ (b) H_3O^+
(c) NH_3 (d) CH_3^-
- (ii) (a) 1 & 2 (b) 3 & 4
(c) 1 & 3 (d) 2, 3 & 4



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49. The charge on a cation M is +2 and on an anion A is -3 the compound formed by them has the formula
- (a) MA_2 (b) M_2A
(c) M_3A_2 (d) M_2A_3
50. Select the molecule/ion which involves a coordinate bond
- (a) NaH (b) NH_3
(c) NH_4^+ (d) H_2O
51. Generally covalent compounds in water
- (a) are soluble (b) are insoluble
(c) ionise (d) hydrolyse
52. The variable electrovalency is observed in
- (a) Normal elements (b) Transition element
(c) Metallic elements (d) Non-metallic element
53. Which of the following molecule/ion has all the electrovalent, covalent and coordinate bonds
- (a) HCl (b) NH_4^+
(c) Cl^- (d) H_2O_2
54. Which one of the following shows maximum inert pair effect
- (a) N (b) P
(c) Sn (d) Pb
55. Both ionic and covalent bonds are present in
- (a) CH_4 (b) KCl
(c) SO_2 (d) NaOH
56. The shape of CO_2 molecule is similar to that of
- (a) H_2O (b) BeF_2
(c) SO_2 (d) C_2H_4
57. Which of the following molecules represents exception to octet rule?
- (a) CO_2 (b) PCl_3
(c) ICl (d) ClF_3
58. Which of the following does not have a co-ordinate bond?
- (a) H_3O^+ (b) PCl_5
(c) O_3 (d) HNO_3



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59. The smallest bond angle around central atom will be there in
- (a) H_2O (b) BeF_2
(c) CH_4 (d) NH_3
60. In the metallic crystals
- (a) the valence electrons remain within the field of influence of their own kernels
(b) The valence electrons constitute a sea of mobile electrons
(c) The valence electrons are localized between the two kernels
(d) Both kernels as well as electrons move rapidly
61. The largest C-C bond distance can be found in
- (a) Propane (b) Ethene
(c) Ethyne (d) All are same
62. Which of the following bonds will have directional nature?
- (a) Ionic bond (b) metallic bond
(c) Covalent bond (d) Both covalent and metallic bond
63. Which of the following species has intra-molecular H-bonding?
- (a) Phenol (b) o-Nitro phenol
(c) p-Nitro phenol (d) Nitro ethane
64. Which of the following has zero dipole moment?
- (a) CHCl_3 (b) CCl_4
(c) CH_2Cl_2 (d) none of these
65. The types of bonds present in NH_4Cl are
- (a) Ionic (b) Covalent
(c) Ionic and Covalent (d) Ionic, covalent and Co-ordinate bond
66. Which of the following has ionic bond?
- (a) AlCl_3 (b) AlBr_3
(c) AlI_3 (d) AlF_3
67. Which of the following has highest dipole moment?
- (a) H_2S (b) H_2O
(c) HF (d) NH_3
68. Which of the following has highest dipole moment?
- (a) BF_3 (b) NH_3
(c) NF_3 (d) BCl_3



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69. Which of the following is conductor of electricity in solid state?
- (a) Diamond (b) Sodium
(c) NaCl (d) Dry ice
70. Which of the following molecule is the oretically not possible?
- (a) SF₄ (b) OF₂
(c) OF₄ (d) O₂F₂
71. Which of the following molecules is polar?
- (a) SO₃ (b) SO₂
(c) SF₆ (d) All are polar
72. Which of the following hydrides is liquid?
- (a) NH₃ (b) PH₃
(c) AsH₃ (d) SbH₃
73. Which of the following has least tendency to form hydrogen bond?
- (a) HF (b) NCl
(c) HI (d) NH₃
74. Which of the following has highest ionic character?
- (a) Mg Cl₂ (b) CaCl₂
(c) BaCl₂ (d) BeCl₂
75. The hybridization of 'C' in graphite is
- (a) sp² (b) sp³
(c) sp (d) sp³d



Periodic Classification of Elements

EXERCISE

- Iron triad of elements also contains
 - Cobalt and Nickel
 - Manganese and Chromium
 - Palladium and Platinum
 - Platinum and Iridium
- Moseley gave term
 - Atomic weight
 - Mass number
 - Atomic number
 - Mass effect
- Which one is a transition element among the following?
 - Aluminium
 - Astatine
 - Nickel
 - Rubidium
- Highest electronegative element is
 - Cesium
 - Flourine
 - Lithium
 - Oxygen
- Diagonal relationship exists between
 - Na and B
 - Li and Mg
 - Na and Mg
 - K and Mg
- The element with the outer electronic configuration $3d^5 4s^1$ is
 - Lanthanide element
 - Actinide element
 - Transition element
 - Alkali metal
- Which of the following has the largest size?
 - Al^{3+}
 - Al^+
 - Al
 - Al^{2+}
- Elements have been arranged in the modern periodic table in the order of increasing
 - atomic weight
 - atomic number
 - atomic volume
 - ionic radius
- In modern periodic table an element having atomic number 6 will be found in
 - IV group
 - V period
 - VI period
 - VI group
- Lanthanides lies between
 - Ba and Hf
 - Ra and Ac
 - Ba and La
 - Hf and Ta



CHEMISTRY



11. The reason that Copper having one valence electron in 4s orbital does not lie in group 1 of periodic table is due to
- completely filled d orbital of penultimate shell
 - incomplete d orbital of penultimate shell
 - half filled d orbital of penultimate shell
 - completely vacant d orbital of penultimate shell
12. For the ionization of Zn atom to Z_n^{2+} ion, there is a decrease in
- number of valency electrons
 - atomic weight
 - atomic number
 - equivalent weight
13. Which element has the highest electronegativity?
- | | |
|--------|-------|
| (a) Mg | (b) O |
| (c) S | (d) C |
14. The elements having completely filled valences orbital are called
- | | |
|-----------------------|---------------------------|
| (a) Alkali metals | (b) Alkaline earth metals |
| (c) Transition metals | (d) Non-metals |
15. p block elements (leaving inert gases) have general electronic configuration
- | | |
|-----------------------|-----------------------|
| (a) $n s^2 n p^{1-6}$ | (b) $n s^1 n p^5$ |
| (c) $n s^2 n p^6$ | (d) $n s^1 n p^{1-6}$ |
16. Element having atomic number 24 is the member of
- | | |
|-------------|-------------|
| (a) f block | (b) p block |
| (c) d block | (d) s block |
17. In transition metals the valence orbitals are
- | | |
|------------|---------------------|
| (a) s, p | (b) s only |
| (c) p only | (d) s, p and d only |
18. Californium is the member of
- | | |
|-----------------------|---------------------|
| (a) alkali metals | (b) actinium series |
| (c) lanthanide series | (d) actinide series |
19. Which pair of elements is in the same period of periodic table?
- | | |
|-------------|-------------|
| (a) Mg – Sb | (b) Ca – Cl |
| (c) Na – Cl | (d) Ca – Na |



CHEMISTRY



20. Diagonal relationship is shown by
- (a) element of 2nd period (b) element of 1st period
(c) first three element of 2nd period, 3rd period (d) and some element of 4th period
21. Ionization potential of Na would be similar in magnitude to
- (a) typical elements (b) representative elements
(c) transition elements (d) inner transition elements
22. Ionization potential of Na would be similar in magnitude to
- (a) electron affinity of Na⁺ ion (b) electronegativity of Na⁺ ion
(c) ionization potential of Mg (d) electron affinity of Na
23. Ionization potentials of transitional and inner transitional elements are
- (a) markedly different (b) marginally different
(c) constant (d) neither of above
24. The energy of 3d orbital is greater than 4s orbital. The reason for this is
- (a) penetration effect (b) shielding effect
(c) ionization potential (d) penetration and shielding effect
25. The electron affinity of fluorine is smaller than chlorine. The reason for this is
- (a) small size (b) higher ionization potential
(c) highest electronegativity (d) atomic number
26. The lowest ionization potential is for
- (a) Bromine (b) Chlorine
(c) Iodine (d) Flourine
27. Element having atomic number 34 belongs to
- (a) Group VI B (b) Group V A
(c) Group III A (d) Group IV B
28. Pauli's exclusion principle
- (a) approves modern periodic table (b) disapproves modern periodic table
(c) has no relation with periodic table (d) neither of above
29. Metallic character in a group
- (a) decrease from top to bottom (b) increases from top to bottom
(c) remains constant from top to bottom (d) shows no regular trend.
30. The ionization potential of an element does not depend upon
- (a) Shelding effect (b) Electroneutrality



CHEMISTRY



- (c) Nuclear charge (d) Penetrating effect
31. Maximum work on periodic table related with atomic number was done by
(a) Mosley (b) Mendeleef
(c) Aston (d) Hund
32. The basis of modern periodic law is
(a) Atomic number (b) Atomic size
(c) Atomic volume (d) Atomic weight
33. Which one of the following is the smallest in size?
(a) N^{3-} (b) O^{2-}
(c) F^- (d) Na^+
34. Which one of the following is isoelectronic with one another?
(a) Na^+ and Ne (b) K^+ and O
(c) Ne and O (d) Na^+ and K^+
35. Which has lowest first ionisation potential?
(a) N (b) Be
(c) B (d) C
36. Variable valency is exhibited by
(a) Normal elements (b) Metallic elements
(c) Non-metallic elements (d) Transition elements
37. The property of an atom in a molecule to attract electrons towards itself is called
(a) Electron affinity (b) Electronegativity
(c) Ionisation potential (d) Electrode potential
38. Which of the following sets of elements is not of transition elements?
(a) Fr, Ra, Tl (b) Rh, Rh, Pd
(c) Ti, Zr, Hf (d) V, Nb, Ta
39. The first four ionisation energy values of an element are 191, 578, 872 and 5962 kJ. The number of valence electrons in the element is
(a) 1 (b) 2
(c) 3 (d) 4
40. Which of the following sets of atoms is arranged in order of increasing electronegativity?
(a) S, Si, P (b) S, P, Si
(c) Si, P, S (d) Si, S, P
41. The element with the highest ionisation potential is



CHEMISTRY



- (a) Boron (b) Carbon
(c) Nitrogen (d) Oxygen
42. The correct order of second ionisation potential of carbon, nitrogen, oxygen and fluorine is
(a) $C > N > O > F$ (b) $O > N > F > C$
(c) $O > F > N > C$ (d) $F > O > N > N$
43. How many ionisation energies can carbon have?
(a) 1 (b) 2
(c) 4 (d) 6
44. The ionisation energy of nitrogen is larger than that of oxygen because of
(a) Greater attraction of electrons by the nucleus
(b) The size of nitrogen atom being smaller
(c) The half-filled p-orbitals possess extra stability
(d) Greater penetration effect
45. Amongst the following elements (whose electronic configurations are given below), the one having the highest ionization energy is
(a) $[\text{Ne}] 3s^2 3p^1$ (b) $[\text{Ne}] 3s^2 3p^3$
(c) $[\text{Ne}] 3s^2 3p^2$ (d) $[\text{Ar}] 3d^{10} 4s^2 4p^2$
46. Which of the following properties display progressive increase down a group in the Bohr's periodic table?
(a) Electronegativity (b) Ionisation potential
(c) Electron affinity (d) Size of the atom
47. Which of the following properties display progressive increase with the rise in atomic number across a period in the periodic table?
(a) Electronegativity (b) Size of an atom
(c) Ionisation potential (d) Both (b) and (c)
48. In which of the following pairs, the first atom or ion is not larger than the second?
(a) $\text{Fe}^{+2}, \text{Fe}^{+3}$ (b) O, S
(c) N, O (d) Cl^-, Cl
49. An element of atomic weight 40 has 2, 8, 8, 2 as the electronic configuration. Which one of the following statements regarding this element is not correct?
(a) It belongs to II group of the periodic table
(b) It has 20 neutrons
(c) The formula of its oxide is MO_2
(d) It belongs to 4th period of the periodic table



CHEMISTRY



50. The most predominantly ionic compounds will be obtained from the combination of elements belonging to
- (a) 1 and 7 groups (b) 2 and 6 groups
(c) 3 and 5 groups (d) 0 and 7 groups
51. Which one of the following configurations represent a metallic character?
- (a) 2, 8, 2 (b) 2, 8, 4
(c) 2, 8, 8 (d) 2, 7
52. Elements whose atoms have 3 outermost shells incomplete are called
- (a) S-block elements (b) p-block elements
(c) d-block elements (d) f-block elements
53. Ce^{58} is the number of
- (a) s-block elements (b) p-block elements
(c) d-block elements (d) f-block elements
54. Transition metals are often paramagnetic owing to
- (a) their high melting point and boiling point
(b) the presence of vacant orbitals
(c) the presence of one or more unpaired electrons in the system
(d) they are being less electropositive than the elements of group IA and IIA
55. Which one of the following elements is the most electronegative?
- (a) Oxygen (b) Chlorine
(c) Nitrogen (d) Fluorine
56. Which one of the following elements has the highest ionisation energy?
- (a) Na (b) Mg
(c) C (d) F
57. Which of the elements has the maximum electron affinity?
- (a) F (b) Cl
(c) Br (d) Na
58. Correct order of electropositive nature of Li, Na and K is
- (a) $Li > Na > K$ (b) $Li > K > Na$
(c) $Na > K > Li$ (d) $K > Li > Na$
59. From fluorine to iodine, the electronegativity
- (a) decreases (b) increases
(c) first decreases then increases (d) changes randomly



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60. The electronegativity of the following elements increase in the order
- (a) C, N, Si, P (b) N, Si, C, P
(c) Si, P, C, N (d) P, Si, N, C
61. The first ionisation potentials in electron volts of nitrogen and oxygen atoms are respectively given by
- (a) 14.6, 13.6 (b) 13.6, 14.6
(c) 13.6, 13.6 (d) 14.6, 14.6
62. Which of the following metals exhibit more than one oxidation state?
- (a) Na (b) Mg
(c) Fe (d) Al
63. Which of the following Alkaline earth metals has the lowest first ionisation potential?
- (a) Mg (b) Ca
(c) Sr (d) Ba
64. Correct order of the size of iodine species as
- (a) $I > I^+ > I^-$ (b) $I > I^+ > I^-$
(c) $I^+ > I^- > I$ (d) $I^- > I > I^+$
65. Which of the following compounds has the lowest anion to cation size ratio ?
- (a) LiF (b) NaF
(c) CsI (d) CsF
66. The properties of Li are similar to those of Mg. This is because
- (a) both have nearly the same size
(b) the ratio of their charge to size is nearly the same
(c) both have similar electronic configurations
(d) both are found together in nature
67. The electron affinity
- (a) of carbon is greater than oxygen (b) of sulphur is less than oxygen
(c) of iodine is greater than bromine (d) of bromine is less than chlorine
68. The element having atomic number 29 in the periodic table belongs to
- (a) s-block (b) p-block
(c) d-block (d) f-block
69. The correct order of reducing power of halide ions is
- (a) $Cl^- > Br^- > I^-$ (b) $Cl^- > I^- > Br^-$
(c) $Br^- > I^- > Cl^-$ (d) $I^- > Br^- > Cl^-$



CHEMISTRY



70. An element having electronic configurations $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ will form
- (a) Acidic oxide (b) Basic oxide
(c) Amphoteric oxide (d) Neutral oxide
71. Which one of the following ions has the smallest radius?
- (a) Cl^- (b) S^{2-}
(c) K^+ (d) Ca^{2+}
72. The electronic configuration of a valency shell of an element is $ns^2 np^5$, it belongs to
- (a) Alkali metal (b) Inert metal
(c) Ideal gas (d) Halogen
73. Which electronic configuration of an element has abnormally high value between second and third ionisation energy?
- (a) $1s^2 2s^2 2p^6 3s^1$ (b) $1s^2 2s^2 2p^6 3s^2 3p^1$
(c) $1s^2 2s^2 2p^6 3s^2 3p^2$ (d) $1s^2 2s^2 2p^6 3s^2$
74. Shining nature of metal is due to
- (a) High density of metal
(b) High polish of metal
(c) Chemical reactivity of metals
(d) Reflection of light by the presence of the electrons
75. Element of which group forms anion most easily
- (a) Oxygen group (b) Nitrogen group
(c) Halogen group (d) Alkali metal
76. In a group of periodic table, ionisation potential decreases from top to bottom since
- (a) Density increases (b) Chemical reactivity decreases
(c) Electronegativity decrease (d) Atomic radius increases
77. Nitrogen is comparatively inert element since
- (a) Its atom has stable electronic configuration
(b) It has low atomic radius
(c) Its electronegativity is sufficiently high
(d) Its molecule has high dissociation energy
78. Which of the following transitions involves maximum amount of energy?
- (a) $M^-(g) \rightarrow M(g)$ (b) $M(g) \rightarrow M^+(g)$
(c) $M^+(g) \rightarrow M^{+2}(g)$ (d) $M^{+2}(g) \rightarrow M(g)^{+3}$



CHEMISTRY



79. The atomic numbers of four elements are given below. Which one is an alkaline earth metal?
- (a) 10 (b) 20
(c) 30 (d) 40
80. The transition element is
- (a) Al (b) Mn
(c) Mg (d) Si
81. Transition elements show
- (a) Variable valency (b) Paramagnetism
(c) Complex formation (d) All of the above
82. Which is the property of non-metals?
- (a) Electronegative (b) Basic nature of oxide
(c) Reducing property (d) Low ionisation potential
83. Which are electronegative?
- (a) N, O, F (b) Na, Mg, Al
(c) Ca, Sr, Ba (d) Fe, Co, Ni
84. In a periodic table, from left to right in a period, the atomic volume
- (a) decreases (b) increases
(c) remains same (d) first decreases, then increases
85. The correct order of decreasing first ionisation energy
- (a) $C > B > Be > Li$ (b) $C > Be > B > Li$
(c) $B > C > Be > Li$ (d) $Be > Li > B > C$
86. Which is the most effective catalytic group in the following metallic groups?
- (a) Alkali metals (b) Transition metals
(c) Alkaline earth metals (d) Radio active metals
87. The first ionisation potential of Na, Mg, Al and Si are in the order
- (a) $Na < Mg > Al < Si$ (b) $Na > Mg > Al > Si$
(c) $Na < Mg < Al < Si$ (d) $Na > Mg > Al < Si$
88. Atomic radii of fluorine and neon in Angstrom unit are respectively given by
- (a) 0.762, 1.60 (b) 1.60, 1.60
(c) 0.72, 0.72 (d) None of these
89. The statement that is false for the long form of the periodic table is
- (a) it reflects the sequence of filling the electrons in the order of sub-energy levels s, p, d and f.



CHEMISTRY



- (b) it helps to predict the stable valency states of the elements
- (c) it reflects trends in physical and chemical properties of the elements
- (d) it helps to predict the relative ionicity of the bond between any two elements
90. In the ground state of cobalt atom ($z = 27$) there are unpaired electrons and thus the atom is
- (a) 2, diamagnetic (b) 2, paramagnetic
- (c) 3, diamagnetic (d) 3, paramagnetic
91. How many unpaired electrons are there in Ni^{2+} ? (Atomic no. of Ni is 28)
- (a) 0 (b) 2
- (c) 4 (d) 8
92. Which of the following species is paramagnetic?
- (a) N_2 (b) NO
- (c) O_3 (d) Co
93. Which of the following species is paramagnetic?
- (a) O_2^- (b) CN^-
- (c) CO (d) NO
94. Among the following divalent ions which one will show strongest paramagnetism?
- (a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$ (b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$
- (c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$ (d) All equal
95. Amongst $\text{Ni}(\text{CO})_4$, $[\text{Ni}(\text{CN})_4]^{-2}$ and NiCl_4^{-2}
- (a) $\text{Ni}(\text{CO})_4$ and NiCl_4^{-2} are diamagnetic and $[\text{Ni}(\text{CN})_4]^{-2}$ is paramagnetic
- (b) NiCl_4^{-2} and $[\text{Ni}(\text{CN})_4]^{-2}$ are diamagnetic and $\text{Ni}(\text{CO})_4$ is paramagnetic
- (c) $\text{Ni}(\text{CO})_4$ and $[\text{Ni}(\text{CN})_4]^{-2}$ are diamagnetic and NiCl_4^{-2} is paramagnetic
- (d) $\text{Ni}(\text{CO})_4$ is diamagnetic and NiCl_4^{-2} and $[\text{Ni}(\text{CN})_4]^{-2}$ are paramagnetic
96. Who gave the law of octaves?
- (a) Dobereiner (b) Duma
- (c) Lothar Meyer (d) Newlands
97. Mendeleef's periodic table was based on
- (a) atomic number (b) atomic size
- (c) atomic volume (d) atomic weight
98. The modern periodic table was based on



CHEMISTRY



- (a) atomic number (b) atomic size
(c) atomic volume (d) atomic weight
99. Which one of the following is the strongest oxidising agent?
(a) ozone (b) oxygen
(c) fluorine (d) chlorine
100. If element has the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^7 5s^2 5p^6 5d^1 6s^2$ it belong to
(a) s-block (b) p-block
(c) d-block (d) f-block
101. If the atomic number of an element is 33, name the group to which it belongs to
(a) 1st group (b) 34 group
(c) 15th group (d) 17th group
102. Which electronic configuration represents the atom of the element having the highest second ionization energy?
(a) $1s^2 2s^2 2p^5$ (b) $1s^2 2s^2 2p^6$
(c) $1s^2 2s^2 2p^6 3s^1$ (d) $1s^2 2s^2 2p^6 3s^2$
103. Which of the following has highest electron affinity?
(a) F (b) Cl
(c) Br (d) I
104. Which of the element will have smallest size?
(a) Be (b) Li
(c) Mg (d) Na
105. Which of the following has lowest ionisation energy?
(a) $1s^2$ (b) $1s^2 2s^2 2p^2$
(c) $1s^2 2s^2 2p^5$ (d) $1s^2 2s^2 2p^6 3s^1$
106. In a periodic table with increase in atomic number, the metallic character
(a) increases both in a group and period
(b) decreases both in a group and a period
(c) decreases in a period and increases in a group
(d) increases in a period and decreases in a group
107. The electron affinity of B, C, N and O are in the order
(a) $B < C < N < O$ (b) $B > C > N > O$
(c) $O > C > B > N$ (d) $O < C < B < N$



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108. The first ionization potential of Na, Mg, Al and Si are in order of
- (a) $\text{Na} < \text{Mg} > \text{Al} < \text{Si}$ (b) $\text{Na} < \text{Mg} < \text{Al} > \text{Si}$
(c) $\text{Na} > \text{Mg} > \text{Al} > \text{Si}$ (d) $\text{Na} > \text{Mg} > \text{Al} < \text{Si}$
109. The first ionization energy of B, C, N and O can be written as
- (a) $\text{O} > \text{N} > \text{C} > \text{B}$ (b) $\text{O} > \text{N} > \text{B} > \text{C}$
(c) $\text{N} > \text{O} > \text{C} > \text{B}$ (d) $\text{B} > \text{C} > \text{N} > \text{O}$
110. Which of the elements is most electropositive?
- (a) H (b) F
(c) Cs (d) Li
111. An element has 3 electrons in 4th shell, the atomic number of the element is
- (a) 13 (b) 21
(c) 31 (d) 27
112. The correct order of electron affinity is
- (a) $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}$ (b) $\text{I}_2 > \text{Br}_2 > \text{Cl}_2 > \text{F}_2$
(c) $\text{Cl}_2 > \text{Br}_2 > \text{I}_2 > \text{F}_2$ (d) $\text{Cl}_2 > \text{Br}_2 > \text{F}_2 > \text{I}_2$
113. The correct order of second ionization energy is
- (a) $\text{C} > \text{N} > \text{O} > \text{F}$ (b) $\text{O} > \text{N} > \text{F} > \text{C}$
(c) $\text{O} > \text{F} > \text{N} > \text{C}$ (d) $\text{F} > \text{O} > \text{N} > \text{C}$
114. The first ionization energy of Mg is lower than the first ionization energy of
- (a) Li (b) Ca
(c) Na (d) Be
115. The atomic radii of Fluorine and Neon in Å units are respectively given by
- (a) 0.72, 1.60 (b) 1.60, 1.60
(c) 0.72, 0.72 (d) none of these
116. The outermost electronic configuration of the most electronegative element is
- (a) $ns^2 np^3$ (b) $ns^2 np^4$
(c) $ns^2 np^5$ (d) $ns^2 np^6$
117. An element with atomic number 38 will be placed in which period of periodic table?
- (a) 4th (b) 3rd
(c) 5th (d) 2nd



CHEMISTRY



118. In which of the following compounds does the ratio of an ion size to the cation size has the lowest ratio?
- (a) Cs I (b) Li I
(c) Li F (d) Cs F
119. Rare earth metals are known as
- (a) s-block elements (b) p-block elements
(c) d-block elements (d) f-block elements
120. Which of the following group of elements have nearly same size?
- (a) Na, Li, K (b) F, Cl, Br
(c) Fe, Co, Ni (d) N, O, F
121. The density of sodium is
- (a) Less than K (b) Equal to that of K
(c) More than K (d) More than Rb
122. Diagonal relationship is shown by
- (a) Mg and Na (b) Be and Al
(c) Mg and Al (d) Al and Si
123. Acidity of pentoxide of group 15 elements
- (a) Decreases (b) Increases
(c) Remains the same (d) None of these
124. The first transition elements is
- (a) Sc (b) La
(c) Fe (d) Ac
125. The chemistry of Be is very similar to that of Al, because
- (a) they belong to same group
(b) they belong to same period
(c) both have nearly the same ionic size
(d) the ratio of their charge to size is nearly the same
126. Which one of the following is not isoelectronic with O^{2-} ?
- (a) N^{3-} (b) F^-
(c) Tl^+ (d) Na^+



CHEMISTRY



127. Which one of the following is strongest acid?
- (a) HI (b) HBr
(c) HCl (d) HF
128. Which of the following has the largest size?
- (a) Rb^+ (b) Mg^{2+}
(c) Li^+ (d) Na^+
129. Which of the following is endothermic process?
- (a) $\text{O}(\text{g}) + \text{e}^- \rightarrow \text{O}^-(\text{g})$ (b) $\text{Na}^+(\text{g}) + \text{e}^- \rightarrow \text{Na}(\text{g})$
(c) $\text{O}^- + \text{e}^- \rightarrow \text{O}^{2-}(\text{g})$ (d) $\text{O}^{2-} \rightarrow \text{O}^-(\text{g}) + \text{e}^-$
130. Element having atomic number 108 belongs to group
- (a) 7 (b) 8
(c) 9 (d) 6
131. Which of the lanthanides is radioactive?
- (a) Lanthanum (b) Europium
(c) Promethium (d) Erbium
132. Which of the following is not radio active?
- (a) Ra (b) Fe
(c) Po (d) Bi
133. The ions which are arranged in correct increasing order of increasing radii
- (a) K^+ , Ca^{2+} , S^{2-} (b) Be^{2+} , Mg^{2+} , Na^+
(c) O^{2-} , P^- , N^{3-} (d) S^{2-} , O^{2-} , As^{3-}
134. Which of the following elements does not belong to the family indicated?
- (a) ${}_{29}\text{Cu}$ – Coinage metal (b) ${}_{56}\text{Ba}$ – Alkaline earth metals
(c) ${}_{30}\text{Zn}$ – Alkaline earth metals (d) ${}_{54}\text{Xe}$ – Noble gases
135. Diagonal relationship is shown by
- (a) Elements of 1st period (b) Elements of 2nd period
(c) Elements of 3rd period (d) Elements of 4th period



Stoichiometry

EXERCISE

- Oxidation involves
 - gain of electrons
 - Loss of electrons
 - increase in the valency of negative part
 - decrease in the valency
- Reduction involves
 - gain of electrons
 - Loss of electrons
 - decrease in the valency of negative part
 - increase in the valency of positive part
- The oxidation number of Cr in K_2Cr_2O is
 - + 2
 - 2
 - + 6
 - 6
- When $K_2Cr_2O_7$ is converted into K_2CrO_4 , the change in oxidation number of Cr is
 - 0
 - 6
 - 4
 - 3
- White P reacts with caustic soda. The products are PH_3 and NaH_2PO_2 . This reaction is an example of
 - Oxidation
 - Reduction
 - Oxidation and Reduction
 - Neutrilization
- One mole of N_2H_4 loses ten moles of electrons to form a new compound Y. Assuming that all the nitrogen appears in the new compound. What is the oxidation state of nitrogen in Y? (There is no change in oxidation state of H)
 - 1
 - 3
 - + 3
 - + 5
- HBr and HI reduce sulphuric acid, HCl can reduce $KMnO_4$ and HF can reduce
 - H_2SO_4
 - $KMnO_4$
 - $K_2Cr_2O_7$
 - none of these
- A solution of sodium metal in liquid ammonia is a strong reducing agent due to the presence of
 - Sodium atoms
 - Sodium hydride
 - Sodium amide
 - Solvated electrons
- The oxidation number of carbon in CH_2O is
 - 2
 - +2



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- (c) 0 (d) +4
10. The oxidation numbers of C in CH₄, CH₃Cl, CH₂Cl₂, CHCl₃ and CCl₄ are respectively,
(a) 0, 2, -2, 4, -4 (b) -4, -2, 0, +2, +4
(c) 2, 4, 0, -2, -4 (d) 4, 2, 0, -2, -4
11. Which is the best reducing agent?
(a) F⁻ (b) Cl⁻
(c) Br⁻ (d) I⁻
12. Which of the following reactions is not redox type?
(a) $2\text{BaO} + \text{O}_2 \longrightarrow 2\text{BaO}_2$
(b) $4\text{KClO}_3 \longrightarrow 2\text{KClO}_4 + \text{KCl}$
(c) $\text{BaO}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{BaSO}_4 + \text{H}_2\text{O}_2$
(d) $\text{SO}_2 + 2\text{H}_2\text{S} \longrightarrow 2\text{H}_2\text{O} + 3\text{S}$
13. In the aluminothermite process, aluminium acts AS
(a) an oxidizing agent (b) a flux
(c) a reducing agent (d) a solder
14. Zinc-copper couple that can be used as a reducing agent is obtained by
(a) Mixing zinc dust and copper gas (b) Zinc coated with copper
(c) Copper coated with zinc (d) Zinc and copper wires welded together
15. In the following equation value of X is
$$\text{ClO}_3^- + 6\text{H}^+ + \text{X} \longrightarrow \text{Cl}^- + 3\text{H}_2\text{O}$$

(a) 4e^- (b) 5e^-
(c) 6e^- (d) 7e^-
16. The brown ring complex compound is formulated as $[\text{Fe}(\text{H}_2\text{O}_5)(\text{NO}^+)]\text{SO}_4$. The oxidation state of iron is
(a) +1 (b) +2
(c) +3 (d) 0
17. Oxidation state of oxygen atom in potassium superoxide is
(a) -1/2 (b) -1
(c) -2 (d) 0
18. In which of the following compounds iron has lowest oxidation state?
(a) $\text{K}_4\text{Fe}(\text{CN})_6$ (b) K_2FeO_4



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- (c) Fe_2O (d) $\text{Fe}(\text{CO})_5$
19. Select the compound in which chlorine is assigned the oxidation number + 5
- (a) HCl (b) HClO_2
(c) HClO_3 (d) HClO_4
20. If three electrons are lost by a metal ion M^{+3} , its final oxidation number would be
- (a) 0 (b) + 2
(c) + 5 (d) + 6
21. A reducing agent is a substance which can
- (a) accept electrons (b) donate electrons
(c) accept protons (d) donate protons
22. Oxidation number of nickel in $\text{Ni}(\text{CO})_4$?
- (a) 0 (b) + 4
(c) - 4 (d) + 2
23. Which statement is wrong?
- (a) Oxidation number of oxygen is + 1 in peroxides
(b) Oxidation number of oxygen is + 2 in oxygen difluoride
(c) Oxidation number of oxygen is $1/2$ in superoxides
(d) Oxidation number of oxygen is - 2 in most of its compounds
24. The reaction $2\text{K}_2\text{MnO}_4 + \text{Cl}_2 \longrightarrow 2\text{KMnO}_4 + 2\text{KCl}$ is an example of
- (a) Oxidation (b) Reduction
(c) Neutralization (d) Chlorination
25. The oxidation state of nitrogen in NH_3 is
- (a) + $1/2$ (b) + 3
(c) - 1 (d) - $1/3$
26. In which of the following ions, the metal is in zero oxidation state
- (a) $[\text{Cr}(\text{H}_2\text{O})_6]^{+3}$ (b) $[\text{Al}(\text{H}_2\text{O})_6]^{+3}$
(c) $[\text{Pt}(\text{CN})_6]^{-4}$ (d) $[\text{Ni}(\text{CN})_4]^{-4}$
27. Oxidation number of Cl is + 1 in
- (a) HCl (b) ICl
(c) Cl_2O (d) HClO_3
28. The Oxidation number of nitrogen in NH_2OH is
- (a) - 3 (b) - 2



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- (c) - 1 (d) + 1
29. In which of the following compounds iron has lowest oxidation state
(a) $K_4[Fe(CN)_6]$ (b) $Fe(CO)_5$
(c) FeO (d) K_2FeO_4
30. The oxidation number of iron in $K_4[Fe(CN)_6]$ is
(a) + 6 (b) + 4
(c) + 3 (d) + 2
31. The reaction $H_2S + H_2O_2 \rightarrow S + 2H_2O$ manifests
(a) acidic nature of H_2O_2 (b) alkaline nature of H_2O_2
(c) oxidising action of H_2O_2 (d) reducing action of H_2O_2
32. When $KMnO_4$ is reduced with oxalic acid in acidic medium, the oxidation number of Mn changes from
(a) 7 to 4 (b) 6 to 4
(c) 7 to 2 (d) 4 to 2
33. The oxidation number of phosphorous in $Ba(H_2PO_2)_2$ is
(a) + 3 (b) + 2
(c) + 1 (d) -1
34. Which of the following is the most powerful oxidising agent
(a) F_2 (b) Cl_2
(c) Br_2 (d) I_2
35. Amongst the compounds Mg_3N_2 , NH_3 and N_2O_3 , nitrogen shows an oxidation number of + 3 in
(a) NH_3 only (b) N_2O_3 only
(c) NH_3 and N_2O_3 only (d) All the three compounds
36. When 100 ml M - H_2SO_4 solution is mixed with 100 ml of M- NaOH solution, the resulting solution will be
(a) acidic (b) alkaline
(c) neutral (d) strongly alkaline
37. 12 g of sulphuric acid is dissolved in water to make 1200 ml of solution. The normality of the solution is
(a) 0.204 N (b) 0.102 N
(c) 0.122 N (d) 0.051 N
38. How many ml of 1M H_2SO_4 solution is required to neutralise 15 ml of 1M NaOH solution?
(a) 30 ml (b) 15 ml
(c) 7.5 ml (d) 3.75 ml



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39. The equivalent mass of iodine in the following reaction is
- $$\text{I}_2 + 2\text{S}_2\text{O}_3^{2-} \longrightarrow 2\text{I}^- + \text{S}_4\text{O}_6^{2-}$$
- (a) Its molecular mass
(b) 1/2 the molecular mass
(c) 1/4 the molecular mass
(d) none of these
40. M is the molecular mass of KMnO_4 . The equivalent mass of KMnO_4 when it is converted into K_2MnO_4 is
- (a) M
(b) M/3
(c) M/5
(d) M/7
41. If 0.50 mole of BaCl_2 is mixed with 0.20 moles of Na_3PO_4 . The maximum number of moles of $\text{Ba}_3(\text{PO}_4)_2$ that can be formed is
- (a) 0.70
(b) 0.50
(c) 0.20
(d) 0.10
42. The best indicator for detection of end point in titration of a weak acid and strong base is
- (a) methyl orange (3 to 4)
(b) methyl red (4 to 6)
(c) bromo thymol blue (6 to 7.5)
(d) phenolphthalein (8 to 9.6)
43. 500 ml. of 0.1 N solution of AgNO_3 are added to 500 ml of 0.1 N solution of KCl . The concentration of nitrate ion in the resulting mixture is
- (a) 0.2 N
(b) 0.1 N
(c) 0.05 N
(d) 0.025 N
44. Phosphoric acid ionises to give three hydrogen ions, its basicity is
- (a) 2
(b) 3
(c) 4
(d) 6
45. 10 ml of 0.1 N HCl solution is mixed with 10 ml of 0.1 N NaOH solution. The pH value of the resulting is
- (a) 0
(b) 3.5
(c) 7
(d) 10.5
46. If one mole of H_2SO_4 reacts with an excess of NaOH solution, how many moles of water are produced?
- (a) 1
(b) 2
(c) 3
(d) 4
47. 2.76 g of Ag_2CO_3 after being heated yields a residue weighing
- (a) 2.16 g
(b) 2.32 g
(c) 2.48 g
(d) 2.64 g
48. The ratio of the amount of H_2S needed to precipitate all the metal ions from 100 ml of 1 M AgNO_3 and 100 ml of 1 M CuSO_4 will be
- (a) 1 : 1
(b) 1 : 2



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- (c) 2 : 1 (d) none of these
49. 12 g of Mg (at mass = 24) on reacting completely with acid would give H_2 , the volume of which at N.T.P. would be
- (a) 6.11 (b) 22.41
(c) 44.81 (d) 11.21
50. How much ammonium chloride is present in 300 ml. of 0.4 M NH_4Cl solution?
- (a) 6.42 g (b) 12.8 g
(c) 3.48 g (d) 1.74 g
51. How many cm^3 of 0.1 M NaOH are equivalent of $10\ cm^3$ 0.1 M H_2SO_4
- (a) $10\ cm^3$ (b) $20\ cm^3$
(c) $50\ cm^3$ (d) $40\ cm^3$
52. What is the concentration of NO_3^- ions if equal volumes of 0.1 M $AgNO_3$ and 0.1 M NaCl are mixed together?
- (a) 0.1 M (b) 0.2 M
(c) 0.05 M (d) 0.25 M
53. The solution 10 ml M/10 $FeSO_4$ was titrated with $KMnO_4$ solution in acidic medium. The amount of $KMnO_4$ used will be
- (a) 5 ml of 0.1 M (b) 10 ml of 0.1 M
(c) 10 ml of 0.5 M (d) 10 ml of 0.02 M
54. The equivalent mass of $MnSO_4$ is half its molecular mass when it is converted to
- (a) Mn_2O_3 (b) MnO_2
(c) MnO_4^- (d) MnO_4^{2-}
55. 75 ml of N/5 H_2SO_4 , 10 ml of N/2 HCl and 30 ml of N/10 HNO_3 are mixed together. The strength of the resulting acid mixture is
- (a) 0.2 N (b) 0.3 N
(c) 0.4 N (d) 0.1 N
56. If 250 ml of 0.25 M NaCl solution is diluted with water to a volume of 500 ml the new concentration of the solution is
- (a) 0.167 M (b) 0.125 M
(c) 0.08333 M (d) 0.0167 M
57. A solution containing 15 gms urea per litre is found isotonic with 4.5 % solution of a non-volatile and nonelectrolyte solute, the molecular weight of solute is
- (a) 60 (b) 342
(c) 180 (d) 45
58. 74.5 gms KCl and 342 gms cane sugar is dissolved separately in equal volumes of water. The osmotic pressure of



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- (a) Sugar solution is higher than KCl solution
(b) KCl solution is higher than sugar solution
(c) KCl and sugar solutions are same
(d) none of these
59. The molality of ethyl alcohol (mol. wt. = 46) in water solution which freezes at -9.3°C is
(a) 1.86 (b) 4.6
(c) 5 (d) 2
60. The molality of 2% NaOH solution is
(a) 2 (b) 0.05
(c) 0.25 (d) 0.5
61. 5.85 gms. NaCl is dissolved in 200 ml water, the molarity of solution is
(a) 1 (b) 0.5
(c) 0.1 (d) 0.25
62. The number of moles in 1000 ml 3 M solution is
(a) 1 (b) 2
(c) 3 (d) 1.5
63. 1.8 % glucose solution is isotonic with
(a) 0.1 M urea solution (b) 0.1 M NaCl solution
(c) 1.0 % urea solution (d) 1.8 % NaCl solution
64. The density of 2.0 M solution of acetic acid (mol. wt. = 60) is 1.02 gm/ml
(a) 2 (b) 2.22
(c) 1 (d) none
65. 100 gms solution contains $1/10$ gm moles of urea, the molality of solution is
(a) 0.1 (b) 0.05
(c) 0.01 (d) 1



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Answer

Stoichiometry

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (b) | 14. (d) | 27. (c) | 40. (a) | 53. (d) |
| 2. (a) | 15. (c) | 28. (c) | 41. (d) | 54. (b) |
| 3. (c) | 16. (a) | 29. (b) | 42. (d) | 55. (a) |
| 4. (a) | 17. (a) | 30. (d) | 43. (c) | 56. (b) |
| 5. (c) | 18. (d) | 31. (c) | 44. (b) | 57. (c) |
| 6. (c) | 19. (c) | 32. (c) | 45. (c) | 58. (b) |
| 7. (d) | 20. (d) | 33. (c) | 46. (b) | 59. (c) |
| 8. (d) | 21. (b) | 34. (a) | 47. (a) | 60. (d) |
| 9. (c) | 22. (a) | 35. (b) | 48. (b) | 61. (b) |
| 10. (b) | 23. (a) | 36. (a) | 49. (d) | 62. (c) |
| 11. (d) | 24. (d) | 37. (a) | 50. (a) | 63. (a) |
| 12. (c) | 25. (d) | 38. (c) | 51. (b) | 64. (b) |
| 13. (c) | 26. (d) | 39. (b) | 52. (c) | 65. (d) |



HYBRIDISATION AND NOMENCLATURE

- Maximum number of isomers for an alkene with molecular formula C_4H_8 is
 - 2
 - 3
 - 4
 - 5
- Which of the following would be optically active?
 - Tertiary-Butyl alcohol
 - Sec-Butyl alcohol
 - n-Butyl alcohol
 - 1-Chloro-4-hydroxy butane
- The number of possible alcohol isomers for $C_4H_{12}O$ is
 - 4
 - 3
 - 2
 - 5
- In which of the following species, the central carbon atom is negatively charged?
 - Carbenes ion
 - Carbanion
 - Carbocation
 - Free radicals
- Which of the following carbocation is least stable?
 - Tertiary alkyl
 - Secondary alkyl
 - Ethyl
 - Methyl
- Which of the following can exhibit cis-trans isomerism?
 - $H - C \equiv C - Cl$
 - $ClCH = CHCl$
 - $CH_3 - \underset{\substack{| \\ Cl}}{CH} - COOH$
 - $Cl - CH_2 - CH_2 - Cl$
- In a benzene molecule, there are 3π bonds and
- Bond angle in sp^2 hybrid orbitals is
 - $109^\circ 28'$
 - 120°
 - 180°
 - 105°
- How many isomers are possible for the molecular formula C_6H_{14} ?
 - 5
 - 4
 - 6
 - 8



CHEMISTRY



10. Bond angle in sp hybrid orbitals is
- (a) $109^\circ 28'$ (b) 120°
(c) 180° (d) 105°
11. Number of isomers of aromatic compounds for C_7H_8O is
- (a) 2 (b) 3
(c) 4 (d) 5
12. Vapour density of CH_3CH_2OH is
- (a) 23 (b) 46
(c) 32 (d) 64
13. General formula for cyclo-alkanes is
- (a) C_nH_{2n+2} (b) C_nH_{2n}
(c) C_nH_{2n-2} (d) C_nH_n
14. The progressive increase in the boiling points from $CH_3Cl(249\text{ K})$, $CH_3Br(278\text{ K})$ and $CH_3I(316\text{ K})$ is due to
- (a) Higher polarity of C-I bond and higher molar mass
(b) Higher polarity of C-I bond and lower molar mass
(c) Lower polarity but higher molar mass in CH_3I
(d) Lower polarity and lower molar mass in CH_3I
15. The compound which is not isomeric with diethyl ether is
- (a) Butanol (b) Butanone
(c) 2-methyl-2-propanol (d) n-propyl methyl ether
16. What hybrid orbitals are in the compound, $CH_3 - CH = CH - CH_2 - CH_3$?
- (a) sp^2 and sp^3 (b) only sp^3
(c) sp and sp^3 (d) sp and sp^2
17. A carbocation and free radical are formed by
- (a) heterolytic and homolytic fission of a covalent bond respectively
(b) heterolytic fission of two covalent bonds
(c) homolytic fission of two covalent bonds
(d) covalent bond being a strong bond does not show homo or heterolytic fission
18. Hybrid orbitals of carbon 2 and carbon 3 in the compound $CH_3-CH=CH-CH_3$ are
- (a) sp^3 , sp (b) sp^2 , sp^2
(c) sp , sp (d) sp^2 , sp



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19. Bond energy of N-N bond is than O-O bond
- (a) greater (b) smaller
(c) equal (d) cannot be predicted
20. s-Character of sp , sp^2 and sp^3 hybrid orbitals follows the order
- (a) $sp > sp^2 > sp^3$ (b) $sp^3 > sp^2 > sp$
(c) $sp^3 > sp > sp^2$ (d) $sp < sp^3 < sp^2$
21. Number of geometrical isomers of the compound C_5H_{10} is
- (a) 4 (b) 3
(c) 2 (d) 5
22. How many isomers are possible for C_6H_{14} ?
- (a) 7 (b) 6
(c) 5 (d) 4
23. Which of the following molecule has an asymmetric carbon atom ?
- (a) $CH_3-\underset{\substack{| \\ Cl}}{CH}-COOH$ (b) CH_3CH_2-COOH
(c) $ClCH_2-CH_2-COOH$ (d) $Cl_2CH-COOH$
24. Number of isomers obtained on monochlorination of n-pentane is
- (a) 4 (b) 3
(c) 2 (d) 1
25. The π bond energy (in kcal) in $C = C$ bond is
- (a) 30 (b) 60
(c) 100 (d) 40
26. Shortest C-C bond distance is in
- (a) C_2H_4 (b) C_2H_6
(c) C_2H_2 (d) C_6H_6
27. A molecule is said to be chiral if it
- (a) contains a centre of symmetry
(b) contains a plane of symmetry
(c) exists as a cis-trans isomer
(d) cannot be super-imposed on its mirror image



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28. Which of the following is non-polar?
- (a) CH_3Cl (b) CH_2Cl_2
(c) CHCl_3 (d) CCl_4
29. Which of the following is the most stable ion?
- (a) $\text{CH}_3 - \text{CH}_2 - \overset{+}{\text{C}}\text{H} - \text{CH}_3$ (b) $\text{CH}_3 - \overset{+}{\text{C}}(\text{CH}_3)_2$
(c) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \overset{+}{\text{C}}\text{H}_2$ (d) $\overset{+}{\text{C}}\text{H}_3$
30. How many primary carbon atoms are there in the compound
- $$\begin{array}{c} \text{CH}_3 \quad \quad \text{CH}_3 \\ | \quad \quad | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \quad \quad | \\ \text{CH}_3 \quad \quad \text{CH}_3 \end{array}$$
- (a) 6 (b) 2
(c) 4 (d) 3
31. The eclipse and staggered conformation of ethane is due to
- (a) Free rotation about C-C single bond
(b) Restricted rotation about C-C single bond
(c) Absence of rotation about C-C bond
(d) None of the above
32. Which of the following is the strongest base?
- (a) NH_2^- (b) OH^-
(c) CH_3^- (d) $\text{CH}_3\text{CH}_2\text{O}^-$
33. A compound with empirical formula CH_2O has vapour density 45. Its molecular formula is
- (a) $\text{C}_2\text{H}_5\text{O}$ (b) $\text{C}_3\text{H}_6\text{O}_3$
(c) $\text{C}_2\text{H}_4\text{O}_2$ (d) $\text{C}_4\text{H}_3\text{O}_4$
34. In $\text{CH}_3\text{CH}_2\text{OH}$, the bond that undergoes heterolytic cleavage readily is
- (a) C-C (b) C-O
(c) C-H (d) O-H
35. Which of the following is an electrophile?
- (a) BCl_3 (b) CH_3OH
(c) NH_3 (d) AlCl_4^-



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36. Most stable carbonium ion is
- (a) n-butyl (b) tertiary-butyl
(c) sec-butyl (d) n-propyl
37. Electrophiles are
- (a) Lewis bases (b) Lewis acids
(c) Amphoteric (d) None of these
38. Number of isomeric xylene is
- (a) 3 (b) 2
(c) 4 (d) 5
39. Aromaticity in benzene is due to
- (a) three double bonds (b) a ring
(c) delocalization of π electrons (d) none of these
40. An optically active compound has 3 different asymmetric carbon atoms. Number of possible isomers are
- (a) 2 (b) 4
(c) 6 (d) 8
41. When a mixture of 1 mole each of 1 bromopropane and 2-bromopropane reacted with 2 moles of sodium the product(s) formed were
- (a) 2-Methyl pentane (b) 2, 3-Dimethyl pentane
(c) n-Hexane (d) All the three
42. Lactic acid is
- (a) Propionic acid (b) Hydroxypropionic acid
(c) Hydropropionic acid (d) None of these
43. The test which distinguishes = bond of ethene and \equiv bond of ethyne is
- (a) decolourisation of bromine water
(b) reaction with chlorine
(c) white precipitate with ammonical silver nitrate
(d) both being unsaturated cannot be distinguished
44. The geometrical isomerism is exhibited by :
- (a) $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2$ (b) $\text{CH}_3\text{CH} = \text{CH}-\text{CH}_3$
(c) $\text{CH}_2 = \text{CH}-\text{CH}_2\text{CH}_3$ (d) $\text{CH}_3-\text{C} \equiv \text{C}-\text{CH}_3$



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45. The chlorine attached to allyl group ($\text{CH}_2 = \text{CHCH}_2\text{Cl}$) is easily replaced (same as in alkyl halide) whereas chlorine in vinyl group ($\text{CH}_2 = \text{CHCl}$) is inert like that in chlorobenzene; the reason for this is
- sp^3 – C holding – Cl in allyl
 - sp^2 – C holding Cl in allyl group
 - sp^2 – C holding Cl in vinyl which can give delocalisation
 - Vinyl group being smaller is inert
46. Which one of the following is the weakest base?
- Ethyl amine
 - Diethyl amine
 - Triethyl amine
 - Ammonia
47. The order of increasing acid ionization constants for (i) Propanoic acid, (ii) Chloroethanoic acid, (iii) 3-Bromopropanoic acid and (iv) Trichloroacetic acid is
- (iv) > (ii) > (iii) > (i)
 - (ii) > (iii) > (iv) > (i)
 - (iii) > (iv) > (ii) > (i)
 - (i) > (iv) > (iii) > (ii)
48. Which one of the following is a carbene?
- CH_3^+
 - $\text{C}^-\text{H}_3\text{Cl}$
 - $\text{C}^\square\text{H}_3$
 - $:\text{CCl}_2$
49. Which of the following is an electrophile?
- NH_3
 - SO_3
 - $:\text{CN}^-$
 - $\text{R}-\text{O}-\text{H}$
50. The decreasing order of the basic strengths of $\text{CH}_3\text{C}^-\text{H}_2$, $\text{CH}_2 = \text{C}^-\text{H}$, $\text{CH} \equiv \text{C}^-$ is
- $\text{CH}_3\text{C}^-\text{H}_2 > \text{CH}_2 = \text{C}^-\text{H} > \text{CH} \equiv \text{C}^-$
 - $\text{CH}_2 = \text{C}^-\text{H} > \text{CH} \equiv \text{C}^- > \text{CH}_3\text{C}^-\text{H}_2$
 - $\text{CH} \equiv \text{C}^- > \text{CH}_2 = \text{C}^-\text{H} > \text{CH}_3 - \text{C}^-\text{H}_2$
 - $\text{CH} \equiv \text{C}^- > \text{CH}_3 - \text{C}^-\text{H}_2 > \text{CH}_2 = \text{C}^-\text{H}$
51. Which one of the following are functional isomers?
- CH_3COOH and HCOOCH_3
 - $\text{CH}_3\text{CH}(\text{Cl})\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$



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- (c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_3$
- (d) $\text{CH}_3-\text{O}-\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3$
52. Out of various conformations of n-butane obtained by rotating C_2 or C_3 through 360° in six steps, the one which is the stable is
- (a) eclipsed form (b) completely staggered form
(c) skew form (d) fully eclipsed form
53. The order of decreasing stability of the carbanions,
- $(\text{CH}_3)_3\bar{\text{C}}$ (1), $(\text{CH}_3)_2\bar{\text{C}}\text{H}$ (2), $\bar{\text{C}}\text{H}_3$ (3) $\text{CH}_3\bar{\text{C}}\text{H}_2$ (4)
- (a) $3 > 4 > 2 > 1$ (b) $2 > 1 > 3 > 4$
(c) $1 > 2 > 3 > 4$ (d) $4 > 2 > 1 > 3$
54. The enolic form of acetone contains
- (a) 9 sigma bonds, 2 pi bonds and 2 lone pairs
(b) 8 sigma bonds, 2 pi bonds and 2 lone pairs
(c) 10 sigma bonds, 1 pi bond and 1 lone pair
(d) 9 sigma bonds, 1 pi bond and 2 lone pairs
55. p-Nitrophenol is a stronger acid than phenol because nitro group is
- (a) acidic (b) electron repelling
(c) electron attracting (d) basic
56. The reaction
- $$\text{CH}_3-\underset{\text{CH}_3}{\text{C}}-\text{C}=\text{O} + \text{H}_2\text{NOH} \longrightarrow \text{CH}_3-\underset{\text{CH}_3}{\text{C}}=\text{NOH}$$
- is best described as
- (a) addition (b) elimination
(c) substitution (d) addition-elimination
57. Which one of the following is an inaccurate description of an electrophile?
- (a) electron-deficient species
(b) an acidic reagent
(c) a species which seeks a pair of electrons
(d) a reagent which attacks electron-rich sites in molecule



CHEMISTRY



58. Alkyl groups are ortho and para directing because of
- (a) + Inductive effect (b) resonance effect
(c) hyper conjugation (d) all of the above
59. The IUPAC name of $\text{CH}_3-\underset{\text{Cl}}{\text{CH}}-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2\text{CH}_3$ is
- (a) 2-Chloro-3-methylbutane (b) 3-Methyl-2-chloropentane
(c) 2-Choloro-3-methylpentane (d) 2-Chloro-3-ethylbutane
60. IPUAC name of $\text{CH}_2 = \text{CHCH}_2\text{Cl}$ is
- (a) allyl chloride (b) 1-Chloro-2-propene
(c) propenyl chloride (d) 3-Chloropropene
61. IPUAC name of the $\text{CH}_3-\overset{\text{CH}_3}{\underset{|}{\text{CH}}}\text{CH}_2\text{COOH}$ is
- (a) Pentanoic acid (b) 2-Methylbutanoic acid
(c) 3-Methylbutenoic acid (d) 3-Methylbutanoic acid
62. The structure of 3-methyl-2-pentenoic acid is
- (a) $\text{CH}_3\text{CH} = \underset{\text{CH}_3}{\underset{|}{\text{C}}} - \text{CH}_2\text{COOH}$ (b) $\text{CH}_3\text{CH}_2\underset{\text{CH}_3}{\underset{|}{\text{C}}} = \text{CHCOOH}$
(c) $\text{CH}_3 - \underset{\text{CH}_3}{\underset{|}{\text{C}}} = \text{CHCH}_2\text{COOH}$ (d) $\text{CH}_3\text{CH} = \underset{\text{CH}_3}{\underset{|}{\text{C}}} - \text{CH}_2\text{COOH}$
63. IPUAC name of CCl_3CHO is
- (a) Chloral (b) 1, 1, 1-Trichloroethanal
(c) Trichloromethanal (d) 2, 2, 2-Trichloroethanal
64. The IUPAC name of $\text{CH}_3\text{OCH}_2\text{CH} = \text{CHCOCl}$ is
- (a) 4-Methoxy-2-butenoyl chloride (b) 1-Chloro-4-methoxy-2-butenol
(c) 4-Oxo-2-pentenoyl chloride (d) 1-Chloro-4-oxopentanone
65. The correct name for the compound $\text{CH}_3-\overset{\text{OH}}{\underset{|}{\text{CH}}}-\text{CH}_2-\overset{\text{Br}}{\underset{|}{\text{CH}_2}}-\text{CH}-\text{CHO}$ is
- (a) 1-Bromo-4-hydroxypentanal (b) 2-Bromo-5-hydroxy-1-hexanal
(c) 2-Hydroxy-5-bromo-6-hexanal (d) None of the above
66. IUPAC name of the compound having the structure $\text{CH}_3\text{CHOHCOOH}$ is
- (a) Lactic acid (b) Propan-2-al-1-oic acid
(c) 2-Hydroxypropanoic acid (d) Hydroxypropanoic acid



CHEMISTRY



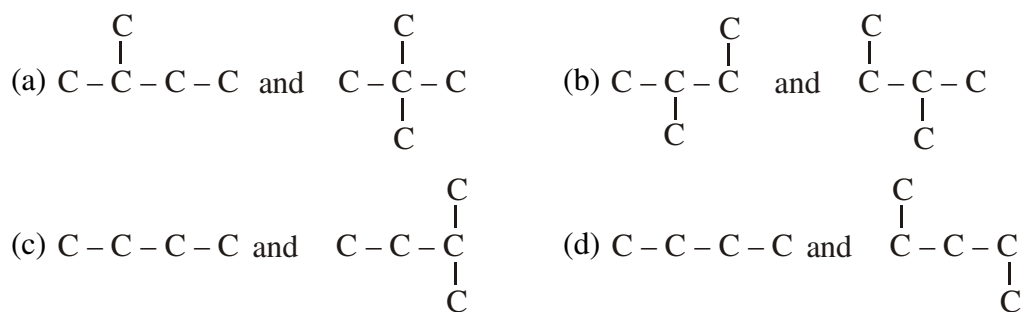
67. The reaction $\text{CH}_3\text{CH}_2\text{Cl} + \text{NaCN} \rightarrow \text{CH}_3\text{CH}_2\text{CN} + \text{NaCl}$ is
- (a) Nucleophilic substitution (b) Electrophilic substitution
(c) Rearrangement (d) Addition
68. The strongest of the four acids listed below is
- (a) HCOOH (b) CH_3COOH
(c) ClCH_2COOH (d) FCH_2COOH
69. Amongst the following, strongest acid is
- (a) CH_3COOH (b) ClCH_2COOH
(c) $\text{CH}_3\text{CH}_2\text{COOH}$ (d) Cl_3CCOOH
70. Resonance is due to
- (a) Delocalisation of sigma electrons (b) Delocalisation of pi-electrons
(c) Migration of H-atoms (d) Migration of protons
71. Which of the following species is paramagnetic in nature?
- (a) Freeradical (b) Carbocation
(c) Carbanion (d) All of the above
72. Which of the following free radicals is most stable?
- (a) Primary (b) Secondary
(c) Tertiary (d) Methyl
73. Which of the following species has a trigonal planar shape?
- (a) CH_3^- (b) CH_3^+
(c) BF_4^+ (d) SiH_4
74. Which of the following is a nucleophilic addition reaction?
- (a) $\text{CH}_3\text{-COCH}_3 + \text{HCN}$ (b) $\text{CH}_2 = \text{CH}_2 + \text{HBr}$
(c) $\text{CH}_2 = \text{CH}_2 + \text{Br}_2$ (d) $\text{CH}_3\text{CH} = \text{CH}_2 + \text{Br}_2$
75. Which of the following has zero dipole moment?
- (a) C_6H_6 (b) trans-2-butene
(c) CH_2ClBr (d) CH_3F
76. Which of the following types of reaction occurs when a reactant has got a double bond?
- (a) Addition (b) Photolysis
(c) Substitution (d) None of these



CHEMISTRY



86. Which of the following pairs of the carbon skeletons is an example of isomerism?



87. Which one of the following is isomer of diethyl ether?



88. The compound $\text{C}_4\text{H}_{10}\text{O}$ can show



89. $\text{C}_3\text{H}_7\text{Cl}$ has isomers?



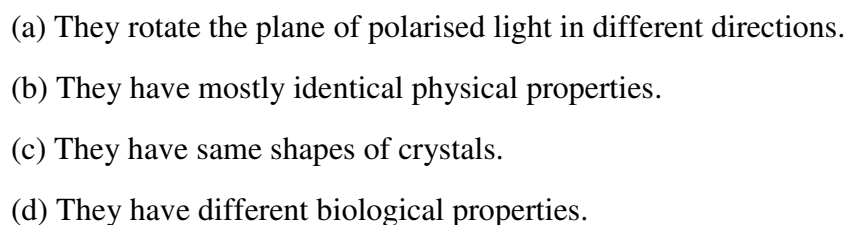
90. The number of geometrical isomers in case of a compound with the structure



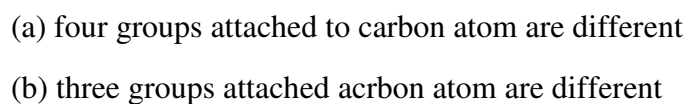
91. The property by virtue of which a compound can turn the plane of polarisation of light is known as



92. Which is incorrect about enantiomers?



93. An organic compound will show optical isomerism if





CHEMISTRY



- (c) two groups attached to carbon atom are different
(d) all
94. The process of separation of racemic modification into d-and l-enantiomers is called
(a) Resolution (b) Dehydration
(c) Revolution (d) Hydration
95. meso-Tartaric acid is optically inactive due to the presence of
(a) Molecular symmetry (b) Molecular asymmetry
(c) External compensation (d) Two asymmetric C-atoms
96. Which of the following compounds is optically active?
(a) $\text{CH}_3\text{CH}_2\text{COOH}$ (b) $\text{CH}_3\text{CHOHCOOH}$
(c) $\text{HOOCCH}_2\text{COOH}$ (d) $\text{CH}_3\text{COCOCH}_3$
97. Which of the following has asymmetric carbon atoms?
- (a)
$$\begin{array}{c} \text{Cl} \quad \text{Br} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
- (b)
$$\begin{array}{c} \text{H} \quad \text{Cl} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{Cl} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
- (c)
$$\begin{array}{c} \text{H} \quad \text{Cl} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
- (d)
$$\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{CH}_3 \\ | \quad | \\ \text{Br} \quad \text{OH} \end{array}$$
98. How many chain isomers can be obtained from the alkane C_6H_{14} ?
(a) 4 (b) 5
(c) 6 (d) 7
99. The compound which has one isopropyl group is
(a) 2, 2, 3, 3-Tetramethylpentane (b) 2, 2-dimethylpentane
(c) 2, 2, 3-trimethylpentane (d) 2-methylpentane
100. A nucleophile must necessarily have
(a) An overall positive (b) An overall negative charge
(c) An unpaired electron (d) A lone pair of electron



CHEMISTRY



Answer

- | | | | | |
|-------|-------|-------|-------|--------|
| 1. b | 21. c | 41. a | 61. b | 81. c |
| 2. b | 22. c | 42. b | 62. b | 82. b |
| 3. a | 23. a | 43. c | 63. d | 83. d |
| 4. b | 24. b | 44. b | 64. b | 84. c |
| 5. d | 25. b | 45. c | 65. b | 85. c |
| 6. b | 26. c | 46. b | 66. c | 86. a |
| 7. b | 27. d | 47. a | 67. a | 87. a |
| 8. b | 28. d | 48. d | 68. a | 88. d |
| 9. a | 29. b | 49. b | 69. d | 89. a |
| 10. c | 30. a | 50. a | 70. b | 90. a |
| 11. d | 31. a | 51. a | 71. a | 91. c |
| 12. a | 32. c | 52. b | 72. c | 92. c |
| 13. b | 33. b | 53. a | 73. b | 93. a |
| 14. c | 34. d | 54. d | 74. a | 94. a |
| 15. b | 35. a | 55. c | 75. b | 95. a |
| 16. a | 36. b | 56. d | 76. a | 96. b |
| 17. a | 37. b | 57. b | 77. c | 97. d |
| 18. b | 38. a | 58. a | 78. b | 98. b |
| 19. a | 39. c | 59. c | 79. c | 99. d |
| 20. a | 40. d | 60. d | 80. c | 100. d |

**FUNCTIONAL GROUP - I**

(Halides, Hydroxycompounds And Ethers)

- The S_N2 reactivity order for halides
 - $R - F > R - Cl > R - Br > R - I$
 - $R - I > R - Br > R - Cl > R - F$
 - $R - Br > R - I > R - Cl > R - F$
 - $R - Cl > R - Br > R - F > R - I$
- The order of polarity of CH_3I , CH_3Br and CH_3Cl molecules follows the order
 - $CH_3Br > CH_3Cl > CH_3I$
 - $CH_3I > CH_3Br > CH_3Cl$
 - $CH_3Cl > CH_3Br > CH_3I$
 - $CH_3Cl > CH_3I > CH_3Br$
- Which would be obtained by boiling $CHCl_3$ with caustic soda
 - CH_3COONa
 - $HCOONa$
 - $Na_2C_2O_4$
 - CH_3OH
- CCl_4 is insoluble in water because
 - Water is non-polar
 - CCl_4 is non-polar
 - Water and CCl_4 are polar
 - None of the above
- The reaction between ethyl bromide and sodium in dry ether to form butane is called
 - Friedel-Craft's reaction
 - Wurtz reaction
 - Cannizzaro's reaction
 - Williamson's reaction
- Ethyl bromide and isopropyl chloride can be distinguished by
 - Alcoholic $AgNO_3$
 - Comparing their colours
 - Burning the compound on spatula
 - Aqueous KOH solution
- In S_N1 reaction, the first step involves the formation of
 - Free radical
 - Carbanion
 - Carbocation
 - Final product
- Which alcohol is most acidic
 - Methanol
 - Ethanol
 - Isopropyl alcohol
 - t-butyl alcohol
- The number of isomeric alcohols of formula $C_4H_{10}O$ is
 - 2
 - 4



CHEMISTRY



- (c) 7 (d) 8
10. Vinyl carbinol is
- (a) $\text{HOH}_2\text{C}-\text{CH}=\text{CH}_2$ (b) $\text{CH}_3\text{C}(\text{OH})=\text{CH}_2$
- (c) $\text{CH}_3-\text{CH}=\text{CH}-\text{OH}$ (d) $\text{CH}_3-\underset{\text{CH}_3\text{OH}}{\text{C}}=\text{CH}_2$
11. Primary, secondary and tertiary alcohols may be distinguished by employing
- (a) Oxidation (b) Victor Meyer's test
- (c) Lucas reagent (d) All
12. Which of the following is stable compound
- (a) $\text{CCl}_3\text{CH}(\text{OH})_2$ (b) $\text{CH}_2=\text{CHOH}$
- (c) $\text{CH}_3-\text{CH}(\text{OH})_2$ (d) $\text{HC}(\text{OH})_3$
13. The $-\text{OH}$ group of methyl alcohol cannot be replaced by chlorine by the action of
- (a) Chlorine (b) HCl
- (c) PCl_3 (d) PCl_5
14. Which of the following are known as mercaptans
- (a) Thio-alcohols (b) Thio-ethers
- (c) Thio-aldehydes (d) Thio-acids
15. The enzyme which can catalyse the conversion of glucose to ethanol is
- (a) Zymase (b) Diastase
- (c) Maltase (d) Invertases
16. Sodium ethoxide and ethyl chloride on heating will give
- (a) Ether (b) Ethyl alcohol
- (c) Acetaldehyde (d) Acetic acid
17. $\text{Z} \xrightarrow{\text{PCl}_5} \text{X} \xrightarrow{\text{Alc.KOH}} \text{Y} \xrightarrow[2.\text{H}_2\text{O};\text{boil}]{1.\text{conc.H}_2\text{SO}_4} \text{Z}$; Z is
- (a) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{OH}$ (b) $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$
- (c) $(\text{C}_2\text{H}_5)_3\text{C}-\text{OH}$ (d) $\text{CH}_3-\text{CH}=\text{CH}_2$
18. Ethyl alcohol reacts with HCl but not with HCN because
- (a) $\text{C}_2\text{H}_5\text{OH}$ is weak base and HCN is weak base



CHEMISTRY



- (b) C_2H_5OH is strong acid and HCN is weak acid
(c) HCl is strong acid and C_2H_5OH is weak base
(d) none of these
19. An organic compound H_3H_6O does not give a precipitate with 2, 4-dinitrophenyl hydrazine reagent and does not react with sodium metal. It could be
(a) CH_3-CH_2-CHO (b) $CH_3-CO-CH_3$
(c) $CH_2=CH-CH_2OH$ (d) $CH_2=CH-OCH_3$
20. Under drastic conditions all the alcohols can be oxidised to carboxylic acids but the following alcohols give carboxylic acids having same number of carbon atoms
(a) Primary (b) Secondary
(c) Tertiary (d) None of these
21. The reaction
 $CH_3 + Br + OH^- \longrightarrow CH_3OH + Br^-$ obeys the mechanism
(a) S_{N1} (b) S_{N2}
(c) S_{E1} (d) S_{E2}
22. C_2H_5I and C_3H_7I react with sodium metal to give
(a) $C_4H_{10} + C_6H_{14} + C_5H_{12}$ (b) $C_5H_{12} + C_6H_{14}$
(c) $C_4H_{10} + C_6H_{14}$ (d) C_5H_{12}
23. A compound A of formula $C_3H_6Cl_2$ on reaction with alkali can give B of formula C_3H_6O or C of formula C_3H_4 . B on oxidation gave compound of the formula $C_3H_6O_2$. C with dilute H_2SO_4 containing Hg^{2+} ion gave D of formula C_3H_6O , which with bromine and alkali gave the sodium salt of $C_2H_4O_2$. Then A is
(a) $CH_3CH_2CHCl_2$ (b) $CH_3CCl_2CH_3$
(c) $CH_2ClCH_2CH_2Cl$ (d) $CH_3CHClCH_2Cl$
24. The reaction conditions leading to the best yields of C_2H_5Cl are
(a) $C_2H_6(\text{excess}) + Cl_2 \xrightarrow{\text{UV light}}$ (b) $C_2H_6 + Cl_2 \xrightarrow[\text{room temperature}]{\text{Dark}}$
(c) $C_2H_6 + Cl_2(\text{excess}) \xrightarrow{\text{UV light}}$ (d) $C_2H_6 + Cl_2 \xrightarrow{\text{UV light}}$
25. What mass of isobutylene is obtained from 37 g of tertiary butyl alcohol by heating with 20% H_2SO_4 at 363 K, if the yield is 65%
(a) 16 g (b) 18.2 g
(c) 20 g (d) 22 g



CHEMISTRY



26. The bad smelling substance formed by the action of alcoholic caustic potash on chloroform and aniline is
- (a) Phenyl isocyanide (b) Nitrobenzene
(c) Acetylene (d) Chlorobenzene
27. 20% aqueous solution of sodium chloride containing ethyl alcohol on electrolysis gives
- (a) Ethyl chloride (b) Chloral
(c) Acetaldehyde (d) Chloroform
28. In the reaction,
- $$\text{CH}_3\text{C} \equiv \bar{\text{C}}\text{Na}^+ + (\text{CH}_3)_2\text{CHCl} \rightarrow$$
- (a) 4-methyl-2-pentyne (b) Propyne
(c) Propyne and propene (d) None of these
29. In the reaction of phenol with CHCl_3 and aqueous NaOH at 70°C , the electrophilic attacking the ring is
- (a) CHCl_3 (b) CHCl_2
(c) CCl_2 (d) COCl_2
30. A compound (A) of formula $\text{C}_3\text{H}_6\text{Cl}_2$ on reaction with alkali can give (B) of formula $\text{C}_3\text{H}_6\text{O}$ or (C) of formula C_3H_4 . (B) on oxidation gave a compound of the formula $\text{C}_3\text{H}_6\text{O}_2$. (C) with dilute H_2SO_4 containing Hg^{2+} ion gave (D) of formula $\text{C}_3\text{H}_6\text{O}$ which with bromine and NaOH gas the sodium salt of $\text{C}_2\text{H}_4\text{O}_2$. Then (A) is
- (a) $\text{CH}_3\text{CH}_2\text{CHCl}_2$ (b) $\text{CH}_3\text{CCl}_2\text{CH}_3$
(c) $\text{CH}_2\text{ClCH}_2\text{CH}_2\text{Cl}$ (d) $\text{CH}_3\text{CHClCH}_2\text{Cl}$
31. The compound which gives the most stable carbonium ion on dehydration is
- (a) $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2\text{OH}$ (b) $\text{CH}_3-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{OH}$
(c) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2\text{OH}$ (d) $\text{CH}_3-\underset{\text{OH}}{\text{CH}}-\text{CH}_2-\text{CH}_3$
32. A compound with molecular formula $\text{C}_4\text{H}_{10}\text{O}_3$ is converted by the action of acetyl chloride to a compound with molecular weight 190. The original compound has
- (a) One OH group (b) Two OH groups
(c) Three OH groups (d) No OH group
33. There are four alcohols P, Q, R and S which have 3, 2, 1 and zero alpha hydrogen atom(s). Which one of the following will not respond to Victor-Meyer's test:



CHEMISTRY



- (a) P (b) Q
(c) R (d) S
34. If there be a compound of the formula $\text{CH}_3\text{C}(\text{OH})_3$ which one of the following compound would be obtained from it without treatment with any reagent
- (a) Methanol (b) Ethanol
(c) Acetic acid (d) Formaldehyde
35. Decreasing order of boiling points of n-pentanol (A), n-pentane (B), 3-pentanol (C) and 2,2-dimethyl propanol (D) is
- (a) A, C, D, B (b) B, D, C, A
(c) C, A, D, B (d) none of these
36. Action of HNO_2 on CH_3NH_2 gives
- (a) CH_3OH (b) $\text{CH}_3\text{O}\cdot\text{CH}_3$
(c) $\text{CH}_3\text{O}-\text{N}=\text{O}$ (d) Both (b) and (c)
37. The product of combustion of an aliphatic thiol (RSH) at 298 K are
- (a) $\text{CO}_2(\text{l})$, $\text{H}_2\text{O}(\text{g})$ and $\text{SO}_2(\text{g})$ (b) $\text{CO}_2(\text{g})$, $\text{H}_2\text{O}(\text{l})$ and $\text{SO}_2(\text{g})$
(c) $\text{CO}_2(\text{l})$, $\text{H}_2\text{O}(\text{l})$ and $\text{SO}_2(\text{g})$ (d) $\text{CO}_2(\text{g})$, $\text{H}_2\text{O}(\text{l})$ and $\text{SO}_2(\text{l})$
38. Which reagent is more effective to convert but-2-enal to but-2-enol
- (a) KMnO_4 (b) NaBH_4
(c) H_2/Pt (d) $\text{KCr}_2\text{O}_7/\text{HSO}_4$
39. 23 g of sodium react with CH_3OH to give
- (a) 1 mole of O_2 (b) 1/2 mole of H_2
(c) 1 mole of H_2 (d) none of these
40. An organic compound $\text{C}_3\text{H}_6\text{O}$ does not give a precipitate with 2, 4-dinitrophenyl hydrazine reagent and does not react with sodium metal. It could be
- (a) $\text{CH}_3-\text{CH}_2-\text{CHO}$ (b) $\text{CH}_3-\text{CO}-\text{CH}_3$
(c) $\text{CH}_2=\text{CH}-\text{CH}_2\text{OH}$ (d) $\text{CH}_2=\text{CH}-\text{OCH}_3$
41. Ether in contact with air for a long time form peroxide. The presence of peroxide in ether can be tested by adding Fe^{2+} ion in it and then adding
- (a) KCNS (b) SnCl_2
(c) HgCl_2 (d) KI
42. 1-phenyl ethanol can be prepared from benzaldehyde by the action of
- (a) CH_3Br (b) CH_3Br and AlBr_3



CHEMISTRY



- (c) CH_3I and Mg (d) $\text{C}_2\text{H}_5\text{I}$ and Mg
43. The red coloured compound formed during Victor-Meyer's test for ethanol is
- (a) $\text{CH}_3\text{CH}(\text{NO}_2)\text{NOH}$ (b) $\text{CH}_3\text{CH}_2\text{NOH}$
- (c) $\text{CH}_3\text{CH}(\text{NO}_2)\text{N}^-\text{O}^-\text{Na}^+$ (d) None of these
44. Dunstan's test is used for identification of
- (a) Acetone (b) Alcohol
- (c) Glycerol (d) Carbonyl compound
45. Na reacts rapidly with
- (a) 1° alcohol (b) 2° alcohol
- (c) 3° alcohol (d) none of these
46. Carbon tetrachloride on treatment with $\text{Fe}/\text{H}_2\text{O}$ gives:
- (a) Chloromethane (b) Methane
- (c) Chloroform (d) Methylene chloride
47. A mixture of methane, ethylene and acetylene gases is passed through a woulf-bottle containing ammoniacal Cu_2Cl_2 the gas coming out is
- (a) Methane (b) Acetylene
- (c) Methane and ethylene (d) The original mixture
48. Iodoform test is not given by
- (a) $\text{CH}_3\text{COCH}_2\text{COOC}_2\text{H}_5$ (b) CH_3COCH_3
- (c) $\text{CH}_3\text{CH}_2\text{COCH}_3$ (d) $\text{CH}_3\text{CH}_2\text{CHOHCH}_3$
49. On conversion into the Grignard reagent followed by treatment with absolute ethanol, how many isomeric alkyl chlorides would yield 2-methyl-butane:
- (a) 2 (b) 3
- (c) 4 (d) 5
50. The toxicity order for CH_3OH , $\text{C}_2\text{H}_5\text{OH}$ and $\text{C}_3\text{H}_7\text{OH}$ is
- (a) $\text{C}_2\text{H}_5\text{OH} < \text{CH}_3\text{OH} < \text{C}_3\text{H}_7\text{OH}$
- (b) $\text{C}_3\text{H}_7\text{OH} < \text{C}_2\text{H}_5\text{OH} < \text{CH}_3\text{OH}$
- (c) $\text{C}_2\text{H}_5\text{OH} < \text{C}_3\text{H}_7\text{OH} < \text{CH}_3\text{OH}$
- (d) $\text{CH}_3\text{OH} < \text{C}_2\text{H}_5\text{OH} < \text{C}_3\text{H}_7\text{OH}$



ALCOHOLS, PHENOLS AND ETHERS

- General formula of monohydric alcohols is
 - $C_nH_{2n}OH$
 - $C_{n+1}H_{2n}OH$
 - $C_{2n}H_{2n+2}OH$
 - $C_nH_{2n+1}OH$
- General formula for primary alcohols is
 - $>CHOH$
 - $\begin{array}{c} | \\ -C-OH \\ | \end{array}$
 - $-CH_2OH$
 - $>C \begin{array}{l} \nearrow OH \\ \searrow OH \end{array}$
- Which of the following is a primary alcohol?
 - 2 – Butanol
 - 1 – Butanol
 - 2 – Propanol
 - 2, 3 Dimethyl – 4 – hexanol
- 2 – Butanol is a
 - Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
 - Aldehyde
- $CH_3CH_2I \xrightarrow[\text{moist}]{Ag_2O} ?$
 - C_2H_6
 - C_2H_5OH
 - $C_2H_5OC_2H_5$
 - None of the above
- $CH_3NH_2 + HNO_2 \rightarrow ?$
 - CH_4
 - CH_3OH
 - NH_3
 - Nitromethane
- Characteristic grouping of a secondary alcohol is
 - $-CH_2OH$
 - $>CHOH$
 - $\begin{array}{c} | \\ -C-OH \\ | \end{array}$
 - $>C \begin{array}{l} \nearrow OH \\ \searrow OH \end{array}$
- $CH_3CH_2NH_2 \xrightarrow{NaNO_2/HCl} ?$
 - C_2H_6
 - C_2H_4
 - CH_3CH_2OH
 - NH_3



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9. $\text{CH}_3\text{COOH} \xrightarrow{\text{LiAlH}_4} ?$
- (a) CH_3CHO (b) CH_4
(c) $\text{CH}_3\text{CH}_2\text{OH}$ (d) CH_3OH
10. Alkaline hydrolysis of esters is known as
- (a) Esterification (b) Hydration
(c) Dehydration (d) Saponification
11. Ethanol is prepared industrially by
- (a) Hydration of ethylene (b) Fermentation of sugar
(c) Both (d) None
12. $\text{CH}_3\text{CH}_2\text{OH}$ is prepared from C_2H_4 by
- (a) Permanent oxidation (c) Catalytic reduction
(b) Absorbing in H_2SO_4 followed by hydrolysis
(d) Fermentation
13. Methanol can be manufactured by
- (a) Destructive distillation of wood (b) Fermentation
(c) Hydration of methane (d) All of the above
14. Industrial method of preparation of CH_3OH is
- (a) Catalytic reduction of CO in presence of ZnO-CrO_3
(b) Reacting methane with steam at 900°C
(c) Reduction formaldehyde
(d) Disproportionation of formaldehyde
15. Alcohols of low molecular weight are
- (a) Soluble in water (b) Soluble in water on heating
(c) Insoluble in water (d) Insoluble in all solvents
16. Reason for solubility of alcohol in water is
- (a) Covalent bond (b) Ionic bond
(c) Hydrogen bond with water (d) None of these
17. Hydrogen bonding is maximum in
- (a) Ethanol (b) Diethyl ether
(c) Ethyl chloride (d) Trimethylamine



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18. Why do alcohols have higher boiling points than their parent hydrocarbons?
- (a) Due to higher molecular weight
 - (b) Due to presence of hydroxyl group
 - (c) Due to association of molecules
 - (d) Due to hydrogen bonding between molecules
19. Which of the following isomeric alcohols has the highest boiling point?
- (a) Primary
 - (b) Secondary
 - (c) Tertiary
 - (d) All equal
20. Which of the following is soluble in water?
- (a) CS_2
 - (b) $\text{CH}_3\text{CH}_2\text{OH}$
 - (c) CCl_4
 - (d) CHCl_3
21. Which of the following alcohols is least soluble in water?
- (a) CH_3OH
 - (b) $\text{C}_3\text{H}_7\text{OH}$
 - (c) $\text{C}_6\text{H}_{13}\text{OH}$
 - (d) $\text{C}_{10}\text{H}_{21}\text{OH}$
22. In the reaction of alcohols with alkali metals
- (a) Only H atom of the OH group is involved
 - (b) Complete OH group involved
 - (c) Both of the above
 - (d) None of the above
23. In the reaction of alcohols with alkali metals which alcohol reacts the fastest?
- (a) Secondary
 - (b) Tertiary
 - (c) Primary
 - (d) All equal
24. 23 gms of Na reacts with CH_3OH to give
- (a) 1 mol of O_2
 - (b) 1 mol of H_2
 - (c) 1/2 mol of H_2
 - (d) None of these
25. An organic compound dissolves in benzene and evolves H_2 on reaction with an alkali metal. The compound is a
- (a) Ketone
 - (b) Aldehyde
 - (c) Tertiary amine
 - (d) Alcohol
26. Alcohols react with acids to give
- (a) Ester + Inorganic acids
 - (b) Ester + H_2O



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- (c) Ester + HCl (d) None of these
27. $\text{CH}_3\text{CH}_2\text{OH}$ on reaction with H_2SO_4 may give
(a) $(\text{CH}_3\text{CH}_2)_2\text{SO}_4$ (b) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$
(c) C_2H_4 (d) All of the above
28. Ethyl hydrogen sulphate reacts with H_2SO_4 at 160° to give?
(a) $(\text{C}_2\text{H}_5)_2\text{SO}_4$ (b) C_2H_4
(c) Both of the above (d) None of the above
29. Alcohols + Grignard reagent gives
(a) Alkanes (b) Alkenes
(c) Alkynes (d) All of the above
30. $\text{R-OH} + \text{R}'\text{MgX}$ gives
(a) RH (b) $\text{R}'\text{H}$
(c) Both (d) None
31. In which of the following the entire OH group is involved?
(a) Reaction with NH_3 (b) Reaction with HBr
(c) Reaction with PBr_3 (d) All of the above
32. With a given alcohol, order of reactivity of halogen acids is
(a) $\text{HCl} > \text{HBr} > \text{HI}$ (b) $\text{HBr} > \text{HI} > \text{HCl}$
(c) $\text{HI} > \text{HBr} > \text{HCl}$ (d) $\text{HBr} > \text{HCl} > \text{HI}$
33. With a given halogen acid, reactivity of alcohol is
(a) Tertiary > Secondary > Primary (b) Secondary > Primary > Tertiary
(c) Primary > Tertiary > Secondary (d) Secondary > Tertiary > Primary
34. The compound B is
$$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} \xrightarrow{\text{PCl}_5} \text{A} \xrightarrow{\text{alc.KOH}} \text{B}$$

(a) Propyne (b) Propene
(c) Propanol (d) Propane
35. Identify Z
$$\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{PBr}_3} \text{X} \xrightarrow{\text{alc.KOH}} \text{Y} \xrightarrow[\text{H}_2\text{O}+\text{heat}]{\text{H}_2\text{SO}_4} \text{Z}$$

(a) $\text{CH}_2 = \text{CH}_2$ (b) $\text{CH}_3\text{CH}_2\text{OH}$
(c) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ (d) None of these



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36. $\text{CH}_3\text{CH}_2\text{OH} + \text{H}_2\text{SO}_4 \rightarrow ?$

- (a) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OC}_2\text{H}_5$ (b) C_2H_6
(c) C_2H_4 (d) C_2H_2

37. Heating of excess of ethanol with H_2SO_4 at 140°C forms

- (a) Aldehyde (b) Ketone
(c) Ether (d) Alkene

38. Which of the following can act as dehydrating agents for alcohols?

- (a) H_2SO_4 (b) Al_2O_3
(c) H_3PO_4 (d) All of the above

39. Primary alcohols on dehydration give

- (a) Alkenes (b) Alkanes
(c) Both (d) None

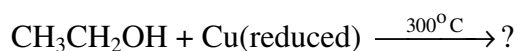
40. Intermediate formed during dehydration of alcohol of

- (a) Carbonium ion (b) Carbanion
(c) Free radical (d) Carbene

41. Which of the following is true regarding ease of dehydration?

- (a) Primary > Secondary (b) Secondary > Tertiary
(c) Tertiary > Primary (d) None of these

42. Product of the reaction of



- (a) C_3H_6 (b) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$
(c) CH_3CHO (d) CH_3COOH

43. When vapours of an alcohol are passed over red hot copper, an alkene is obtained. The alcohol is

- (a) Primary (b) Secondary
(c) Tertiary (d) None of these

44. $\text{CH}_3\text{CH}_2\text{OH} + \text{K}_2\text{Cr}_2\text{O}_7 \rightarrow ?$

- (a) CH_3COOH (b) CH_3CHO



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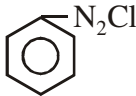
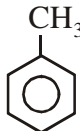



- (c) HCHO (d) HCOOH
45. An alcohol on oxidation gives a ketone. Then the alcohol is
(a) Primary (b) Secondary
(c) Tertiary (d) None
46. Lucas reagent is
(a) $\text{ZnCl}_2 + \text{conc. HCl}$ (b) $\text{ZnCl}_2 + \text{dil HCl}$
(c) $\text{ZnCl}_2 + \text{H}_2\text{SO}_4$ (d) $\text{Zn} + \text{conc. HCl}$
47. Which of the following alcohols, will first give turbidity with Lucas reagent?
(a) Primary (b) Secondary
(c) Tertiary (d) None of these
48. Primary secondary and tertiary alcohols are distinguished by
(a) Oxidation method (b) Lucas test
(c) Victor Meyer Method (d) All of these
49. An enzyme converting starch to maltose is
(a) Maltase (b) Zymase
(c) Invertase (d) Diastase
50. Rectified spirit is a mixture of
(a) 95% $\text{C}_2\text{H}_5\text{OH} + 5\% \text{H}_2\text{O}$ (b) 94% $\text{C}_2\text{H}_5\text{OH} + 6\% \text{H}_2\text{O}$
(c) 94.4% $\text{C}_2\text{H}_5\text{OH} + 5.43\% \text{H}_2\text{O}$ (d) 95.87% $\text{C}_2\text{H}_5\text{OH} + 4.13\% \text{H}_2\text{O}$
51. Power alcohol is a mixture of petrol and alcohol in the ratio
(a) 4 : 1 (b) 1 : 4
(c) 2 : 1 (d) 1 : 2
52. If there be a compound $\text{CH}_3-\overset{\text{OH}}{\underset{\text{OH}}{\text{C}}}-\text{OH}$, then which compound is spontaneously obtained from it
(a) CH_3OH (b) $\text{CH}_3\text{CH}_2\text{OH}$
(c) CH_3COOH (d) HCHO
53. CH_2OH on oxidation with periodic acid gives CH_2OH
(a) $\begin{array}{c} \text{COOH} \\ | \\ \text{COOH} \end{array}$ (b) Glycol



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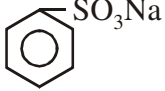

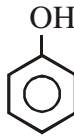
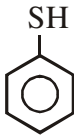
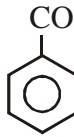
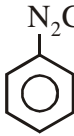
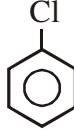
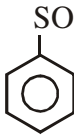
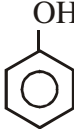
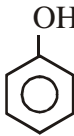

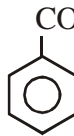


- (c) Glycollic Acid (d) HCHO
54. Glycerol is a
(a) Primary alcohol (b) Monohydric alcohol
(c) Dihydric alcohol (d) Trihydric alcohol
55. Dehydration of glycerol gives
(a) Propane (b) Propene
(c) Benzene (d) Acrolein
56. Nitroglycerine is used as
(a) Explosive (b) Insecticide
(c) Refrigerant (d) All
57. In phenols
(a) -OH group is attached in side chain
(b) -OH group is directly attached to benzene
(c) Both of these
(d) None of these
58. 2 - Methyl phenol is
(a) o-cresol (b) p-cresol
(c) catechol (d) None of these
59. An aromatic compound has the formula C_7H_8O . Number of isomers for the compound are
(a) 3 (b) 4
(c) 5 (d) 8
60. m-Dihydroxy benzene is
(a) Catechol (b) Resorcinol
(c) Quinol (d) Cresol
61.  + $H_2SO_4 \longrightarrow ?$
(a)  (b) 



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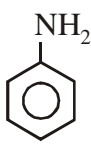
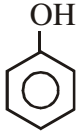

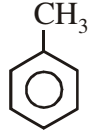
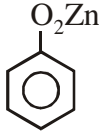
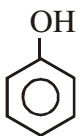

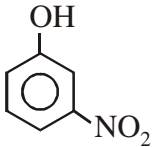
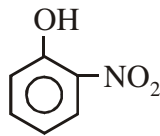


- (c) 
62.  $\xrightarrow{\text{NaOH}}$
- (a)  (b) 
- (c)  (d) 
63. Phenol can be prepared from
- (a)  (b) 
- (c)  (d) All of these
64. Phenol is
- (a) Strongly acidic (b) Weakly acidic
(c) Strongly basic (d) Weakly basic
65.  + $\text{CH}_3\text{COCl} \xrightarrow{\text{aq. NaOH}}$ is an example of
- (a) Dow's reaction (b) Reimer-Tiemman reaction
(c) Schotten Baumann reaction (d) Kolbe reaction
66.  + NH_3 ?
- (a)  (b) 



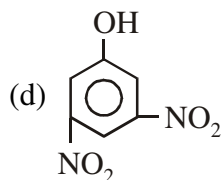
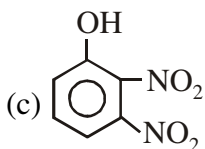
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- (c) 
67.  + Zn dust \longrightarrow ?
- (a)  (b) 
- (c)  (d) $\text{CH} \equiv \text{CH}$
68. Rate of substitution in phenol is
- (a) < Benzene (b) > Benzene
(c) = Benzene (d) None of these
69. Phenol reacts with Br_2 to give sym-tribromophenol. How much Br_2 is needed?
- (a) 1.5 mol (b) 3 mol
(c) 4.5 mol (d) 6 mol
70. Monohalogenation of phenol is carried out at
- (a) Low temperatures (b) In presence of a non-polar solvent
(c) Both of these (d) None of these
71.  + $\text{Br}_2 \xrightarrow[0^\circ]{\text{CS}_2}$ X + Y, X and Y are
- (a) o-bromophenol and p-bromophenol (b) 2, 4, 6-tribromophenol and HBr
(c) Only benzene (d) None
72.  + dil $\text{HNO}_3 \xrightarrow{\text{room temp}}$
- (a)  (b) 

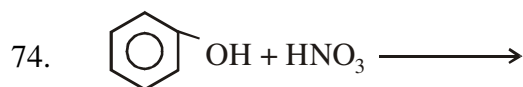


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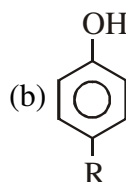
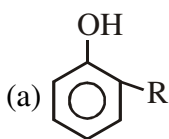
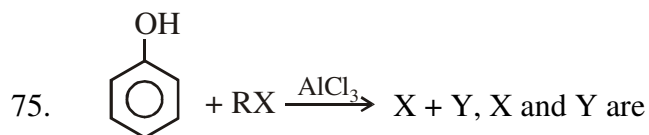


73. o-nitrophenol is steam volatile but p-nitrophenol is not, because of

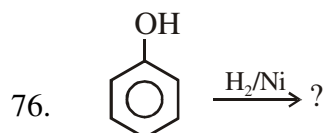
- (a) Intramolecular hydrogen bonding present in o-nitrophenol
- (b) Intermolecular H-bonding
- (c) Chelation in p-nitrophenol
- (d) None



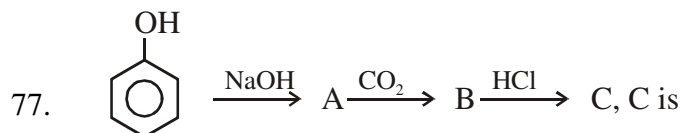
- (a) Picric acid
- (b) m-nitrophenol
- (c) o and p-nitrophenol
- (d) None



- (c) Both of these
- (d) None of these



- (a) Cyclohexane
- (b) Benzene
- (c) Cyclohexanal
- (d) None of these



- (a) Salicylaldehyde
- (b) Benzoic acid
- (c) Chlorobenzene
- (d) Salicylic acid

78. Phenol is converted to salicylaldehyde by

- (a) Etard reaction
- (b) Kolbe reaction



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- (c) Reimer-Tiemann reaction (d) Cannizzaro reaction
79. In Reimer-Tiemann reaction, if we use CCl_4 , then we get
- (a) Salicylaldehyde (b) Salicylic Acid
(c) Cyclohexanol (d) Phenolphthalein
80. Aspirin is known as
- (a) Methyl salicylic acid (b) Acetyl salicylic acid
(c) Acetyl salicylate (d) Methyl salicylate
81. Salol is prepared from
- (a) Salicylic acid and phenol (b) Salicylic acid and methanol
(c) Both of these (d) None of these
82. Which of the following increases acidity of phenols
- (a) $-\text{NO}_2$ (b) $-\text{CN}$
(c) Halogen (d) All
83. Which of the following increases basicity of phenol?
- (a) $-\text{CH}_3$ (b) $-\text{NH}_2$
(c) Both of these (d) None of these
84. Phenol is less acidic than
- (a) CH_3COOH (b) p-nitrophenol
(c) Both of these (d) None of these
85. Which of the following compounds would not be oxidized to benzoic acid?
- (a) Benzyl alcohol (b) Toluene
(c) Phenol (d) None of these
86. Ether is
- (a) $\text{R} - \underset{\text{H}}{\text{C}} = \text{O}$ (b) $\text{R} - \underset{\text{R}}{\text{C}} = \text{O}$
(c) $\text{R} - \underset{\text{R}}{\text{O}}$ (d) $\text{R} - \underset{\text{OR}}{\text{C}} = \text{O}$
87. Hybridization of central atom in ethers is
- (a) sp (b) sp^2
(c) sp^3 (d) sp^3d^2
88. Compound not isomeric with di-ethyl ether is



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- (a) n-propyl methyl ether (b) 1-Butanol
(c) 2-Methyl-2-Propanol (d) Butanone
89. Williamson's synthesis is used to prepare
(a) Acetone (b) Diethyl ether
(c) P.V.C. (d) Bakelite
90. $\text{CH}_3\text{CH}_2\text{ONa} + \text{CH}_3\text{CH}_2\text{Cl}$ will give
(a) Diethyl ether (b) $\text{CH}_3\text{CH}_2\text{OH}$
(c) CH_3CHO (d) CH_3COOH
91. Ether is purified before distillation because
(a) It is poisonous
(b) It is converted into explosive peroxide
(c) Both of these
(d) None of these
92. PCl_5 reacts with
(a) Alcohols (b) Ethers
(c) Both of these (d) None of these



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Answer

- | | | | | |
|-------|-------|-------|-------|-------|
| 1. d | 20. b | 39. a | 58. a | 77. d |
| 2. c | 21. d | 40. a | 59. c | 78. c |
| 3. b | 22. a | 41. c | 60. b | 79. b |
| 4. b | 23. c | 42. c | 61. d | 80. b |
| 5. c | 24. c | 43. c | 62. b | 81. b |
| 6. b | 25. d | 44. a | 63. d | 82. d |
| 7. b | 26. b | 45. b | 64. d | 83. c |
| 8. c | 27. d | 46. a | 65. c | 84. c |
| 9. c | 28. b | 47. c | 66. c | 85. c |
| 10. d | 29. a | 48. d | 67. a | 86. c |
| 11. c | 30. b | 49. d | 68. b | 87. c |
| 12. c | 31. d | 50. d | 69. a | 88. d |
| 13. a | 32. c | 51. a | 70. c | 89. b |
| 14. a | 33. a | 52. c | 71. a | 90. a |
| 15. a | 34. b | 53. d | 72. b | 91. b |
| 16. c | 35. b | 54. d | 73. a | 92. c |
| 17. a | 36. c | 55. d | 74. a | |
| 18. d | 37. c | 56. a | 75. c | |
| 19. a | 38. d | 57. b | 76. c | |

**ALDEHYDES AND KETONES**

- IUPAC name of CH_3CHO is
 - Ethanal
 - Acetaldehyde
 - Ethanol
 - Methyl aldehyde
- Hybridisation in $-\text{CHO}$ is ?
 - sp
 - sp^2
 - sp^3
 - none of these
- Which of the following does not contain an $-\text{OH}$ group?
 - Alcohol
 - Phenol
 - Aldehyde
 - Carboxylic acid
- Carboxyl group undergoes
 - Electrophilic addition
 - Nucleophilic addition
 - Both of these
 - None of these
- $\text{HCHO} + \text{KOH} \rightarrow ?$
 - HCHO
 - CH_3CHO
 - CH_3OH
 - None of these
- Which of the following carbonyl compounds is most reactive
 - HCHO
 - CH_3CHO
 - $\text{CH}_3\text{CH}_2\text{CHO}$
 - CH_3COCH_3
- Which of the following does not undergo aldol condensation?
 - HCHO
 - CH_3CHO
 - $\text{CH}_3\text{CH}_2\text{CHO}$
 - CH_3COCH_3
- Which of the following gives silver mirror test?
 - $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
 - $\text{CH}_3\text{CH}_2\text{CHO}$
 - $\text{CH}_3 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_3$
 - Propane
- Which of the following undergoes haloform reaction?
 - HCHO
 - $(\text{CH}_3)_2\text{CO}$
 - $\text{CH}_3 - \text{O} - \text{CH}_3$
 - $\text{CH}_3\text{CH}_2\text{Cl}$
- Aldehydes and ketones give addition reaction with



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- (a) HCN (b) NaHSO₃
(c) Both (d) None
11. (CH₃COO)₂ Ca on dry distillation gives
(a) HCHO (b) CH₃CHO
(c) CH₃ - $\overset{\text{O}}{\parallel}{\text{C}}$ - CH₃ (d) (CH₃CO)₂CO
12. CH₂Cl₂ on hydrolysis gives
(a) HCHO (b) CH₃CHO
(c) CH₃COCl (d) None
13. Reaction involving reduction of aldehydes and ketones using Aluminium isopropoxide is
(a) Rosenmund reaction (b) Wurtz-Fitting reaction
(c) Meerwein-Pondorf-Verlay reaction (d) None
14. NH₃ reacts with HCHO to give
(a) CH₃CHO (b) Urotropine
(c) Hexamethylene-diamine (d) Both (a) and (c)
15. Aldehydes having no α-hydrogen atom undergo
(a) Friedal Craft's reaction (b) Riemer-Tieman reaction
(c) Cannizzaro's reaction (d) Rosenmund reaction
16. Structural formula of the compound isomeric with acetone is
(a) CH₃CH₂CHO (b) CH₃CHO
(c) CH₃CH₂OH (d) None
17. $\text{HC} \equiv \text{CH} \xrightarrow[\text{Hg}^{2+}]{\text{H}_2\text{SO}_4} ?$
(a) CH₃CH₂OH (b) CH₃COCH₃
(c) CH₃CHO (d) C₂H₄
18. Partial oxidation of methane gives
(a) HCHO (b) HCOOH
(c) H₂O and CO₂ (d) CO + H₂
19. Tollen's reagent is
(a) Ammoniacal cuprous chloride (b) Ammoniacal cuprous oxide
(c) Ammoniacal silver nitrate (d) Ammoniacal silver nitrite



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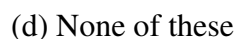
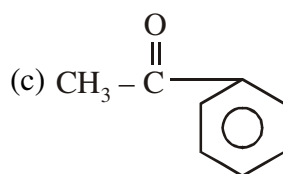
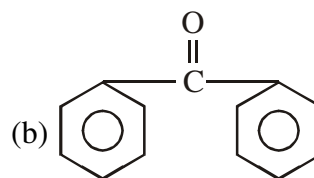
20. $\text{CH}_3\text{CH}_2\text{OH}$ is passed over heated Cu at 300°C and the product treated with NaOH. The final product is
- (a) Aldol (b) β -hydroxy butyraldehyde
(c) Both (d) None
21. Which of the following reacts with Tollen's reagent?
- (a) CH_3COOH (b) CH_3COCH_3
(c) CH_3COCl (d) CH_3CHO
22. IUPAC name of crotonaldehyde is
- (a) Propenal (b) 2-Butenal
(c) 1-Butenal (d) None
23. Formula of mesitylene, formed on treating CH_3COCH_3 with conc. H_2SO_4 is
- (a) $(\text{CH}_3)_2\text{C} = \text{CHCOCH}_3$ (b) $(\text{CH}_3)_2\text{C}(\text{OH})\text{CH}_2\text{COCH}_3$
(c) 1, 3, 5-Trimethyl benzene (d) None
24. Which of the following gives a ketone on oxidation
- (a) $(\text{CH}_3)_3\text{C}-\text{OH}$ (b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
(c) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$ (d) $(\text{CH}_3)_2\text{CH}-\text{CH}_2\text{O}$
25. CH_3CHCl_2 on hydrolysis gives
- (a) CH_3CHO (b) CH_3COCH_3
(c) $\text{CH}_3\text{CH}(\text{OH})_2$ (d) $\text{CH}_3\text{CH}_2\text{OH}$
26. Which of the following gives positive haloform and Fehling's tests?
- (a) CH_3COCH_3 (b) CH_3CHO
(c) $\text{CH}_3\text{CH}_2\text{OH}$ (d) HCHO
27. A mixture of $(\text{CH}_3\text{COO})_2\text{Ca}$ and $(\text{HCOO})_2\text{Ca}$ on heating gives
- (a) CH_3COCH_3 (b) CH_3COOH
(c) CH_3OH (d) CH_3CHO
28. Reduction using amalgamated Zn and HCl is
- (a) Clemmensen reduction (b) Wolff Kishner reduction
(c) Sabatier and Senderen's reduction (d) None of these
29. Passing water gas through an electric discharge at low pressure, we get
- (a) HCHO (b) HCOOH
(c) CH_3CHO (d) CO_2 and H_2O



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30. CH_3CHO reacts with ethanol give 3-Hydroxy butanal. The reaction is
- (a) Polymerization (b) Claisen condensation
(c) Aldol condensation (d) Riemer-Tieman reaction
31. Which of the following gives tert-butyl alcohol when treated with Grignard's reagent
- (a) $\text{CH}_3\text{MgBr} + \text{CH}_3\text{COCH}_3$ (b) $\text{CH}_3\text{CH}_2\text{MgBr} + \text{CH}_3\text{COCH}_3$
(c) $\text{CH}_3\text{MgBr} + (\text{CH}_3)_3\text{C} - \text{OH}$ (d) $\text{CH}_3\text{MgBr} + \text{CH}_3\text{CH}_2\text{CHO}$
32. Alkene on ozonolysis giving acetone is
- (a) $\text{CH}_2 = \text{CH}_2$ (b) $\text{CH}_3 - \text{CH} = \text{CH}_2$
(c) $(\text{CH}_3)_2 - \text{CH} = \text{CH} - (\text{CH}_3)_2$ (d) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$
33. The reagent that distinguishes aldehydes and ketones is
- (a) Schiff's reagent (b) Ammonia
(c) NaHSO_3 (d) Fenton's reagent
34. $\text{CH}_3\text{COCl} + \text{H}_2 \xrightarrow[\text{Pd/BaSO}_4]{\text{Xylene}} \text{CH}_3\text{CHO} + \text{HCl}$. The reaction is
- (a) Stephen's reduction (b) Rosenmund's reaction
(c) Hoffman's reaction (d) Cannizaro's reaction
35. Which of the following does not give iodoform test?
- (a) Isopropyl alcohol (b) Acetone
(c) Acetaldehyde (d) All of these
36. Propyne on hydrolysis in presence of HCl and Hg^{2+} gives
- (a) CH_3CHO (b) CH_3COCH_3
(c) HCHO (d) None of these
37. Which of the following gives Iodoform test?




38. Benedict's solution provides?
- (a) Ag^+ (b) Cu^{2+}



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- (c) Ba^{2+} (d) Li^+
39. Chloral belongs to
- (a) Alcohols (b) Aldehydes
(c) Ketones (d) Amides
40. Oxidation of CH_3CHO in presence of $(\text{CH}_3\text{CHOO})_2\text{Mn}$ gives
- (a) CH_3COOH (b) CH_3COCH_3
(c) $\text{CH}_3\text{CH}_2\text{OH}$ (d) C_2H_4
41. Which of the following shows electromeric effect
- (a) Aldehyde (b) Alkane
(c) Alkyl amines (d) Alkyl halides
42. Urotropine is used as
- (a) Analgesic (b) Antipyretic
(c) Urinary antiseptic (d) All of these
43. Identify $\text{Z} \cdot \text{CH}_2 = \text{CH}_2 \xrightarrow{\text{HBr}} \text{X} \xrightarrow{\text{Hydrolysis}} \text{Y} \xrightarrow{\text{Na}_2\text{CO}_3} \text{Z}$
- (a) $\text{C}_2\text{H}_5\text{I}$ (b) $\text{C}_2\text{H}_5\text{OH}$
(c) CHI_3 (d) CH_3CHO
44. Strong oxidising agents oxidise propanone to
- (a) CH_3CHO (b) CH_3COOH
(c) C_2H_6 (d) None
45. An aldehyde which does not give ppt with Fehling's solution is
- (a) HCHO (b) CH_3CHO
(c)  (d) $\text{CH}_3\text{CH}_2\text{CHO}$
46. Structural formula of chloral hydrate is
- (a) $\text{Cl}_3\text{C} - \text{CH} \begin{matrix} \nearrow \text{OH} \\ \searrow \text{OH} \end{matrix}$ (b) $\text{CCl}_2\text{CH} \begin{matrix} \nearrow \text{OH} \\ \searrow \text{OH} \end{matrix}$
(c) $\text{CCl}_3 - \text{CH}(\text{OH})$ (d) None of these
47. Formalin is
- (a) a solution of HCHO in water (b) Liquid HCHO
(c) 40% HCHO solution in water (d) 40% HCHO solution in alcohol



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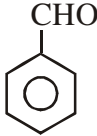


48. Reducing agent in Wolff-Kishner's reduction is
- (a) LiAlH_4 (b) NaBH_4
(c) $\text{NH}_2\text{NH}_2 + \text{Base}$ (d) $\text{Zn} - \text{Hg}/\text{Cl}$
49. Schiff's reagent gives pink colour with
- (a) Alcohol (b) Acetaldehyde
(c) Acetone (d) Methyl chloride
50. Ketones are oxidation products of
- (a) 1° Alcohol (b) 2° Alcohol
(c) 3° Alcohol (d) None of these
51. Propanone does not undergo
- (a) Oxime formation (b) Hydrazone formation
(c) Cyanohydrin formation (d) Reduction of Fehling's solution
(c) Cyanohydrin formation (d) Reduction of Fehling's solution
52. Ketones on reaction with $\text{NH}_2\text{CONHNH}_2$ form
- (a) Hydrazones (b) Schiff's base
(c) Oximes (d) Semicarbazones
53. Compound with the general formula
- $$\begin{array}{c} \text{R} - \text{CH} - \text{OR} \\ | \\ \text{OR} \end{array}$$
- are called
- (a) Di-ester (b) Acetals
(c) Hemi-acetal (d) Aldol
54. Oppenauer oxidation is the reverse of
- (a) Wolff-Kishner reduction (b) Rosenmund reduction
(c) Clemmensen's reduction (d) MPV reduction
55. Which of the following will not undergo aldol condensation?
- (a) Ethanol (b) Propanal
(c) 2, 2, 2-Trichloro-ethanal (d) 2, 2-dibromo-ethanal
56. β -hydroxy butyraldehyde is an example of
- (a) Aldol (b) Diol
(c) Hemiacetal (d) Acetal



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57. Which of the following is most difficult to oxidise?
- (a) HCHO (b) CH₃CHO
(c) CH₃COCH₃ (d) CH₃CH₂CHO
58. Benzal chloride on hydrolysis produces
- (a) Phenol (b) Benzoic acid
(c) Benzene (d) Benzaldehyde
59. Benzaldehyde undergoes disproportionation in
- (a) NaOH (b) Na₂CO₃
(c) NaHCO₃ (d) None of these
60. Which of the following reacts with ethanolic KCN?
- (a) C₂H₆ (b) Acetyl chloride
(c) Chlorobenzene (d) Benzaldehyde
61. Cinnamic acid is produced by
- (a) Benzoin condensation (b) Perkin's reaction
(c) Aldol condensation (d) Cannizzaro's reaction
62. Sodium potassium citrate is one of the components which of the following reagents?
- (a) Fehling's solution (b) Tollen's reagent
(c) Benedict's solution (d) Baeyer's reagent
63. Which of the following produces phonone?
- (a) HCHO (b) CH₃CHO
(c) CH₃COCH₃ (d) none of these
64. Starting with , we get α, β-unsaturated compound in one step by
- (a) Aldol condensation (b) Perkin reaction
(c) MPV reduction (d) Etard's reaction
65. Acetaldehyde undergoes self condensation in presence of aluminium ethoxide to give ethyl acetate. The reaction is called?
- (a) Perkin reaction (b) Tischenko reaction
(c) Cannizzaro's reaction (d) Aldol condensation
66. The reagent reacting with both aldehydes and ketones is



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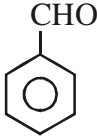


- (a) Fehling's solution (b) Schiff's reagent
(c) Grignard's reagent (d) Tollen's reagent
67. Phosphorous pentachloride reacts with
(a) Alcohols (b) Ethers
(c) Ketones (d) All of the above
68. Which of the following does not undergo Cannizzaro's reaction?
(a) Methanal (b) Trichloroacetaldehyde
(c) Benzaldehyde (d) Ethanal
69. Grignard's reagent reacts with
(a) Carboxyl compound (b) Esters
(c) CO₂ (d) All of the above
70. Formation of a cyanohydrin in aldehydes is
(a) Electrophilic addition (b) Nucleophilic addition
(c) Nucleophilic substitution (d) Electrophilic substitution
71. A red precipitate with Fehling's solution is
(a) Cu (b) CuO
(c) Cu₂O (d) Cu + CuO + Cu₂O
72. A compound giving iodoform test is
(a) 1 - Pentanol (b) 2 - Pentanone
(c) 3 - Pentanone (d) Pentanal
73. Which of the following is oxidized to prepare methyl ethyl ketone?
(a) 2 - Propanol (b) 1 - Butanol
(c) 2 - Butanol (d) 1 - Butyl alcohol
74. Acetone will be prepared by the ozonolysis of
(a) 1 - Butene (b) 2 - Butene
(c) Isobutene (d) 2 - Butyne
75. A cyanohydrin on hydrolysis gives lactic acid. The compound is
(a) HCHO (b) CH₃CHO
(c) CH₃CH₂CN (d) CH₃CH₂OH
76. General formula for aldehydes is



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- (a) $R - CHO$ (b) $R - COOH$
- (c) $R - \overset{\overset{O}{\parallel}}{C} - R'$ (d) $(RCO)_2O$
77. General formula for ketones is
- (a) $R - CHO$ (b) $R - COOH$
- (c) $R - \overset{\overset{O}{\parallel}}{C} - R'$ (d) $(RCO)_2O$
78. Which of the following cannot be used to distinguish between phenol and benzyl alcohol?
- (a) $NaOH$ (b) $NaHCO_3$
- (c) Br_2/CCl_4 (d) $FeCl_3$
79. Which of the following doesn't give positive test with Tollen's reagent?
- (a) $R-CHO$ (b) 
- (c) $CH_3 - \overset{\overset{O}{\parallel}}{C} - R$ (d) $R - CHOH - COR$
80. Denatured spirit is mainly used as a
- (a) good fuel
- (b) drug
- (c) solvent in preparing varnishes
- (d) material in the preparation of beverages



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Answer

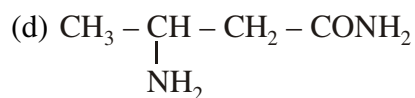
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|-------|-------|-------|-------|-------|
| 1. a | 17. c | 33. a | 49. b | 65. b |
| 2. b | 18. a | 34. b | 50. b | 66. c |
| 3. c | 19. c | 35. d | 51. d | 67. d |
| 4. b | 20. c | 36. b | 52. d | 68. d |
| 5. c | 21. d | 37. c | 53. b | 69. d |
| 6. a | 22. b | 38. b | 54. c | 70. b |
| 7. a | 23. c | 39. b | 55. c | 71. c |
| 8. b | 24. c | 40. a | 56. a | 72. b |
| 9. b | 25. a | 41. a | 57. c | 73. c |
| 10. c | 26. b | 42. c | 58. b | 74. c |
| 11. c | 27. d | 43. c | 59. a | 75. b |
| 12. a | 28. a | 44. b | 60. d | 76. a |
| 13. c | 29. b | 45. c | 61. b | 77. c |
| 14. d | 30. c | 46. c | 62. a | 78. b |
| 15. c | 31. a | 47. c | 63. c | 79. c |
| 16. a | 32. c | 48. c | 64. b | 80. c |

AMINES

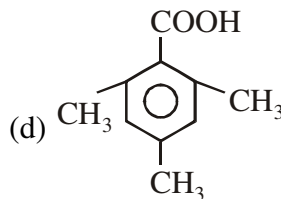
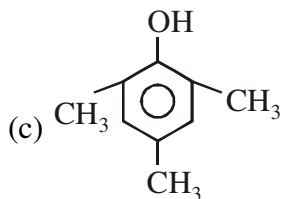
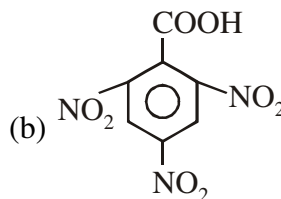
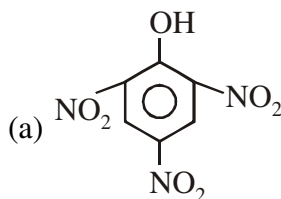
- Which is most basic
 - NH_3
 - CH_3NH_2
 - $(\text{CH}_3)_2\text{NH}$
 - $\text{C}_6\text{H}_5(\text{CH}_3)_2$
- Boiling points follow the order
 - $\text{CH}_3\text{CH}_3 < \text{CH}_3\text{NH}_2 < \text{CH}_3\text{OH} < \text{HCOOH}$
 - $\text{CH}_3\text{NH}_2 < \text{CH}_3\text{OH} < \text{CH}_3\text{CH}_3 < \text{HCOOH}$
 - $\text{CH}_3\text{OH} < \text{CH}_3\text{CH}_3 < \text{CH}_3\text{NH}_2 < \text{HCOOH}$
 - $\text{HCOOH} < \text{CH}_3\text{NH}_2 < \text{CH}_3\text{OH} < \text{CH}_3\text{CH}_3$
- Acid amide treated with alkali and bromine leads to the formation to
 - primary amine with same number of C atoms
 - primary amine with 1 less C atom
 - primary amine with 1 more C atom
 - primary amine with $> \text{CO}$ group
- HNO_2 converts primary amine into
 - alcohol
 - nitrate
 - nitroalkane
 - nitrite
- Aniline treated with HNO_2 forms
 - Nitrobenzene
 - TNT
 - Benzene diazonium chloride
 - Phenol
- Which gives offensive smell with chloroform and KOH?
 - CH_3NH_2
 - $(\text{CH}_3)_2\text{NH}$
 - $(\text{CH}_3)_3\text{N}$
 - All of these
- Boiling points of amines and the corresponding alcohols and acids vary as
 - Amine $>$ Acid $>$ Alcohol
 - Amine $>$ Alcohol $>$ Acid
 - Amine $<$ Acid $<$ Alcohol
 - Amine $<$ Alcohol $<$ Acid
- Identify 'X'
$$\text{CH}_3 - \underset{\text{OH}}{\text{C}} - \text{CH}_3 - \text{COOH} \xrightarrow{\text{PCl}_5} \text{Intermediate} \xrightarrow{\text{Liq. NH}_3} \text{X}$$
 - $\text{CH}_3 - \text{CH} = \text{CH} - \text{COOH}$
 - $\text{CH}_3 - \text{CH} = \text{CH} - \text{CONH}_2$



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9. Picric acid is



10. Gabriel synthesis is used to prepare

(a) 1° amine

(b) 2° amines

(c) 3° amine

(d) All of these

11. Secondary amines are prepared by reduction of

(a) nitriles

(b) carbylamines

(c) amines

(d) nitrocompounds

12. Benzene diazonium salts are stable at

(a) low temperature

(b) very low temperature

(c) high temperature

(d) very high temperature

13. Which converts amide to 1° amine?

(a) Claisen reaction

(b) Perkin reaction

(c) Mendius reaction

(d) None

14. Amines are basic due to

(a) Production of OH^- when treated with water

(b) Replaceable H atoms on N atom

(c) Lone pair of electron on N atom

(d) None

15. Sulphanilic acid exists as

(a) cation

(b) anion

(c) zwitter ion

(d) common ion



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16. 1° , 2° and 3° amines are commonly separated by
- (a) ACCl (b) Benzene sulphonyl chloride
(c) $(\text{COOC}_2\text{H}_5)_2$ (d) HNO_2
17. Oily nitrosoamine is produced by reaction of with nitrous acid
- (a) methyl amine (b) ethylamine
(c) diethylamine (d) triethylamine
18. An organic compound with formula $\text{C}_3\text{H}_5\text{N}$ on hydrolysis forms an acid which reduced Fehling solution. Compound could be
- (a) Ethanenitrile (b) Isocyanoethane
(c) Ethoxy-ethane (d) Propane nitrile
19. 1 – (N – ethyl-N-methyl) propanamine forms non-superimposable mirror images. But it does not show optical activity because of
- (a) absence of chiral N atom
(b) presence at 2 chiral N atoms
(c) presence of lone pair on N atom
(d) rapid flipping of one form into the other
20. Trimethyl amine has
- (a) Planar geometry (b) Trigonal bipyramidal geometry
(c) Pyramidal shape (d) Octahedral geometry
21. Trisilyl amine has
- (a) Planar geometry (b) Trigonal bipyramidal geometry
(c) Pyramidal shape (d) Octahedral geometry
22. $(\text{CH}_3)_3\text{N}$ and $(\text{SiH}_3)_3\text{N}$ differ in
- (a) $d\pi - p\pi$ bonding in $(\text{CH}_3)_3\text{N}$ and $p\pi - d\pi$ in $(\text{SiH}_3)_3\text{N}$
(b) $p\pi - p\pi$ bonding in $(\text{CH}_3)_3\text{N}$ and $d\pi - p\pi$ in $(\text{SiH}_3)_3\text{N}$
(c) $d\pi - p\pi$ bonding in $(\text{CH}_3)_3\text{N}$ and $p\pi - d\pi$ in $(\text{SiH}_3)_3\text{N}$
(d) $d\pi - p\pi$ bonding in $(\text{CH}_3)_3\text{N}$ and $d\pi - p\pi$ in $(\text{SiH}_3)_3\text{N}$
23. Oxidation of aniline with acidified $\text{K}_2\text{Cr}_2\text{O}_7$ gives X as one of the products. X can be
- (a) benzoic acid (b) quinol
(c) p-benzoquinone (d) maleic acid
24. Schiff's bases are formed when aniline reacts with



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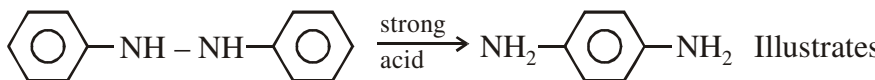


- (a) aromatic aldehydes (b) aryl ketones
(c) aryl halides (d) aryl alcohols
25. Secondary propyl amine is
(a) Primary amine (b) Secondary amine
(c) Tertiary amine (d) Cyanide
26. What is formed when RNH_2 reacts with RCHO
(a) Aniline (b) Acetal
(c) Ketal (d) Imine
27. Conjugate base of $(\text{CH}_3)_2\text{NH}_2^+$ is
(a) $(\text{CH}_3)_3\text{N}$ (b) $(\text{CH}_3)_2\text{NH}$
(c) $(\text{CH}_3)_2\text{N}^-$ (d) $(\text{CH}_3)_2\text{N}^+$
28. End product of the reactions is $\text{C}_2\text{H}_5\text{NH}_2 \xrightarrow{\text{HNO}_2} \text{A} \xrightarrow{\text{PCl}_5} \text{N} \xrightarrow{\text{NH}_3} \text{C}$
(a) ethyl cyanide (b) ethylamine
(c) methyl amine (d) acetamide
29. 1° and 2° amines are distinguished by
(a) Br_2/KOH (b) HClO
(c) HNO_2 (d) NH_3
30. Which is most sensitive to electrophilic action?
(a) benzene (b) benzaldehyde
(c) dinitrobenzene (d) aniline
31. Methyl amine is
(a) acidic (b) basic
(c) neutral (d) none of these
32. Which isomerism is not prevalent in amines
(a) position (b) functional
(c) metamerism (d) stereoisomerism
33. Which will not react with Heisenberg's reagent
(a) $\text{CH}_3\text{CH}_2\text{NH}_2$ (b) $(\text{CH}_3)_2\text{NH}$
(c) $(\text{CH}_3)_3\text{N}$ (d) CH_3NH_2
34. Isocyanide is reduced to



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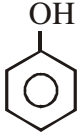

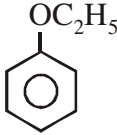
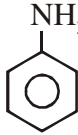
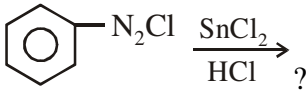


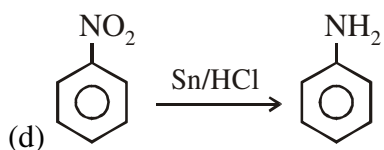
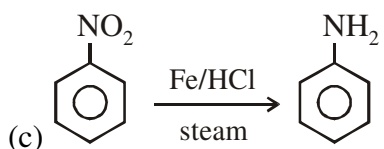
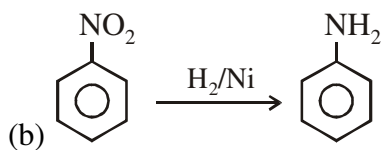
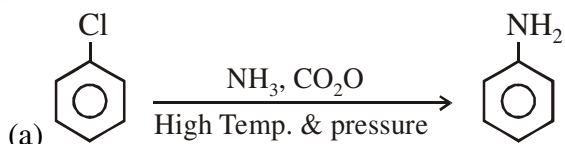
- (a) 1° amine (b) 2° amine
(c) 3° amine (d) none of these
35. Which precipitates the hydroxide with treated with $\text{CH}_3\text{NH}_3 + \text{OH}$
(a) BaCl_2 (b) F_3Cl_3
(c) CaCl_2 (d) NaCl
36.  Illustrates
(a) Benzidine rearrangement (b) Pinacol-pinacolone type
(c) Fries rearrangement (d) None of these
37. Aniline is titrated against a standard solution of
(a) NaOH (b) Phenol
(c) HCl (d) Ethanol
38. The species which forms a complex with CO^{2+} ion is
(a) CH_3NH_2 (b) $(\text{CH}_3)_4\text{N}^+$
(c) $\text{NH}_2\text{CONHCONH}_2$ (d) $\text{H}_2\text{NCH}_2\text{COO}^-$
39. Urea is manufactured by all except
(a) $\text{NH}_4\text{CNO} \xrightarrow{\Delta} \text{NO}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ (b) $\text{CaCN}_2 \xrightarrow{\text{H}_2\text{SO}_4} \text{H}_2\text{CN}_2 \xrightarrow{\text{H}_2\text{O}} \text{Urea}$
(c) $2\text{NH}_3 + \text{CO}_2 \xrightarrow{\text{pressure}} \text{Urea}$ (d) $\text{O}=\text{C} \begin{cases} \text{OC}_2\text{H}_5 \\ \text{OC}_2\text{H}_5 \end{cases} + 2\text{NH}_3 \longrightarrow \text{Urea}$
40. Urea is oxidised to N_2 in the presence of
(a) conc. MnO_2 (b) ZnO
(c) Alkaline hypobromite (d) MgO
41. Urea condensed with malonic acid gives
(a) Barbituric acid (b) Oxylyl urea
(c) Acetic acid (d) Uric acid
42. Urea heated in a test tube forms colourless needles of which gives violet colour with CuS and NaOH
(a) Barbituric acid (b) Oxylyl urea
(c) Biuret (d) Uric acid
43. At 180°C urea forms



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- (a) CO_2 and N_2 (b) $\text{NH}_2\text{CONH} - \text{CO} - \text{NH}_2$
(c) $\text{H}_2\text{C}_3\text{N}_3\text{O}_3$ (d) HCNO
44. Hydrazine burns in air to form
(a) CO_2 , NO_2 and H_2O (b) NO_2 and CH_4
(c) N_2 and CO_2 (d) CO_2 and H_2O only
45. Benzene diazonium chloride solution on boiling gives
- (a)  (b) 
- (c)  (d) 
46. Azodye is formed by coupling benzene diazonium chloride with
(a) phenol (b) aniline
(c) both of these (d) none of these
47. Benzene diazonium chloride is formed by reaction between
(a) HNO_2 and aniline (b) HNO_2 and benzene
(c) H_2 and benzene (d) N_2 and chlorobenzene
48. 
- (a) Phenyl hydrazine hydrochloride (b) Aniline
(c) Chlorobenzene (d) None of these
49. Diazo reaction was discovered by
(a) Peter Griess (b) Kolbe
(c) Sandmeyer (d) Wurtz
50. Which undergoes mustard oil reaction?
(a) Primary amine (b) Secondary amine
(c) Tertiary amine (d) Quaternary ammonium salt
51. Aniline is manufactured by all except



52. Very high temperature and pressure is needed for

- (a) $C_6H_5NO_2 \rightarrow C_6H_5NH_2$ (b) $C_6H_5Cl + NH_3 \rightarrow C_6H_5NH_2$
(c) $C_6H_5CH + H_2 \rightarrow C_6H_5CH_2NH_2$ (d) $C_6H_5CONH_2 \rightarrow C_6H_5NH_2$

53. 1°, 2° and 3° amines can be separated by all except

- (a) Fractional distillation (b) Hoffmann's method
(c) Heisenberg's method (d) Selective crystallation

54. Hoffmann's method for separation of amines involves

- (a)
c1ccc(S(=O)(=O)Cl)cc1 (b) Diethyl oxalate
(c) $HCl/SnCl_2$ (d)
CCOC(=O)OC

55. Intermolecular H-bonding is not likely to be found in

- (a) Aniline (b) Triphenylamine
(c) Dimethylamine (d) Methylamine

56. A N-containing compound that dissolves in cold dil. HCl is

- (a) C_6H_5CN (b) $C_6H_5NH_2$
(c) $C_6H_5NO_2$ (d) $C_6H_5CONH_2$

57. A compound X has the formula C_7H_7NO . ON treatment with Br_2 and KOH , X gives an amine Y gives carbylamine test. Y upon diazotisation and coupling with phenol gives azodye Z. X is



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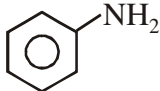
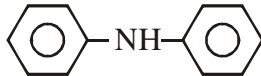


- (a) $C_6H_5CONH_2$ (b) $C_6H_5-C-NH-CO-CH_3$
(c) $C_6H_5NH_2$ (d) Any of these
58. $(SiH_3)_3N$ is known as
(a) tri-silicon hydrate ammonia (b) Silicon nitride
(c) trisilyl amine (d) trisilicon hydride amine
59. Bond angle in NH_3 is
(a) $109^\circ 30'$ (b) $109^\circ, 28'$
(c) 107° (d) 105°
60. Gabriel's phthalimide reaction is used to prepare
(a) primary amines (b) 2° amines
(c) 3° amines (d) all of the above
61. Lossen rearrangement involves
(a) Oxalic acid (b) Oxamic acid
(c) Hydroxamic acid (d) Acetic acid
62. Tertiary amines are obtained by
(a) Gabriel phthalimide synthesis (b) Embden Meyerhof pathway
(c) Heating quaternary ammonium bases (d) Any of these
63. Secondary amines react with HNO_2 to give
(a) Yellow colour (b) Orange colour
(c) Cyan colour (d) Violet colour
64. Aniline forms aniline black when oxidised with
(a) Alkaline $KMnO_4$ (b) Acidic $KMnO_4$
(c) Chromic acid (d) $HClO$
65. 3° amines are weak bases due to
(a) Saytzeff rule (b) Blackmann's law
(c) Clausius-Clayperon law (d) None of these
66. Least reactive of all acid derivatives is
(a) amide (b) chloride
(c) fluoride (d) none of these
67. Urea was first prepared by



CHEMISTRY



- (a) Vant Hoff (b) Wohler
(c) Wurtz (d) Perkin
68. Wohler used
(a) Ammonium cyanide (b) Ammonium cyanate
(c) Ammonium isocyanide (d) Ammonium isocyanate
69. Which is least basic
(a)  (b) $(\text{CH}_3)_3\text{N}$
(c)  (d) $(\text{CH}_3)_2\text{NH}$
70. Before nitration, aniline is
(a) Acetylated (b) Chlorinated
(c) Oxidised (d) None of these
71. Selective reduction of one- NH_2 group in diaminobenzene is done by
(a) $(\text{NH}_4)_2\text{CO}_3$ (b) $(\text{NH}_4)_2\text{SO}_4$
(c) $(\text{NH}_4)_2\text{SO}_3$ (d) $(\text{NH}_4)_2\text{S}$
72. Secondary amines can exhibit
(a) Metamerism (b) Geometrical isomerism
(c) Optical isomerism (d) None of these
73. Diethyl oxalate does not react with
(a) Primary amine (b) Secondary amine
(c) Tertiary amine (d) All of these
74. All class of amines react with
(a) Water (b) Acids
(c) Alkyl halides (d) All of these
75. Which amine does not react with HNO_2
(a) Primary (b) Secondary
(c) Tertiary (d) None of these
76. Grignard reagent reacts with to give hydrocarbons
(a) Primary (b) Secondary
(c) Primary and secondary (d) Primary, secondary and tertiary



CHEMISTRY



77. Which is poisonous
- (a) HCN (b) KCN
(c) NaCN (d) all of these
78. Main nitrogenous excretory product of reptiles is
- (a) Water (b) Urea
(c) Uric acid (d) Ammonia

Answer

1. c	17. d	33. c	49. a	65. d
2. a	18. b	34. b	50. c	66. b
3. b	19. d	35. b	51. d	67. b
4. a	20. c	36. a	52. b	68. d
5. c	21. a	37. c	53. d	69. c
6. a	22. c	38. a	54. b	70. a
7. d	23. c	39. a	55. b	71. d
8. d	24. a	40. c	56. b	72. a
9. a	25. a	41. a	57. a	73. c
10. d	26. d	42. c	58. c	74. d
11. b	27. b	43. c	59. c	75. c
12. a	28. b	44. c	60. a	76. c
13. d	29. a	45. a	61. c	77. d
14. c	30. d	46. c	62. c	78. c
15. c	31. b	47. a	63. a	
16. b	32. d	48. a	64. b	



Amines, Nitro Compounds, Nitrites cyanides, Isocyanide

- An example of ambient nucleophile is
 - $-\text{NH}_2$
 - $-\text{OH}$
 - $-\text{NO}_2$
 - H_2O
- Urea on heating from biureat which is
 - $\text{NH}_2\text{CONH}_2\text{CONH}_2$
 - $\text{NH}_2\text{COCONH}_2$
 - Botn (a) & (b)
 - None of these
- Which is most basic?
 - NH_3
 - CH_3NH_2
 - $(\text{CH}_3)_2\text{NH}$
 - $(\text{CH}_3)_3\text{N}$
- $\text{RCOOH} \xrightarrow[\text{reaction R}]{\text{NH}_3\Delta} \text{Product R}$

Product P and reactor R are

 - R NH_2 , schimdt
 - RCONH_2 , schimdt
 - RCONH_2 Hofmann
 - RNH_3 HOmann
- The reduction of methyl cyanide with sodium and alcohol gives
 - methyl amine
 - ethyl amine
 - cuetic acid
 - methyl alcohol
- Ammonium acetate can be converted into acetamide by
 - Heating
 - heating in the presence of P_2O_5
 - Using Br_2/KOH
 - Heating in the presence of CH_3COOH
- An aliphatic organic compound containing C, H and N reacts with dilute HCl to produce formic acid. It is reduced to dimethyl amine by P or Ni and it undergoes an addition reaction with chlorine and sulphur. The compound can be
 - CH_3NC
 - CH_3CN
 - CH_3NH_2
 - A mixture of (a) and (b)
- Ethyl isocyanide is prepared by the reaction between
 - $\text{C}_2\text{H}_5\text{Br}$ and KCN
 - $\text{C}_2\text{H}_5\text{Br}$ and AgCN
 - $\text{C}_2\text{H}_5\text{Br}$ and HCN
 - $\text{C}_2\text{H}_5\text{Br}$ and NH_3
- In the reaction
 $\text{RCONH}_2 + \rightarrow \text{RNH}_2$, the reagent X is



CHEMISTRY



- (a) PCl_5 (b) $\text{NaOH} + \text{Br}$
(c) Sodalime (d) NaOBr
10. In nitration of benzene with conc HNO_3 and conc H_2SO_4 , the electrophile is
(a) NO_2^+ (b) NO_2^-
(c) NO_2 (d) Nitric oxide
11. A nitroalkane reacts with nitrous acid to produce a blue pseudonitroles which is insoluble in alkali the nitroalkane could be
(a) $\text{CH}_3\text{CH}_2\text{NO}_2$ (b) $(\text{CH}_3)_2\text{CNNO}_2$
(c) $(\text{CH}_3)_3\text{CNO}_2$ (d) $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{NO}_2$
12. The oxidation of aniline with $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$ produces
(a) benzoic acid (b) benzene
(c) P-benzoquinone (d) P-nitrophenol
13. How many isomeric amines can have the formula $\text{C}_4\text{H}_{11}\text{N}$
(a) five (b) six
(c) seven (d) eight
14. The presence of primary amine can be confirmed by
(a) Reaction with HNO_2 (b) reaction with CHN_3
(c) reaction with grignard reagent (d) reaction with acetyl chloride
15. Gabriel phthalimide synthesis is used for the preparation of
(a) primary aromatic amine (b) primary aliphatic amine
(c) secondary amine (d) Tertiary amine
16. Amides may be converted into amines by reaction named after
(a) Perkin (b) claisen
(c) Hofmann (d) Kolbe
17. A compound which on reaction with aqueous nitrous acid gives an oily nitroso amine is
(a) methylamine (b) Ethylamine
(c) Diethyl amine (d) Triethyl amine
18. The pri., sec. and ter. amines can be distinguished by
(a) Hisenberg's reagent (b) Grignard's reagent



CHEMISTRY



- (c) Fehling's solution (d) Tollen's reagent
19. Gas evolved during the reaction of sodium metal on ethyl amide is
- (a) N_2 (b) C_2H_2
(c) H_2 (d) CO_2
20. Which of the following is carbamide
- (a) CH_3CONH_2 (b) NH_2CONH_2
(c) $CH_2(NH_2)CONH_2$ (d) $CO(OH)NH_2$
21. The action of nitrous acid on a primary amine gives
- (a) Nitroalkane (b) Alkyl nitrite
(c) Alcohol (d) Secondary amine
22. A colourless organic compound gave brisk effervescence with a mixture of $NaNO_2$ and dil HCl it could be
- (a) Glucose (b) Oxalic acid
(c) Urea (d) Benzoic acid
23. Tertiary nitro compound can not show tautomerism because
- (a) They are very stable (b) Isomerises to give sec nitro compounds
(c) Do not have available H atom (d) They are highly reactive
24. $RMgX$ on reacting with cyanogen chloride gives
- (a) $R - NC$ (b) $R - Cl$
(c) $R - CN$ (d) none of these
25. Nitro methane is subjected to the treatment with chlorine in the presence of sodium hydroxide. the main products
- (a) Mono chloro nitromethane (b) Trichloro methane
(c) Chloropicrin (d) None of these
26. Diethyl amine on oxidation with $KMnO_4$ gives
- (a) Ethanol (b) Propanone
(c) Tert ethyl hydrazine (d) None of these
27. When aniline is heated with glacial acetic acid in presence of anhydrous $ZnCl_2$, the product is
- (a) Acetamide (b) Acetanilide
(c) Phenyl acetamide (d) Chlorobenzene
28. Nitroalkane is acidic only towards



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- (a) Na_2CO_3 (b) NaOH
(c) Alcohol (d) Liquid NH_3
29. Nitro benzene on reduction with Al-Hg and water gives
(a) Azo benzene (b) Aniline
(c) Azoxy benzene (d) Phenyl hydroxylamine
30. Oil of mirbane is another name of
(a) Aniline (b) Nitrobenzene
(c) Toulén (d) Toudene
31. The reduction of CH_3CN to $\text{CH}_3\text{CH}_2\text{NH}_2$ is called
(a) Rosenmund reduction (b) Clemmensen's reduction
(c) Mendius reduction (d) Hofmann's reduction
32. Aniline on treating with NaNO_2/HCl at 0°C followed by alkaline β -naphthal solution, gives
(a) A brilliant red dye (b) A blue coloured solution
(c) A purple precipitate (d) A yellow coloured complex
33. Isocyanide test is used for detection of
(a) Primary alcohol (b) Primary amines
(c) Secondary amines (d) Secondary amine
34. A diazonium salt reacts with phenol to give an azo dye. The reaction is called
(a) Diazotisation (b) Condensation
(c) Coupling (d) Reduction
35. When aniline reacts with oil of bitter almonds ($\text{C}_6\text{H}_5\text{CHO}$) condensation takes place and benzol derivatives are formed these are known as
(a) Iodide of millon's base (b) Schiff's reagent
(c) Bendict reagent (d) Schiff's base
36.
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{N} \begin{array}{l} / \text{H} \\ \backslash \text{H} \end{array} \\ | \\ \text{CH}_3 \end{array}$$
 is a
(a) Primary amine (b) Secondary amine
(c) Tertiary amine (d) Ammonium salt
37. The geometry of ethyl amine is?



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- (a) Pyramidal (b) Tetrahedral
(c) Triangular planner (d) Square planar
38. When ethanol is mixed with ammonia and passed over chlorine, the compound formed is?
(a) $C_2H_5NH_2$ (b) C_2H_4
(c) $C_2H_5OC_2H_5$ (d) CH_3OCH_3
39. In order to get secondary amine which of the following should be reduced?
(a) Nitriles (b) Carbylamine
(c) Amines (d) Nitro compounds
40. Alkanamide, which on Hofmann's gives 1-phenylethyl-amine is
(a) 2-phenylpropanamide (b) 3-phenylpropanamide
(c) 2-phenylethanamide (d) n-phenylethanamide
41. The reaction
$$CH_3CN + 4H \xrightarrow{Na/C_2H_5OH} CH_3CH_2NH_2$$
 is called
(a) Hofmann's Bromamide reaction (b) Mendius reaction
(c) Sahatier reaction (d) None of these
42. Acetoneoxime on catalytic hydrogenation gives
(a) 1-propanamine (b) Iso propylamine
(c) Ethyl methyl amine (d) CH_4 and ethanamine
43. Which of the following is hydrolysed to give secondary amine
(a) Alkyl cyanide (b) $HCON \begin{matrix} /CH_3 \\ \backslash CH_3 \end{matrix}$
(c) Nitro paraffins (d) Acid amide
44. In the diazotisation of aniline with sodium nitrite and hydrochloric acid, the excess of hydrochloric acid is used primarily to
(a) Suppress the concentration of free aniline
(b) Suppress the hydrolysis too phenol
(c) ensure a stoichiometric amount of nitrous acid and HCl
(d) Neutrilise the base liberated
45. Primary amine heated with CS_2 in presence of excess of $HgCl_2$ gives isothiocyanate. The reaction is called



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- (a) Hofmann's bromamide reaction (b) Hofmann's mustard oil reaction
- (c) Perkin's condensation (d) Hofmann's elimination
46. Silver chloride is soluble in methylamine due to the formation of
- (a) $[\text{Ag}(\text{CH}_3\text{NH}_2)_3] \text{Cl}$ (b) $\text{Ag} + \text{CH}_3\text{Cl} + \text{NH}_4\text{Cl}$
- (c) $[\text{Ag}(\text{CH}_3\text{NH}_2)_2] \text{Cl}$ (d) AgOH
47. Carbylamine reaction tubes are into thrown into sink, to avoid bad odour but treated with conc. HCl to give?
- (a) $\text{R} - \text{COOH} + \text{NH}_3$ (b) RNH_2
- (c) $\text{RNH}_2 + \text{HCOOH}$ (d) $\text{RCOOH} + \text{N}_2$
48. Amines which do not react with diethyl oxalate
- (a) Primary (b) Secondary
- (c) Tertiary (d) All of them
49. Reaction of primary amine with aldehyde yields
- (a) Aldimines (b) Nitriles
- (c) Amides (d) Nitro compound
50. Primary amines on heating with CO_2 followed by excess of mercuric chloride
- (a) Hoffmann bromide reaction
- (b) Hoffmann mustard oil reaction
- (c) Carbylamine reaction
- (d) Perkin reaction



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Answer

1. d	11. b	21. c	31. c	41. c
2. a	12. c	22. c	32. a	42. c
3. c	13. a	23. c	33. b	43. a
4. a	14. b	24. c	34. c	44. b
5. a	15. b	25. c	35. d	45. c
6. b,d	16. c	26. c	36. a	46. d
7. a	17. c	27. b	37. a	47. b
8. b	18. a	28. b	38. a	48. c
9. b,d	19. c	29. d	39. b	49. a
10. a	20. b	30. b	40. c	50. b



CHEMISTRY

CHEMICAL EQUILIBRIUM



- For the Gas phase Reaction $2\text{NO} = \text{N}_2 + \text{O}_2$; $\Delta H = -43.5 \text{ kcal}$; which one of the following is true for $\text{N}_{2(\text{g})} + \text{O}_{2(\text{g})} = 2\text{NO}$
 - K is independent of T
 - K decreases as T decreases
 - K increases as T decreases
 - K varies with addition of NO
- The addition of the salt CH_3COONa to a solution of CH_3COOH results in a decrease of the initial
 - $[\text{Na}^+]$
 - $[\text{CH}_3\text{COO}^-]$
 - $[\text{H}^+]$
 - $[\text{OH}^-]$
- If sodium acetate is added to a dilute solution of acetic acid, the pH will
 - increase
 - decrease
 - first decrease and then increase
 - first increase, then decrease
- 0.10 mole of acetic acid and 0.02 mole of sodium acetate are dissolved in water to make one litre of solution. The dissociation constant of CH_3COOH is 1.8×10^{-5} which of these statements are false?
 - $[\text{H}^+]$ is 9×10^{-10} moles per litre
 - $[\text{CH}_3\text{COO}^-]$ is 0.02 moles per litre
 - The common ion effect in the solution causes an increase in the ionisation of acetic acid
 - If no sodium acetate were present, the concentration of H^+ could be considerably higher.
- The pH of a 1 N solution of CH_3COONa (hydrolysis constant = 5.6×10^{-10}) is nearly
 - 7.4
 - 8.4
 - 9.38
 - 8.9
- A solution of NH_3 containing 10^{-5} mol/litre of OH^- ions is added to a 0.01 M solution of MgSO_4 , a salt which is completely dissociated. If K_{sp} for $\text{Mg}(\text{OH})_2$ is 1.2×10^{-11} , which of the following statement are true?
 - A saturated solution of $\text{Mg}(\text{OH})_2$ is formed
 - The solubility product of $\text{Mg}(\text{OH})_2$ is exceeded, and a precipitate is formed
 - No solid is precipitated when the solutions are mixed
 - No significant change occurs
- K_{sp} of each of the following salts is 1.0×10^{-6} , which salts has greatest molar solubility
 - MX
 - MX_2
 - MX_3
 - M_2X
- Solubility of a salt M_2X is $x \text{ gm mole l}^{-1}$. The solubility product of the salt will be
 - x^5
 - $16x^2$



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(c) $96x^5$

(d) $108x^5$

9. For the reaction, $2\text{KClO}_3(\text{s}) = 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$, $K_c = 2.0$ at 750°C . What is the equilibrium concentration of O_2 ?
- (a) 2.0 M (b) $(2.0)^{1/3}$ M
(c) $(2.0)^{-1/3}$ M (d) 8.0 M
10. For the reaction $2\text{H}_2\text{O}(\text{l}) = 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$, the relation between K_p and K_c is
- (a) $K_p = K_c$ (b) $K_p = K_c(\text{RT})$
(c) $K_p = K_c(\text{RT})^3$ (d) $K_p = K_c(\text{RT})^{-3}$
11. Nitrogen gas was injected into an equilibrium mixture of
- $$2\text{SO}_3(\text{g}) \rightleftharpoons 2\text{SO}_2(\text{g}) + \text{O}_2(\text{g})$$
- The pressure is increased from 1.0 atm. Which of the following statements is correct?
- (a) The concentration of the reacting gases are unchanged
(b) $[\text{SO}_3]$ increases
(c) $[\text{SO}_2]$ increases
(d) $[\text{O}_2]$ increases
12. The reaction $\text{NO}(\text{g}) + \text{O}_3(\text{g}) \rightleftharpoons \text{NO}_2(\text{g}) + \text{O}_2(\text{g})$ reached equilibrium at 310 K. Some of the NO_2 was then removed from the reaction chamber. Which of the following statements correctly describes the new equilibrium that would result?
- (a) The concentration of NO increase
(b) The concentration of O_2 decreases
(c) The concentration of NO remains the same
(d) The concentration of O_3 decreases
13. For the reaction $2\text{NH}_3(\text{g}) \rightleftharpoons \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$, what would you expect if 0.6 atm of neon gas is added to the equilibrium mixture of gases?
- (a) Since neon is more dense than hydrogen, it would suppress the reverse reaction thus, more hydrogen would be formed
(b) the position of equilibrium would shift to the left
(c) because neon does not react with any of the other chemical species, it cannot change the equilibrium partial pressures of the reactants or products therefore the position of equilibrium will remain the same.
(d) because neon is isoelectronic with ammonia, it would compete with ammonia in the forward reaction; therefore the equilibrium would shift to the right
14. One mole of SO_2 , two moles of O_2 , and two moles of SO_3 are placed in a 1.0 litre flask of 200°C . If K_c for the reaction,
- $$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}), \text{ is } 0.50 \text{ at } 200^\circ\text{C}, \text{ what occurs in the flask?}$$
- (a) $[\text{SO}_3]$ increases



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- (b) $[O_2]$ increases
- (c) $[SO_2]$ decreases
- (d) no reaction occurs as the system is at equilibrium
15. An equilibrium mixture for the reaction $2H_2S_{(g)} \rightleftharpoons 2H_{2(g)} + S_{2(g)}$ had 1 meter of H_2S , 0.2 mole of H_2 and 0.8, mole of S_2 in a 2 litre flask. The value of K_e in mole litre⁻¹ is
- (a) 0.004 (b) 0.080
(c) 0.016 (d) 0.160
16. The molar solubility of $BaSO_4$ is 1.4×10^{-5} M. What is the value of K_{sp} for this salt?
- (a) 1.14×10^{-5} (b) 2.28×10^{-5}
(c) 1.30×10^{-10} (d) 5.20×10^{-10}
17. A solution was prepared such that the concentrations of each of the ion $Br^-CO_3^{2-}$, CN^- , I^- , and PO_4^{3-} were 1.00×10^{-4} M. If Ag^+ ions were then added to this solution which of following precipitates would form first?
- (a) $AgBr$, $K_{sp} = 5.2 \times 10^{-13}$ (b) Ag_2CO_3 , $K_{sp} = 8.2 \times 10^{-12}$
(c) $AgCN$, $K_{sp} = 1.2 \times 10^{-16}$ (d) AgI , $K_{sp} = 8.5 \times 10^{-17}$
18. Calculate the equilibrium concentration of Zn^{+2} in a solution formed by placing 0.0010 moles of $Zn(OH)_4^{2-}$ in 1.0 litre of solution
- $Zn(OH)_4^{2-}(aq) \rightleftharpoons Zn^{+2}(aq) + 4OH^-(aq)$, $K_{inst} = 3.5 \times 10^{-16}$
- (a) 5.9×10^{-10} M (b) 2.0×10^{-4} M
(c) 6.7×10^{-5} M (d) 1.0×10^2 M
19. A solution contains 0.10 M Cl^- and 1.0×10^{-8} M CrO_4^{2-} . Solid $AgNO_3$ is added slowly. At what concentration of Ag^+ ions does a precipitate begin to form $AgCl$.
- (a) 1.4×10^{-2} M (b) 1.9×10^{-12} M
(c) 1.0×10^{-8} M (d) 1.7×10^{-11} M
20. Fear or excitement generally causes one to breathe rapidly and it results in the decrease of CO_2 concentration in blood. In what way will it change the pH of blood?
- (a) pH will increase (b) pH will decrease
(c) no change (d) pH will adjust to 7
21. A higher value for equilibrium constant K shows that
- (a) The reaction has gone to near completion towards right
(b) The reaction has not yet started
(c) The reaction has gone to top near completion towards left
(d) None of these
22. For the chemical reaction



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- $3X_{(g)} + Y_{(g)} \rightarrow X_3Y_{(g)}$ the amount of X_3Y at equilibrium is affected by
- (a) Temperature and pressure
(b) Temperature only
(c) Pressure only
(d) Temperature, Pressure and Catalyst
23. In the gaseous equilibrium $A + 2B \rightleftharpoons C + \text{heat}$, the forward reaction is favoured by
- (a) low temperature
(b) low pressure
(c) high pressure and low temperature
(d) high pressure and high temperature
24. Le chatelier's Principle is not applicable to
- (a) $Fe_{(s)} + S_{(s)} \rightleftharpoons FeS_{(s)}$
(b) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$
(c) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
(d) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$
25. Pressure is applied to the following equilibrium liquid ... vapour the boiling point of the liquid
- (a) will decrease
(b) will increase
(c) may not change
(d) will not change
26. For which reaction $K_p = K_c$
- (a) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
(b) $2NOCl_{(g)} \rightleftharpoons 2NO_{(g)} + Cl_{2(g)}$
(c) $I_{2(g)} + H_{2(g)} \rightleftharpoons 2HI_{(g)}$
(d) None
27. The degree of dissociation of a weak acid increases with
- (a) decreasing pressure
(b) increasing pressure
(c) increasing concentration
(d) decreasing concentration
28. Ionic product of water is defined as
- (a) $[H_3O^+][OH^-]$
(b) $\frac{[H_3O^+][OH^-]}{[H_2O]^2}$
(c) $\frac{[H_3O^+][OH^-]}{[H_2O]}$
(d) $\frac{[H_3O]}{[OH^-]}$
29. The pH of a neutral solution at 1000°C when $k_w = 1.0 \times 10^{-12}$ is
- (a) 7
(b) 6
(c) 0
(d) 12
30. An acid solution of $\text{pH} = 2$ is diluted hundred times. The pH of the solution becomes
- (a) 6.95
(b) 6



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(c) 4

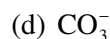
(d) 8



31. The hydronium ion concentration of 0.01M CH_3COOH is ($K_a = 10^{-5}$)
- (a) 10^{-7} (b) 10^{-2}
(c) 3.3×10^{-4} (d) 10^{-5}
32. Which of the following is a buffer solution?
- (a) $\text{CH}_3\text{COOH} + \text{NH}_3\text{OH}$ (b) $\text{HCl} + \text{NaOH}$
(c) $\text{H}_2\text{SO}_4 + \text{KOH}$ (d) a, b and c are buffers
33. The pH of 0.20 M HCOOH is between ($K_a(\text{HCOOH}) = 1.8 \times 10^{-4}$)
- (a) 2.0 and 2.5 (b) 2.5 and 3.0
(c) 3.0 and 3.5 (d) 3.5 and 4.0
34. The weak monoprotic acid HA is 3.2% dissociated in 0.086 M solution. What is the acidity constant, K_a , of HA?
- (a) 2.8×10^{-3} (b) 9.0×10^{-5}
(c) 2.3×10^{-4} (d) 1.5×10^{-2}
35. If a neutral solution has $\text{p}K_w = 13.36$ at 50°C then pH of the solution is
- (a) 6.68 (b) 7
(c) 7.63 (d) None of these
36. The $\text{p}K_a$ of a weak acid is 4.8 what should be the ratio of $[\text{Acid}]/[\text{Salt}]$ of a buffer if $\text{pH} =$
- (a) 0.1 (b) 10
(c) 1 (d) 2
37. Water is a
- (a) protophobic solvent (b) protophilic solvent
(c) amphiprotic solvent (d) aprotic solvent
38. The following reactions are known to occur in the body
 $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons \text{H}^+\text{HCO}_3^-$. If CO_2 escapes from the system
- (a) pH will decrease
(b) Hydrogen ion concentration will diminish
(c) H_2CO_3 concentration will be promoted
(d) The forward reaction will be promoted
39. The pH of a solution is zero. The solution is
- (a) Neutral (b) Normal acid
(c) Decinormal acid (d) Strongly alkaline
40. Select the species which can act both as an acid and as a base
- (a) SO_2^- (b) HSO_4^-



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41. The value of K_w of water at 298 K
- (a) 1.0×10^{-14} (b) 1.0×10^{-12}
(c) 1.0×10^{-14} (d) 0.2×10^{-12}
42. The pH of 0.1 M NH_4Cl solution is
- (a) More than 7 (b) Less than 7
(c) Nearly 7 (d) Highly acidic
43. The $\text{p}K_a$ of a weak acid (HA) is 4.5. The pOH of an aqueous buffered solution of HA in which 50% of the acid ionised is
- (a) 4.5 (b) 2.5
(c) 9.5 (d) 7.0
44. In a saturated solution of the sparingly soluble strong electrolyte AgIO_3 (Molecular mass = 283) the equilibrium which sets in is $\text{AgIO}_3(\text{s}) \rightleftharpoons \text{Ag}^+(\text{aq}) + \text{IO}_3^-(\text{aq})$, if the solubility product constant K_{sp} of AgIO_3 at a given temperature is 1.0×10^{-8} , what is the mass of AgIO_3 contained in 100 mL of its saturated solution?
- (a) 28.3×10^{-2} g (b) 2.83×10^{-3} g
(c) 1.0×10^{-7} g (d) 1.0×10^{-4} g
45. The first and second dissociation constants of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be
- (a) 5.0×10^{-5} (b) 5.0×10^{15}
(c) 5.0×10^{-15} (d) 0.2×10^5
46. The equilibrium constant for the reaction $\text{SO}_3(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g})$ is $K_c = 4.9 \times 10^{-2}$. The value of K_c for the reaction $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$
- (a) 416 (b) 2.40×10^{-3}
(c) 9.8×10^{-2} (d) 4.9×10^{-2}
47. Given the data at 25°C
- $$\text{Ag} + \text{I}^- \rightarrow \text{AgI} + \text{e}^- ; E^\circ = 0.152 \text{ V}$$
- $$\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^- ; E^\circ = -0.800 \text{ V}$$
- What is the value of $\log K_{sp}$ for AgI? $\left(2.303 \frac{RT}{F} = 0.059 \text{ V} \right)$
- (a) -8.12 (b) + 8.612
(c) -37.83 (d) -16.13
48. If α is the degree of dissociation of Na_2SO_4 , the van't Hoff factor (i) used for calculating the molecular mass is
- (a) $1 - 2\alpha$ (b) $1 + 2\alpha$



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(c) $1 - \alpha$

(d) $1 + \alpha$

49. Consider an endothermic reaction $X \rightarrow Y$ with the activation energies E_b and E_f or the backward and forward reactions respectively. In general

(a) there is no definite relation between E_b and E_f

(b) $E_b = E_f$

(c) $E_b > E_f$

(d) $E_b < E_f$

50. The solubility product of a salt having general formula MX_2 , in water is 4×10^{-12} . The concentration of M^{2+} ions in the aqueous solution of the salt is

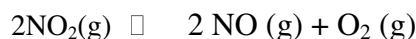
(a) $4.0 \times 10^{-10} M$

(b) $1.6 \times 10^{-4} M$

(c) $1.0 \times 10^{-4} M$

(d) $2.0 \times 10^{-6} M$

51. For the reaction



($K_c = 1.8 \times 10^{-6}$ at $184^\circ C$) ($R = 0.00831 \text{ kJ}/(\text{mol}\cdot K)$)

When K_p and K_c are compared at $184^\circ C$ it is found that

(a) whether K_p is greater then, less than or equal to K_c depends upon the total gas pressure

(b) $K_p = K_c$

(c) K_p is less than K_c

(d) K_p is greater than K_c

52. The exothermic formation of ClF_3 is represented by the equation

$Cl_2(g) + 3F_2(g) \rightleftharpoons 2ClF_3(g)$; $\Delta H_r = -329 \text{ kJ}$ which of the following will increase the quantity of ClF_3 in an equilibrium mixture of Cl_2 , F_2 and ClF_3 ?

(a) Adding F_2

(b) Increasing the volume of the container

(c) Removing Cl_2

(d) Increasing the temperature

53. An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm pressure. Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask. When the decomposition reaction reaches equilibrium, the total pressure in the flask rises to 0.84 atm? The equilibrium constant for NH_4HS decomposition at this temperature is

(a) 0.11

(b) 0.17

(c) 0.18

(d) 0.30

54. The conjugate base of $H_2PO_4^-$ is

(a) PO_4^{3-}

(b) P_2O_5

(c) H_3PO_4

(d) HPO_4^{2-}

55. What is the equilibrium expression for the reaction $P_4(s) + 5O_2(g) \rightleftharpoons P_4O_{10}(s)$?



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$$(a) K_c = \frac{[P_4O_{10}]}{[P_4][O_2]^5}$$

(b)

$$K_c = \frac{[P_4O_{10}]}{5[P_4][O_2]}$$

$$(c) K_c = [O_2]^5$$

$$(d) K_c = \frac{1}{[O_2]^5}$$

56. For the reaction,

$CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$, the K_p/K_c is equal to

$$(a) \frac{1/RT}{\sqrt{RT}}$$

$$(b) RT$$

$$(c) \sqrt{RT}$$

$$(d) 1.0$$

57. The equilibrium constant for the reaction

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ at temperature T is 4×10^{-4} . The value of K_c for the reaction $NO(g) \rightleftharpoons \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$ at the same temperature is

$$(a) 2.5 \times 10^2$$

$$(b) 50$$

$$(c) 4 \times 10^{-4}$$

$$(d) 0.02$$

58. The molar solubility (in mol L^{-1}) of a sparingly soluble salt MX_4 is 's'. The corresponding solubility product is K_{sp} . s is given in terms of K_{sp} by the relation

$$(a) s = (K_{sp}/128)^{1/4}$$

$$(b) s = (128 K_{sp})^{1/4}$$

$$(c) s = (256 K_{sp})^{1/5}$$

$$(d) s = (K_{sp}/256)^{1/5}$$



CHEMISTRY

CHEMICAL EQUILIBRIUM



ANSWER

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (d) | 2. (c) | 3. (a) | 4. (c) | 5. (d) |
| 6. (c) | 7. (c) | 8. (d) | 9. (b) | 10. (c) |
| 11. (a) | 12. (b) | 13. (c) | 14. (b) | 15. (c) |
| 16. (c) | 17. (d) | 18. (c) | 19. (c) | 20. (a) |
| 21. (a) | 22. (a) | 23. (c) | 24. (a) | 25. (b) |
| 26. (c) | 27. (d) | 28. (a) | 29. (b) | 30. (c) |
| 31. (c) | 32. (a) | 33. (a) | 34. (b) | 35. (a) |
| 36. (a) | 37. (c) | 38. (b) | 39. (b) | 40. (b) |
| 41. (a) | 42. (b) | 43. (c) | 44. (b) | 45. (c) |
| 46. (a) | 47. (d) | 48. (b) | 49. (d) | 50. (c) |
| 51. (d) | 52. (a) | 53. (a) | 54. (?) | 55. (?) |
| 56. (?) | 57. (?) | 58. (?) | | |



CHEMISTRY ELECTROCHEMISTRY



Exercise

- On electrolysis a solution of dilute H_2SO_4 is between platinum electrodes, the gas evolved at anode is
 - SO_2
 - SO_3
 - O_2
 - H_2
- The amount of ion discharged during electrolysis is not directly proportional to
 - resistance
 - time
 - current
 - chemical equivalent of the ion
- The cell constant is the product of resistance and
 - specific conductance
 - equivalent conductance
 - molecular conductance
 - specific resistance
- The amount of electrolyte decomposed by passing one coulomb's of charge is known as
 - equivalent
 - gram-equivalent
 - chemical equivalent
 - electro-chemical equivalent
- In the electrolysis of an aqueous solution of NaOH , 5.6 litres of hydrogen was liberated at cathode. How much hydrogen was liberated at the anode?
 - 2.8 litres
 - 5.6 litres
 - 11.2 litres
 - 22.4 litres
- A current of electricity was passed through a series of cells containing AgNO_3 , CuSO_4 , and H_2SO_4 solutions for a period of 25 minutes. If the weight of silver deposited was 0.5394 gram. What would be the weight of Cu ?
 - 0.1589 grams
 - 1.589 grams
 - 15.89 gram
 - 158.9 grams
- Theory of ionization was given by
 - Rutherford
 - Bohr
 - Faraday
 - Arrhenius
- The chemical reaction
$$\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$$
occurs spontaneously because the change in free energy is
 - Positive
 - Negative
 - Zero
 - Equal to ΔS .
- Which one of the following electrolytes is used in silver plating?



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- (a) Silver chloride
nitrate
- (b) Silver
- (c) Potassium argentocyanide
- (d) Silver amino-chloride
10. 2.5 Faraday of electricity are passed through Aluminium chloride solution, the number of gram equivalent of aluminium deposited is
- (a) 1 (b) 2
(c) 2.5 (d) 0.81
11. The standard reduction potentials, E° for the half reactions are as
- $$\text{Zn}^{2+} + 2e \rightarrow \text{Zn} \quad E^\circ = -0.76 \text{ V}$$
- $$\text{Fe}^{2+} + 2e \rightarrow \text{Fe} \quad E^\circ = -0.41 \text{ V}$$
- The e.m.f of the reaction $\text{Fe} + \text{Zn} \rightarrow \text{Fe}^{2+} + \text{Zn}^{2+}$
- (a) -0.35 V (b) $+0.35 \text{ V}$
(c) $+1.17 \text{ V}$ (d) -1.17 V
12. The best conductor of electricity is a 1 M solution of
- (a) boric acid (b) acetic acid
(c) sulphuric acid (d) phosphoric acid
13. Molar conductivity of strong electrolytes increases with increase in dilution due to
- (a) more ionisation (b) less interionic attraction
(c) more interionic attraction (d) less ionisation
14. As compared to the electricity conductivity of aqueous NaCl, the electrical conductivity of molten NaCl is
- (a) more (b) less
(c) equal (d) none of the above
15. How many coulombs of energy is required for reduction of 1 mol Al^{3+} to Al?
- (a) 96500 C (b) 193000 C
(c) 256000 C (d) 289500 C
16. When a lead storage battery is discharged
- (a) lead sulphate is consumed (b) sulphuric acid is consumed
(c) lead is formed (d) SO_2 is evolved
17. Electro-chemical equivalent of a substance is the quantity liberated on passing electricity equal to
- (a) Faraday (b) one coulomb
(c) 96500 coulombs (d) one ampere
18. During electrolysis of copper sulphate, copper ions move towards
- (a) anode (b) cathode



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- (c) both electrodes (d) all
19. Loss of electrons is oxidation, the process which occurs at anode is
(a) oxidation (b) reduction
(c) both oxidation and reduction (d) none
20. Mathematically Faraday's first law of electrolysis can be expressed as
(a) $w \times Q$ (b) $w \times \frac{1}{Q}$
(c) $w \times Q^2$ (d) $w \times \frac{1}{Q^2}$
21. A cell in which electric current is produced by an oxidation-reduction reaction is called a
(a) standard cell (b) reversible cell
(c) voltaic cell (d) concentration cell
22. Water is non-electrolyte but conducts electricity on dissolving a small quantity of the following
(a) oxygen (b) sugar
(c) NaCl (d) acetone
23. In a cell $An/Zn^{2+} || Cu^{2+} | Cu$ the positive electrode will be
(a) Cu (b) Cu^{2+}
(c) Zn (d) Zn^{2+}
24. Which of the following ion will move towards anode during electrolysis of fused NaOH?
(a) Na^+ ions (b) H^+ ions
(c) OH^- ions (d) O^{2-} ions
25. When electricity is passed through a solution of $AlCl_3$, 13.5 g Al are deposited. The number of faraday must be
(a) 0.5 (b) 1.0
(c) 1.5 (d) 2.0
26. When water is electrolysed, hydrogen and oxygen are evolved (in gram) in the ratio of
(a) 1 : 1 (b) 1 : 8
(c) 1 : 16 (d) 2 : 1
27. A galvanic cell is set up weighing 100 grams and 1.0 litre of 1.0 M $CuSO_4$ solution. How long would the cell run assuming it delivers a steady current of 1.0 ampre?
(a) 1 hour (b) 24.6 hours
(c) 46 hours (d) 53.6 hours
28. The e.m.f of a galvanic cell can be calculated from
(a) The E° values of the half-cells (b) The pH of the solution
(c) The size of electrode (d) The amount of metal in the anode



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29. If 96500 coulombs of current are passed through a solution of ZnSO_4 , the amount of Zn deposited will be equal to its
- (a) gram-equivalent weight (b) gram-molecular weight
(c) atomic-weight (d) electro-chemical equivalent
30. When the solution of an electrolyte is diluted, the equivalent conductance
- (a) decreases (b) increases
(c) remains constant (d) can not be predicted
31. The standard electrode potential of $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$ is
- (a) 1.5 Volts (b) 0.0 Volts
(c) -0.44 Volts (d) -0.04 Volts
32. During electrolysis all ions moves
- (a) In the same direction (b) do not move
(c) to oppositely charged particle (d) all are wrong
33. Calcium metal is obtained by
- (a) electrolysis of molten CaCl_2 (b) heating cement
(c) electrolysis of solution of CaCl_2 in water (d) reduction of CaCl_2 with carbon
34. When the same electric current is pass through the solution of different electrolytes in series. The amount of element deposited on the electrodes are in one ratio of their
- (a) atomic number (b) atomic weight
(c) specific gravities (d) equivalent weight
35. If a strip of copper metal is placed in a solution of ferrous sulphate
- (a) copper will precipitate out (b) iron will precipitate out
(c) copper and iron both will be dissolved (d) no reaction will take place
36. The addition of a polar solvent to a solid electrolyte results in
- (a) polarisation (b) association
(c) ionisation (d) non-liberation of heat
37. Which of the following has lowest number of ions?
- (a) 50 gram CaCl_2 (molar mass – 111) (b) 50 gram K_2SO_4 (molar mass – 174)
(c) 50 gram NH_4Cl (molar mass – 535) (d) 50 gram NaCl (molar mass – 58)
38. Which of the following is a good conductor of electricity?
- (a) NaCl (b) diamond
(c) graphite (d) Na
39. In the Edison accumulator the electrolyte used is



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- (a) Acidulated water hydroxide
- (b) Potassium
- (c) Copper sulphate
- (d) Ammonium chloride
40. Which of the following is strong Electrolyte?
- (a) $\text{CH}_3\text{CH}_2\text{OH}$
- (b) CH_3OCH_3
- (c) NaCl
- (d) fat
41. The passage of current in an electrolyte is due to the movement of
- (a) electrons
- (b) molecules
- (c) atoms
- (d) ions
42. During the electrolysis of fused NaCl . Which reaction occurs at anode?
- (a) chlorine ions are oxidised
- (b) chlorine ions are reduced
- (c) sodium ions are oxidised
- (d) sodium ions are reduced
43. The reciprocal of specific resistance is known as
- (a) equivalent conductivity
- (b) observed conductivity
- (c) molecular conductivity
- (d) specific conductivity
44. The degree of ionisation is not affected by
- (a) nature of electrolyte
- (b) dilution
- (c) temperature
- (d) none of the above
45. In an aqueous solution of Cu self, zinc can
- (a) displace it
- (b) not displace it
- (c) form amalgam
- (d) none
46. A conductance cell had a resistance of 165 ohms when filled with 0.02 molar KCl at 25°C . The specific conductance for such a solution is 0.00277 mho/cm. What will be the cell constant?
- (a) 0.457
- (b) 0.547
- (c) 0.745
- (d) 0.754
47. Which of the following does not conduct electric current?
- (a) molten Pb
- (b) methanol
- (c) molten KCl
- (d) AgNO_3 solution
48. The unit of molar conductivity is
- (a) 5 cm mol^{-1}
- (b) $5 \text{ cm}^2 \text{ mol}^{-1}$
- (c) $5 \text{ cm}^{-2} \text{ mol}$
- (d) $5 \text{ cm}^{-2} \text{ mol}^{-1}$
49. Passing of 4825 coulomb electricity in aqueous solution of AgNO_3 will liberate
- (a) 4.5 gram silver
- (b) 3.5 gram silver



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(c) 5.4 gram silver
silver

(d) 7.4 gram

50. Which of the following has maximum conductivity?
(a) KNO_3 (b) Ca(OH)_2
(c) NaH_2PO_4 (d) $\text{CH}_3\text{COONH}_4$
51. The extent of a chemical reaction will not depend on
(a) the time for which the current is passed
(b) the size of the cell
(c) whether the redox reaction involves one or more electron
(d) the strength of the current passed through the cell
52. Which of the following does not conduct electric current?
(a) Molten Pb (b) Methanol
(c) Molten KCl (d) AgNO_3 solution
53. Standard electrode potential refers to the electrode potential of
(a) the metal in combination with 1 N solution of its ions
(b) the metal in combination with 1 mol L^{-1} solution of its ions
(c) the metal atom
(d) the metal in combination with its ions of any concentration
54. The chemical reaction
$$\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^2 + \text{Cu}$$
occurs spontaneously because the change in free energy is
(a) Positive (b) Negative
(c) Zero (d) Equal to ΔS
55. A salt bridge is provided between two half cells for
(a) high resistance electrical connection (b) increasing EMF of the cell
(c) avoiding mixing of solutions (d) low resistance electrical connection
56. Which of the following has maximum conductivity?
(a) KNO_3 (b) Ca(OH)_2
(c) NaH_2PO_4 (d) $\text{CH}_3\text{COONH}_4$
57. Non-conducting property of methyl alcohol is due to
(a) molecular state (b) associated state
(c) liquid state (d) ionic state
58. Passing of 4825 coulomb electricity in aqueous solution of AgNO_3 will liberate
(a) 4.5 g silver (b) 3.5 g silver
(c) 5.4 g silver (d) 7.4 g silver



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59. If the ratio of Ag, Cu and Au deposited at cathode during electrolysis of aqueous solution of AgNO_3 , CuSO_4 and AuCl_3 is 6 : 3 : 2, the electricity passed in those cells is
- (a) 4 faraday (b) 6 faraday
(c) 3 faraday (d) 5 faraday
60. The unit of molar conductivity is
- (a) 5 cm mol^{-1} (b) $5 \text{ cm}^2 \text{ mol}^{-1}$
(c) $5 \text{ cm}^2 \text{ mol}$ (d) $5 \text{ cm}^{-2} \text{ mol}^{-1}$
61. Molar conductivity of strong electrolytes increases with increase in dilution due to
- (a) more ionisation (b) less interionic attraction
(c) more interionic attraction (d) less ionisation
62. The degree of dissociation of an electrolyte is a measure of
- (a) The speed of the movement of ions in solution
(b) The number of molecules available in the salt solution
(c) Volume of the electrolytic solution
(d) The extent to which a substance is dissociated into ions in a solution
63. As compared to the electrical conductivity of aqueous NaCl , the electrical conductivity of molten NaCl is
- (a) more (b) less
(c) equal (d) none of the above
64. In an electrolytic cell, which one is an appropriate statement?
- (a) oxidation takes place at negatively charged electrode while reduction takes place at positively charged electrode
(b) oxidation takes place at positively charged electrode while reduction takes place at negatively charged electrode
(c) oxidation takes place at anode while reduction takes place at cathode, irrespective of the sign of the electrode
(d) none of the above
65. The net emf for electrolytic cell is negative. This shows
- (a) spontaneous nature of the cell (b) non-spontaneous nature of the cell
(c) reversible nature of the cell (d) none of the above
66. How many coulombs of energy is required for reduction of 1 mol Al^{3+} to Al
- (a) 96500 C (b) 193000 C
(c) 256000 C (d) 289500 C
67. The correct form of Nernst expression for Daniell cell is



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75. When a lead storage battery is discharged –
- (a) lead sulphate is consumed (b) sulphuric acid is consumed
(c) lead is formed (d) SO₂ is evolved
76. The degree of ionisation is not affected by
- (a) nature of electrolyte (b) dilution
(c) temperature (d) none of these
77. Predict using following data which one is strongest oxidising agent?
- $E_{(K^+/K)}^{\circ} = -2.93 \text{ V}$; $E_{(Zn^{2+}/Zn)}^{\circ} = -0.76 \text{ V}$
 $E_{(H^+/1/2H_2)}^{\circ} = -0.00 \text{ V}$; $E_{(Cu^{2+}/Cu)}^{\circ} = 0.34 \text{ V}$
- (a) Zinc (b) hydrogen
(c) Copper (d) potassium
78. Which of the following ions move towards the cathode during electrolysis of fused NaOH?
- (a) H⁺ ions (b) O₂⁻ ions
(c) OH⁻ ions (d) Na⁺ ions
79. If $E_{Zn^{2+}/Zn}^{\circ} = -0.76 \text{ V}$ and $E_{Cu^{2+}/Cu}^{\circ} = 0.34 \text{ V}$, the emf of Daniell cell would be
- (a) 0.42 V (b) 1.10 V
(c) -0.42 V (d) -1.10 V
80. The degree of dissociation of a weak electrolyte in aqueous solution
- (a) is inversely proportional to the concentration of the electrolyte
(b) is directly proportional to the initial concentration of the electrolyte
(c) depends upon equilibrium concentration of the electrolyte
(d) does not depend upon the initial concentration of electrolyte



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CHEMICAL KINETICS



Assignment

- Unit of rate of a reaction is
 - mole/lit
 - mole/lit/sec
 - no unit
 - depends upon order
- Which represent zero order reaction
 - $k = x/t$
 - $k = \frac{2.303}{t} \log \frac{a}{a-x}$
 - $k = \frac{1}{t} \frac{x}{a(a-x)}$
 - none of these
- The elementary step of the reaction $2\text{Na} + \text{Cl}_2 = 2\text{NaCl}$ is found to follow III order kinetics its molecularity is
 - 1
 - 2
 - 3
 - 4
- Which order or reaction obeys the relation $t_{1/2} = 1/Ka$
 - First
 - Second
 - Third
 - Zero
- Rate of a reaction
 - Increases with increase in temperature
 - Decrease with increase in temperature
 - Does not depend on temperature
 - Does not depend on concentration
- Which one is first order reaction
 - $\text{NH}_4\text{NO}_2 \rightarrow \text{N}_2 + 2\text{H}_2\text{O}$
 - $2\text{HI} \rightarrow \text{H}_2 + \text{I}_2$
 - $2\text{HO}_2 \rightarrow 2\text{NO} + \text{O}_2$
 - $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$
- 75% of a first order reaction was found to complete in 32 minute. When will 50% of the same reaction complete:
 - 24 minute
 - 16 minute
 - 8 minute
 - 4 minute
- A first order reaction has a half period of 69.3 sec. At $0.10 \text{ mol litre}^{-1}$ reactant concentration, rate will be
 - $10^{-4} \text{ M sec}^{-1}$
 - $10^{-3} \text{ M sec}^{-1}$
 - $10^{-1} \text{ M sec}^{-1}$
 - $6.93 \times 10^1 \text{ M sec}^{-1}$



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9. Consider the reaction, $2A + B \rightarrow C + D$. If the rate expression is $\text{rate} = k[A]^2[B]^1$ and if concentration of the reactant are increased by three times, the rate of the reaction will increase by
- (a) 9 times (b) 81 times
(c) 64 times (d) 27 times
10. The specific reaction rate constant for a first order reaction is $60 \times 10^{-4} \text{ sec}^{-1}$. If the initial concentration of the reactant is 0.01 mole per liter the rate is
- (a) $60 \times 10^{-6} \text{ M sec}^{-1}$ (b) $36 \times 10^{-4} \text{ M sec}^{-1}$
(c) $60 \times 10^{-2} \text{ M sec}^{-1}$ (d) $36 \times 10^{-1} \text{ M sec}^{-2}$
11. The rate constant for a second order reaction is $8 \times 10^{-5} \text{ M}^{-1} \text{ min}^{-1}$. How long will it take a 1M solution to be reduced to 0.5 M
- (a) 8.665×10^3 minute (b) 8×10^{-5} minute
(c) 1.25×10^4 minute (d) 4×10^{-5} minute
12. For a first order reaction $t_{0.75}$ is 138.6 seconds. Its specific are constant (in seconds) is
- (a) 10^{-2} (b) 10^{-4}
(c) 10^{-5} (d) 10^{-6}
13. For a general reaction, $aA + bB \rightarrow cC + dD$ the rate of reaction may be given as
- (a) $r = -\frac{d[A]}{dt} \times \frac{1}{a} = k [A][B]^b$ (b) $r = -\frac{d[B]}{dt} \times \frac{1}{b} = k [A]^a [B]^b$
(c) $r = \frac{d[C]}{dt} \times \frac{1}{c} = k [A]^a [B]^b$ (d) $r = -\frac{d[D]}{dt} \times \frac{1}{d} = k [A]^a [B]^b$
14. According to Arrhenius relationship between rate constant, k and temperature can be given by
- (a) $k = Ae^{-E_a/RT}$ (b) $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \times \frac{T_2 - T_1}{T_1 T_2}$
(c) $\log k = \log A - \frac{E_a}{2.303RT}$ (d) $\Delta G^0 = -2.303R RT \log K$
15. What will be the amount of ${}^n_m X (t_{1/2} = 25 \text{ min})$ left after 50 minutes?
- (a) 1/2 (b) 1/4
(c) 1/3 (d) 1/10
16. For a given reaction of first order, it takes 20 minutes of the concentration to drop from 1.0 mole litre⁻¹ to 0.6 mole litre⁻¹. The time required for the concentration to drop from 0.6 mole litre⁻¹ to 0.36 mole litre⁻¹ will be
- (a) more than 20 minutes (b) less than 20 minutes
(c) equal to 20 minutes (d) infinity
17. The half-life period of a radioactive element is 140 days. After 560 days one gram of the element will reduce to
- (a) (1/2) g (b) (1/4) g



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(c) (1/8) g

(d) 1/16 g

18. The volume of the reacting system $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2(\text{g})$ is suddenly reduced to half of its value. If the reaction is second order with respect to NO and first order with respect to O_2 , the rate of reaction will
- (a) diminish to one-fourth of its initial value
(b) diminish to one-eighth of its initial value
(c) increase eight times of its initial value
(d) decrease four times of its initial value
19. If a reaction with $t_{1/2} = 69.3$ second, has a rate constant value of 10^{-2} per second, the order is
- (a) 0 (b) 1
(c) 2 (d) 3
20. If doubling the initial concentration of a reactant doubles $t_{1/2}$ of the reaction the order of the reaction is
- (a) 3 (b) 2
(c) 1 (d) 0
21. Order of overall reaction can't be
- (a) zero (b) fractional
(c) (-) ve (d) whole no
22. For a reaction $2\text{NH}_3 \rightarrow \text{N}_2 + 3\text{H}_2$ it is observed that $\frac{-d(\text{NH}_3)}{dt} = K_1(\text{NH}_3)$, $\frac{d(\text{N}_2)}{dt} = K_2(\text{NH}_3)$, $\frac{d(\text{H}_2)}{dt} = K_3(\text{NH}_3)$. What is the relation between K_1 , K_2 and K_3
- (a) $K_1 = K_2 = K_3$ (b) $2K_1 = 3K_2 = 6K_3$
(c) $3K_1 = 6K_2 = 2K_3$ (d) $6K_1 = 3K_2 = 2K_3$
23. For reaction $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$. If volume of the container is tripled the rate would be
- (a) 3 times (b) 27 times
(c) 1/27 times (d) remain same
24. Rate of the reaction $\text{A} + 2\text{B} \rightarrow \text{P}$ is 2×10^{-2} mole/lit/sec. When concentration of A and B are 1 mol/lit. Rate = $K[\text{A}]^2[\text{B}]$. The rate when half of the B has reacted will be
- (a) 5.6×10^{-3} (b) 3.75×10^{-3}
(c) 2.5×10^{-2} (d) 2.5×10^{-3}
25. Which is wrong about 1 order?
- (a) $t_{1/2} = 50$ sec, $t_{0.75} = 100$ sec (b) $t_{0.5} = 25$ sec, $t_{0.75} = 75$
(c) $t_{1/2} = 100$ sec, $t_{0.75} = 150$ sec (d) both b and c
26. A first order reaction has specific rate constant of 2 min^{-1} the half life of the reaction will be



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- (a) 1.653 min (b) 0.347 min
- (c) 2 min (d) 0.0347 min
27. If the concentration units are reduced by n times, then the value of rate constant of first order will
- (a) Increase by n times (b) Decrease by factor of n
- (c) Not change (d) None of these
28. For the reaction, $\text{H}_2(\text{g}) + \text{Br}_2(\text{g}) = 2\text{HBr}(\text{g})$, the reaction rate = $K[\text{H}_2][\text{Br}_2]^{1/2}$. Which statement is true about this reaction
- (a) The reaction is of second order (b) Molecularity of the reaction is $3/2$
- (c) The unit of K is sec^{-1} (d) Molecularity of the reaction is 2
29. Which rate expression suggests an over all order of 0.5 for the reaction involving substance X, Y, Z
- (a) Rate = $K [\text{X}] [\text{Y}] [\text{Z}]$ (b) Rate = $K [\text{X}]^{0.5} [\text{Y}]^{0.5} [\text{Z}]^{0.5}$
- (c) Rate = $K [\text{X}]^{1.5} [\text{Y}]^{-1} [\text{Z}]^0$ (d) Rate = $K [\text{X}] [\text{Y}]^0 / [\text{Z}]^2$
30. The rate constant of a first order reaction is $4 \times 10^{-3} \text{ sec}^{-1}$. At a reactant concentration of 0.02 M, the rate of reaction would be
- (a) $8 \times 10^{-5} \text{ sec}^{-1}$ (b) $4 \times 10^{-3} \text{ M sec}^{-1}$
- (c) $2 \times 10^{-1} \text{ M sec}^{-1}$ (d) $4 \times 10^{-1} \text{ M sec}^{-1}$
31. The rate of a chemical reaction doubles for every 10°C rise in temperature. If the rate is increased by 60°C , the rate of reaction increases by
- (a) 20 times (b) 32 times
- (c) 64 times (d) 128 times
32. For $\text{A} + \text{B} \rightarrow \text{C} + \text{D}$, $\Delta H = -20 \text{ kJ mol}^{-1}$. The activation energy of the forward reaction is 85 kJ mol^{-1} . The activation energy for backward reaction is kJ mol^{-1}
- (a) 65 (b) 105
- (c) 85 (d) 40
33. The rate of reaction between A and B increases by a factor of 100, when the concentration of A is increased to folds, the order of the reaction with respect to A is
- (a) 10 (b) 11
- (c) 4 (d) 2
34. A certain radioactive element A, has a half-life = t seconds. In $(t/2)$ seconds the fraction of the initial quantity of the element so far decayed is nearly
- (a) 25% (b) 29%
- (c) 21% (d) 17%
35. For the first order reaction $\text{A}(\text{g}) \rightarrow 2\text{B}(\text{g}) + \text{C}(\text{g})$, the initial pressure is $P_A = 90 \text{ mm Hg}$, the pressure after 10 minutes is found to be 180 mm Hg. The rate constant of the reaction is
- (a) $1.15 \times 10^{-3} \text{ sec}^{-1}$ (b) $2.3 \times 10^{-3} \text{ sec}^{-1}$



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sec^{-1} (c) $3.45 \times 10^{-3} \text{ sec}^{-1}$

(d) 6×10^{-3}

36. The activation energies of two reaction are E_{a_1} and E_{a_2} with $E_{a_1} > E_{a_2}$. If the temperature of the reacting system is increased from T_1 to T_2 , predict which of the following alternative (s) is/are correct?
- (a) $\frac{k'_1}{k_1} = \frac{k'_2}{k_2}$ (b) $\frac{k'_1}{k_1} > \frac{k'_2}{k_2}$
- (c) $\frac{k'_1}{k_1} < \frac{k'_2}{k_2}$ (d) $\frac{k'_1}{k_1} < 2 \frac{k'_2}{k_2}$
37. Which of the following statements is not correct?
- (a) Law of mass action and rate law expressions are same for single-step reactions
- (b) Order of the slowest elementary reaction of a complex reaction gives the order of the complex reaction
- (c) Both order and molecularity have normally a maximum value of 3
- (d) Molecularity of a complex reaction $A + 2B \rightarrow C$ is 3.
38. For a given reaction the logarithm of the concentration of the reactant plotted against time gave a straight line with negative slope. The order of the reaction is
- (a) 0.3 (b) 2
- (c) 1 (d) 0
39. From different sets of data of $t_{1/2}$ at different initial concentration say 'a' for a given reaction, the product ($t_{1/2} \times a$) is found to be constant. the order of the reaction is
- (a) 0 (b) 1
- (c) 2 (d) 3
40. The energy of activation of a forward reaction is 50 kcal. The energy of activation of its backward reaction is
- (a) equal to 50 kcal (b) greater than 50 kcal
- (c) less than 50 kcal (d) either greater or less than 50 kcal
41. The energies of activation for forward and reverse reactions for $A_2 + B_2 \rightleftharpoons 2 AB$ are 180 kJ mol^{-1} and 200 kJ mol^{-1} respectively. The presence of a catalyst lowers the activation energy of both (forward and reverse reactions by 100 kJ mol^{-1} . The enthalpy change of the reaction ($A_2 + B_2 \rightarrow 2 AB$) in the presence of catalyst will be (in kJ mol^{-1})
- (a) 300 (b) 120
- (c) 280 (d) 20
42. Consider the reaction, $2A + B \rightarrow \text{products}$. When concentration of B alone was doubled, the half-life did not change. When the concentration of A alone was doubled, the rate increased by two times. The unit of rate constant for this reactions is:
- (a) $\text{L mol}^{-1} \text{s}^{-1}$ (b) no unit



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(c) $\text{mol L}^{-1}\text{s}^{-1}$

(d) s^{-1}

43. A reaction was found to be second order with respect to the concentration of carbon monoxide. If the concentration of carbon monoxide is doubled, with everything else kept the same, the rate of reaction will:

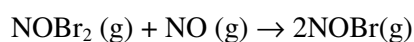
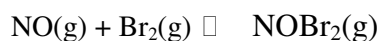
(a) remain unchanged (b) triple
(c) increase by a factor of 4 (d) double

44. Rate of a reaction can be expressed by Arrhenius equation as:

$$k = Ae^{-E/RT}$$

In this equation, E represents:

- (a) the energy above which all the colliding molecules will react
(b) the energy below which colliding molecules will not react
(c) the total energy of the reacting molecules at a temperature, T
(d) the fraction of molecules with energy greater than the activation energy of the reaction
45. The following mechanism has been proposed for the reaction NO with Br_2 to form NOBr:



If the second step is the rate determining step, the order of the reaction with respect to $\text{NO}(\text{g})$ is:

- (a) 1 (b) 0
(c) 3 (d) 2
46. A reaction involving two different reactants can never be
- (a) bimolecular reaction (b) second order reaction
(c) first order reaction (d) unimolecular reaction



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CHEMICAL KINETICS



ANSWER

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (d) | 2. (a) | 3. (c) | 4. (b) | 5. (a) |
| 6. (a) | 7. (b) | 8. (d) | 9. (d) | 10. (a) |
| 11. (c) | 12. (a) | 13. (b) | 14. (a) | 15. (b) |
| 16. (c) | 17. (d) | 18. (b) | 19. (b) | 20. (c) |
| 21. (c) | 22. (c) | 23. (c) | 24. (a) | 25. (d) |
| 26. (b) | 27. (c) | 28. (d) | 29. (c) | 30. (a) |
| 31. (c) | 32. (b) | 33. (d) | 34. (c) | 35. (a) |
| 36. (a) | 37. (a) | 38. (c) | 39. (a) | 40. (b) |
| 41. (d) | 42. (a) | 43. (b) | 44. (a) | 45. (d) |
| 46. (d) | | | | |



CHEMISTRY SOLUTIONS



EXERCISES

- A 10 N solution stands for
 - normal solution
 - decanormal solution
 - decinormal solution
 - semi normal solution
- 1 equivalent means
 - 1000 milli equivalent
 - 1000 gm of the compound
 - equivalent weight in gm
 - equivalent weight in mg
- In which mode of expression, the concentration of solution remains independent of temperature?
 - molarity
 - normality
 - formality
 - molality
- Molarity is expressed as
 - grams/litre
 - litres/mole
 - moles/litre
 - moles/1000 gm
- A solution contains 1 mole of alcohol and 4 moles of water. The mole fraction of water and alcohol will be
 - 1/4 and 4/1
 - 4/1 and 1/4
 - 1/5 and 4/5
 - 4/5 and 1/5
- If 0.50 mole of BaCl_2 is mixed with 0.20 mole of Na_3PO_4 , the maximum number of moles of $\text{Ba}_3(\text{PO}_4)_2$ that can be formed is
 - 0.1
 - 0.2
 - 0.5
 - 0.7
- The normality of 10% acetic acid is
 - 1 N
 - 10 N
 - 1.7 N
 - 0.83 N
- An azeotropic mixture of two liquids boils at a lower temperature than either of them when
 - it is saturated
 - it shows negative deviation from Raoult's law
 - it shows positive deviation from Raoult's law
 - it does not deviate from Raoult's law
- For a dilute solution, Raoult's law states that
 - the lowering of vapour pressure is equal to the mole fraction of the solute



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- (b) the relative lowering of vapour pressure is equal to the mole fraction of the solute
- (c) the relative lowering of vapour pressure is proportional to the amount of solute in solution
- (d) the vapour pressure of the solution is equal to the mole fraction of solvent
10. A liquid is in equilibrium with its vapour at its boiling point. On an average, the molecules in the two phases have equal
- (a) intermolecular forces (b) potential energy
- (c) total energy (d) kinetic energy
11. Which one of the following pairs will not be forming ideal solution?
- (a) C_6H_6 and CCl_4 (b) C_6H_6 and $C_6H_5CH_3$
- (c) C_2H_5Br and C_2H_5I (d) $(CH_3)_2CO$ and CCl_4
12. Ideal solution is formed when its components
- (a) have only zero heat of mixing
- (b) have only zero volume change
- (c) have both zero heat of mixing as well as zero volume change
- (d) can be converted into ideal gases
13. 1.0 gm of pure calcium carbonate was found to require 50 ml of dilute HCl for complete reaction. The strength of the HCl solution is given by
- (a) 4 N (b) 2 N
- (c) 0.4 N (d) 0.2 N
14. The molarity of pure water is
- (a) 55.6 (b) 50
- (c) 100 (d) 18
15. If 250 ml of 0.25 M NaCl solution is diluted with water to a volume of 500 ml, the new concentration of the solution is
- (a) 0.167 M (b) 0.125 M
- (c) 0.0833 M (d) 0.0167 M
16. A molal solution is one that contains one mole of a solute in
- (a) 1000 gm of the solvent (b) one litre of the solvent
- (c) one litre of the solution (d) 22.4 litres of the solution
17. The pressure under which liquid and vapour can co-exist at equilibrium is called the
- (a) limiting vapour pressure (b) real vapour pressure
- (c) normal vapour pressure (d) saturated vapour pressure
18. 10 ml. of acetone is mixed with 100 ml of H_2O . The vapour pressure of water above the solution is



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- (a) equal to the vapour pressure of pure water
- (b) equal to the vapour pressure of the solution
- (c) less than the vapour pressure of pure water
- (d) more than vapour pressure of pure water
19. A mixture contains 2 moles of N_2 and 6 moles of H_2 . If the total pressure of the mixture is 4 atm, the partial pressure of Nitrogen in the mixture will be
- (a) 1 atm (b) 2 atm
- (c) 4 atm (d) 6 atm
20. The vapour pressure of a liquid in a closed container depends upon
- (a) amount of liquid (b) surface area of the container
- (c) temperature (d) none of these
21. Colligative properties of the solution depend upon
- (a) nature of solute (b) nature of solvent
- (c) number of particles present in the solution (d) number of moles
22. The azeotropic mixture of water (b.p. $-100^\circ C$) and HCl (b.p. $85^\circ C$) boils at $108.5^\circ C$. When this mixture is distilled, it is possible to obtain
- (a) pure hydrogen chloride (b) pure water
- (c) pure water as well as pure HCl (d) neither HCl nor H_2O in their pure states
23. The elevation of boiling point of a solution is
- (a) directly proportional to molal concentration
- (b) inversely proportional to molal concentration
- (c) directly proportional to the molarity of the solution
- (d) directly proportional to normality
24. The temperature at which the vapour pressure is equal to the external pressure is called the
- (a) critical temperature (b) boiling point
- (c) normal point (d) saturation point
25. At high altitudes the boiling point of water lowers because
- (a) atmospheric pressure is low (b) temperature is low
- (c) atmospheric pressure is high (d) none of these
26. When mercuric iodide is added to the aqueous solution of potassium iodide then
- (a) freezing point is raised (b) freezing point does not change
- (c) freezing point is lowered (d) boiling point does not change
27. When glycerine is added to a litre of water, which of the following behaviour is observed?
- (a) water evaporates more easily (b) the temperature of water increases



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(c) the freezing point of water is lowered
viscosity of water is lowered

(d) the

28. Which of the following 0.1 M aqueous solution will have the lowest freezing point?
(a) potassium sulphate (b) sodium chloride
(c) urea (d) glucose
29. The freezing point of 1% solution of lead nitrate in water will be
(a) below 0°C (b) 0°C
(c) 1°C (d) 2°C
30. Freezing point of equimolal aqueous solution will be highest for
(a) $C_6H_5NH_3Cl$ (b) $Ca(NO_3)_2$
(c) $La(NO_3)_3$ (d) $C_6H_{12}O_6$
31. The freezing point of a 0.05 molal solution of a non-electrolyte in water is
(a) $-1.86^\circ C$ (b) $-0.93^\circ C$
(c) $-0.93^\circ C$ (d) $0.93^\circ C$
32. VentHoff factor for an electrolyte is
(a) > 1 (b) < 1
(c) $= 1$ (d) 0
33. The molal freezing point constant for water is $1.86^\circ C/mole$. If 342 gm of cane sugar ($C_{12}H_{22}O_{11}$) is dissolved in 1000 ml. of water the solution will freeze at
(a) $-1.86^\circ C$ (b) $1.86^\circ C$
(c) $-3.92^\circ C$ (d) $2.42^\circ C$
34. Which of the following correctly expresses the VanHoff's factor?
(a) Calculated osmotic pressure/observed osmotic pressure
(b) Observed molecular weight/calculated molecular weight
(c) Calculated boiling point/observed boiling point
(d) Observed colligate property/calculated colligative property
35. Which of the following compounds corresponds VanHoff factor (Z) to be equal to 2 for dilute solution?
(a) K_2SO_4 (b) Na_2SO_4
(c) Sugar (d) $MgSO_4$
36. 100 gm. of 10% aqueous solution of NaOH contains 10 gm. of NaOH in
(a) 90 gm of water (b) 100 gm of water
(c) 110 gm. of water (d) 100 ml. of water
37. Acetic acid dissolved in Benzene shows a molecular mass of
(a) 30 (b) 60



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(c) 120

(d) 180



38. The liquid pair benzene-toluene shows
- (a) irregular deviation from Raoult's law
 - (b) negative deviation from Raoult's law
 - (c) positive deviation from Raoult's law
 - (d) practically no deviation from Raoult's law
39. A 5% solution of glucose (molecular weight 180) is isotonic with a 2.5% solution of a substance X at the same temperature. What is the molecular weight of X?
- (a) 45
 - (b) 90
 - (c) 135
 - (d) 180
40. On dissolving common salt in water, the
- (a) freezing point of water increases
 - (b) boiling point of water decreases
 - (c) boiling point of water increases
 - (d) boiling point of water remains same
41. Blood has been found to be isotonic with
- (a) concentrated sodium chloride solution
 - (b) very dilute sodium chloride solution
 - (c) saturated sodium chloride solution
 - (d) normal saline solution
42. Which of the following is not a colligative property?
- (a) depression in freezing point
 - (b) freezing point
 - (c) elevation in boiling point
 - (d) osmotic pressure
43. A solution contains 'a' moles of component A and 'b' moles of component B, the mole fraction of component 'b' is
- (a) $\frac{a+b}{b}$
 - (b) $\frac{a}{a+b}$
 - (c) $\frac{b}{a+b}$
 - (d) $\frac{a+b}{a}$
44. According to the reaction $I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$
What weight of nitrate ion is needed to convert 5g of iodine into iodic acid
- (a) 12.4 g
 - (b) 24.8 g
 - (c) 0.248 g
 - (d) 2.48 g
45. The osmotic pressure of a solution can be accurately measured in the shortest possible time by
- (a) De vries method
 - (b) Barkley and Hastley method
 - (c) Morse and Frazer method
 - (d) Pfeiffer method
46. A mixture which shows negative deviation from Raoult's law is
- (a) $CH_3OH + H_2O$
 - (b) $C_2H_5OH + (CH_3)_2CO$
 - (c) $C_6H_5CH_3 + CCl_4$
 - (d) $HCl + H_2O$



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47. ΔV_{mix} is the change in volume and ΔH_{mix} is the change in enthalpy during mixing of two liquids. If 2 liquids show negative deviation then
- (a) $\Delta H_{\text{mix}} < 0, \Delta V_{\text{mix}} < 0$ (b) $\Delta H_{\text{mix}} > 0, \Delta V_{\text{mix}} > 0$
(c) $\Delta H_{\text{mix}} < 0, \Delta V_{\text{mix}} > 0$ (d) $\Delta H_{\text{mix}} > 0, \Delta V_{\text{mix}} < 0$
48. During the mixing of two liquids which show positive deviation
- (a) $\Delta H_{\text{mix}} > 0, \Delta V_{\text{mix}} < 0$ (b) $\Delta H_{\text{mix}} < 0, \Delta V_{\text{mix}} > 0$
(c) $\Delta H_{\text{mix}} > 0, \Delta V_{\text{mix}} > 0$ (d) $\Delta H_{\text{mix}} < 0, \Delta V_{\text{mix}} < 0$
49. While mixing two liquids which show negative deviation
- (a) heat is absorbed
(b) heat is evolved
(c) heat is neither evolved nor absorbed
(d) heat is evolved or absorbed depending on the degree of negative deviation
50. While mixing two liquids showing positive deviation
- (a) heat is evolved
(b) heat is absorbed
(c) heat is neither evolved nor absorbed
(d) heat is evolved or absorbed depending on the degree of positive deviation
51. 0.25 litre of a solution contains W_B gm of non-volatile solute of molecular mass M_B . The osmotic pressure P exerted by the solution at temperature T will be given by
- (a) $\frac{4W_B}{M_B} \times 0.821 T \text{ atm}$ (b) $\frac{0.0821 W_B T}{M_B} \text{ atm}$
(c) $\frac{4 \times 8.314 W_B T}{M_B} \text{ atm}$ (d) $8 T \frac{W_B T}{M_B} \text{ atm}$
52. A certain aqueous solution contains ethanol and sucrose. If the mole fraction of ethanol is 0.15 and that of sucrose is 0.43, what is the mole fraction of water in the solution
- (a) 0.28 (b) 0.50
(c) 0.42 (d) 0.24
53. Which solution will have the highest boiling point?
- (a) 1 % solution of glucose in water (b) 1 % solution of sodium chloride in water
(c) 1 % solution of zinc sulphate in water (d) all of these
54. A H_2SO_4 solution contains 80.0% by weight H_2SO_4 and has a specific gravity of 1.73. Its normality is approximately
- (a) 18.0 (b) 1.8
(c) 28.2 (d) 36.0
55. The number of a particular component per unit total mole of a solution is called its



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- (a) Molarity fraction
- (b) Mole
- (c) Molality
- (d) Mass fraction
56. What volume of 0.1 N oxalic acid solution can be reduced by 250 gm. of an 8% KMnO_4 solution?
- (a) 6.31 (b) 12.61
(c) 28.21 (d) 0.631
57. A plant cell shrinks when placed in
- (a) Water (b) An isotonic solution
(c) A hypertonic solution (d) A hypotonic solution
58. Aqueous solution of a substance X, having molecular weight M, has molality m. Mole fraction of substance is
- (a) $\frac{m}{m + \frac{1000}{18}}$ (b) $\frac{mM}{m + \frac{1000}{18}}$
(c) $\frac{m}{m + \frac{1000}{M}}$ (d) $\frac{18M}{m + \frac{1000}{M}}$
59. The molecular mass of benzoic acid in benzene, as determined by cryoscopy is twice its true molecular mass. This is attributed to of benzoic acid
- (a) polymerization (b) electrolytic dissociation
(c) association through H-bonds (d) intramolecular H-bonding
60. Which of the following modes expressing concentration is independent of temperature
- (a) Molarity (b) Molality
(c) Normality (d) Formality
61. 0.1 M HCl is
- (a) weak acid (b) strong acid
(c) weak base (d) strong base
62. Which of the following is not a solution?
- (a) air (b) a gold ring
(c) smoke (d) salt solution
63. According to Raoult's law the relative lowering of vapour pressure of a solution of non-volatile substance is equal to?
- (a) mole fraction of solute (b) mole fraction of solvent
(c) weight percent of solute (d) weight percent of solvent
64. Which of the following can not be used to find out the molecular weight of non-volatile solute
- (a) Victor Meyer's method (b) Osmotic pressure



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(c) Cryoscopic method
Colligative method

(d)

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65. The molarity of 0.1 N H_2SO_4 ?
- (a) 0.1 M (b) 0.05 M
(c) 0.2 M (d) 0.02 M
66. Which of the following dissolves in hot conc. NaOH
- (a) Fe (b) Cu
(c) Al (d) Ag
67. Which of the following absorbs heat when dissolved in water?
- (a) sodium sulphate (b) sodium chloride
(c) sodium carbonate (d) sodium hydroxide
68. If molecular weight of KMnO_4 is M, its equivalent weight in acidic medium is
- (a) $M/5$ (b) $M/4$
(c) $M/3$ (d) $M/2$
69. If molecular weight of KMnO_4 is M, its equivalent weight in basic medium is
- (a) $M/5$ (b) $M/4$
(c) $M/3$ (d) $M/2$
70. Two element X (at wt. 75) and Y (at. wt. 10) combine to give a compound having 75.8% of X. The formula of the compound is
- (a) XY (b) X_2Y
(c) X_2Y_2 (d) X_2Y_3



CHEMISTRY ANSWER



- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (b) | 2. (c) | 3. (d) | 4. (c) | 5. (d) |
| 6. (a) | 7. (d) | 8. (c) | 9. (b) | 10. (d) |
| 11. (d) | 12. (c) | 13. (d) | 14. (a) | 15. (b) |
| 16. (a) | 17. (d) | 18. (c) | 19. (a) | 20. (c) |
| 21. (a) | 22. (d) | 23. (a) | 24. (b) | 25. (a) |
| 26. (c) | 27. (c) | 28. (a) | 29. (a) | 30. (d) |
| 31. (c) | 32. (a) | 33. (a) | 34. (d) | 35. (d) |
| 36. (a) | 37. (c) | 38. (d) | 39. (b) | 40. (c) |
| 41. (d) | 42. (b) | 43. (b) | 44. (a) | 45. (b) |
| 46. (d) | 47. (a) | 48. (c) | 49. (b) | 50. (b) |
| 51. (a) | 52. (c) | 53. (b) | 54. (c) | 55. (b) |
| 56. (a) | 57. (c) | 58. (a) | 59. (c) | 60. (b) |
| 61. (a) | 62. (c) | 63. (a) | 64. (a) | 65. (b) |
| 66. (c) | 67. (a) | 68. (a) | 69. (c) | 70. (d) |

**SURFACE CHEMISTRY*****EXERCISE***

- The size of colloidal particles varies from
 - 10^{-2} to 10^{-3} cm
 - 10^{-3} to 10^{-5} cm
 - 10^{-4} to 10^{-7} cm
 - 10^{-7} to 10^{-9} cm
- Water during colloids are known as
 - Hydrophilic
 - Hydrophobic
 - Lyophilic
 - Lyophobic
- Which of the following shows the maximum hydrophobic behaviour
 - Glycine
 - Stearic acid
 - Glucose
 - Adenine
- Which one is a colloid
 - Sodium
 - Urea
 - Cane sugar
 - Blood
- An aerosol is a colloidal system of a
 - Liquid dispersed in a gas
 - Liquid dispersed in a solid
 - Solid dispersed in a liquid
 - Solid dispersed in a gas
- Hydrophilic sols are
 - reversible
 - irreversible
 - stable
 - unstable
- Milk is a
 - colloidal solution
 - colloidal system
 - emulsion
 - hydrophilic colloid
- Butter is a colloid formed when
 - fat is dispersed in water
 - fat globules are dispersed in water
 - water is dispersed in fat
 - suspension of casein in water
- Fog is an example of colloidal system of
 - liquid in a gas
 - gas in a liquid
 - gas in a solid
 - solid in a liquid
- Which one is a lyophobic colloid
 - Gelatin
 - Starch



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(c) Sulphur

(d) Gum arabic

11. Lyophilic sols are more stable than lyophobic sols because
- (a) the colloidal particles have positive charge
 - (b) the colloidal particles have negative charge
 - (c) the colloidal particles have negative charge
 - (d) there is a strong electrostatic repulsion between the negative charged particles
12. Colloidal solutions are purified by
- (a) filtration
 - (b) dialysis
 - (c) electro-osmosis
 - (d) coagulation
13. If the dispersed phase is a liquid and the dispersion medium is a solid, the colloid is know as
- (a) a sol
 - (b) an emulsion
 - (c) a gel
 - (d) a foam
14. An arsenius sulphide sol carries a negative charge. The maximum precipitating power for this sol is possessed by
- (a) K_2SO_4
 - (b) $CaCl_2$
 - (c) Na_3PO_4
 - (d) $AlCl_3$
15. The colloidal solution of gold prepared by different methods have different colours due to
- (a) difference in the size of colloidal particles
 - (b) different concentration of gold
 - (c) fact that gold exhibits variable valency
 - (d) presence of different type of foreign particles
16. Which one of the following yield a positively charged sol
- (a) As_2S_3
 - (b) gold
 - (c) $Fe(OH)_3$
 - (d) starch
17. The blue colour of water in the sea is due to
- (a) refraction of blue light by the impurities in sea water
 - (b) scattering of blue light by water molecule
 - (c) refraction of blue sky by sea water
 - (d) absorption of other colours except the blue colour by water molecules
18. Arsenius sulphide sol is prepared by
- (a) oxidation
 - (b) reduction
 - (c) hydrolysis
 - (d) double decomposition
19. Bleeding is stopped by the application of ferric chloride because
- (a) the blood starts flowing in the opposite direction



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- (b) the blood is coagulated, the blood vessel is sealed
- (c) the blood reacts and a solid is formed which seals the blood vessel
- (d) the ferric chloride seals the blood vessel
20. Colloidal medicines are more effective because
- (a) they are cheap (b) they are easy to prepare
- (c) the germs move towards them (d) they are easily assimilated and absorbed
21. Washing with soap involves one of the following
- (a) emulsification of grease and dirt with soap
- (b) grease and dirt are dissolved in soap
- (c) grease and dirt react with soap with the formation of colourless substance
- (d) grease is a semisolid
22. Tanning of leather is one of the following
- (a) colouring of leather by chemicals
- (b) coagulating hardening of the leather by chemicals
- (c) during process to make the leather hard
- (d) polishing of leather to make it look attractive
23. Gelatin is often used as an ingredient in the manufacture of ice-cream. The reason for this is
- (a) to improve the flavour
- (b) to cause the mixture to solidify
- (c) to stabilize the colloid and prevent crystal growth
- (d) to prevent the formation of a colloid
24. Cloud bursts occur due to one of the following reasons
- (a) the clouds are attracted towards the electrical charge on the earth
- (b) large amount of water is present in the cloud
- (c) dense clouds are present in the upper atmosphere
- (d) mutual discharge of oppositely charged clouds resulting in the coagulation of water drops
25. The Brownian motion is due to
- (a) temperature fluctuation within the liquid phase
- (b) attraction and repulsion between charges on the colloidal particles
- (c) impact of the molecules of the dispersion medium on the colloidal particles
- (d) convective currents
26. Gold number gives
- (a) The amount of gold present in the colloid



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- (b) The amount of gold required to break the colloid
- (c) The amount of gold required to protect the colloid
- (d) None of the above
27. Adsorption is a phenomenon in which a substance
- (a) goes into the body of the other substance
- (b) remains close to the other substance
- (c) accumulates on the surface of the other substance
- (d) none of these
28. In adsorption of oxalic acid on activated charcoal is known as
- (a) Absorbent (b) Absorbate
- (c) Adsorber (d) Absorber
29. Physical adsorption is quite appreciable
- (a) at room temperature (b) at higher temperature
- (c) at lower temperature (d) none of these
30. Electrophoresis is the migration of colloidal particles under the influence of a/an
- (a) electric field (b) electromagnetic field
- (c) gravitational field (d) magnetic field
31. Which is the correct statement in case of milk
- (a) milk is an emulsion of fat in water (b) milk is an emulsion of protein in water
- (c) milk is stabilized by protein (d) milk is stabilized by fat
32. Vanishing cream is an example of
- (a) solid cream (b) myophilic sol
- (c) foam (d) true solution
33. The detergent action soap is due to its
- (a) emulsifying property (b) alkalinity
- (c) solubility in water (d) precipitating power
34. Purple of cassius is
- (a) a solution of AgNO_3 in HNO_3 (b) a colloidal solution of gold
- (c) a colloidal solution of platinum (d) a colloidal solution of palladium
35. A colloiddally dispersed phase in a sol carries an electric charge. This is shown by
- (a) Electrophoresis (b) Dialysis
- (c) Tyndal effect (d) Brownian movement
36. Arsenic sulphide would be most easily coagulated by



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- (a) BaCl_2 (b) KCl
- (c) $\text{K}_4[\text{Fe}(\text{CN})_6]$ (d) AlCl_3
37. Metals like silver and copper can be obtained in the colloidal state by
- (a) Peptization (b) Bredigs arc method
- (c) Dialysis (d) Coagulation
38. In which of the following colloidal systems the dispersion medium is solid
- (a) soap lather (b) smoke
- (c) boot polish (d) clouds
39. Colloidal particles of soap solution in water are
- (a) negatively charged (b) positively charged
- (c) neutral (d) unpredictable
40. The basic principle of cotterell precipitator is
- (a) Le Chateliers principle (b) Neutralization of charge on clouds
- (c) Peptisation (d) None of these
41. Clouds represent an example of
- (a) gas in solid (b) solid in gas
- (c) gas in gas (d) liquid in gas
42. The stability of the dispersed phase in a lyophobic colloids is due to
- (a) high viscosity of the medium
- (b) the formation of electrical layer between two phases
- (c) high surface tension of sol
- (d) none of the above
43. Which of the following is a cause of Brownian movement of colloids
- (a) thermal agitation in medium
- (b) collision due to air molecules
- (c) unbalanced impacts by molecules of the dispersion medium
- (d) cause is unpredictable
44. In the precipitation of AgI , sol, the excess of AgNO_3 , is added to potassium iodide solution. The particles of the sol will acquire
- (a) negative charge (b) positive charge
- (c) no charge (d) unpredictable
45. Which one of the following is a property of physisorption
- (a) non specific nature (b) high specificity
- (c) irreversibility (d) none of these



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46. Which of the following statement is not correct in respect of hydrophylic sol
- (a) particles are hydrated
 - (b) they are quite stable and are not easily coagulated
 - (c) they are irreversible
 - (d) there are considerable interactions between the dispersed phase and dispersion medium
47. Which of the following is not heterogeneous
- (a) an emulsion
 - (b) true solution
 - (c) suspension
 - (d) colloidal sol
48. In a solvent, colloidal particles form
- (a) gas phase
 - (b) dispersed phase
 - (c) dispersion medium
 - (d) dispersed system
49. Cataphoresis is the migration of colloidal particles under the influence of
- (a) Gravitational force
 - (b) Electric field
 - (c) Magnetic field
 - (d) None of these
50. A colloidal solution in which liquid is the dispersed phase and solid is the dispersion medium is known as
- (a) Aqua dag
 - (b) A sol
 - (c) A gel
 - (d) An emulsion
51. The colloidal particles which behave as normal, strong electrolytes at low concentration but exhibit colloidal properties at higher concentrations are known as
- (a) Micromolecular colloids
 - (b) Micelles
 - (c) Dissociated colloids
 - (d) Multimolecular colloids
52. An example of an associated colloid (micelle) is
- (a) vegetable oil
 - (b) rubber
 - (c) pumice stone
 - (d) soap
53. In the sea water the living fish uses the oxygen that is
- (a) part of the H₂O molecule
 - (b) physically dissolved in water
 - (c) exhaled by other species of fish
 - (d) none of these
54. One adding a few drops of dil HCl to freshly precipitated ferric oxide a red coloured colloidal solution is obtained. This is known as
- (a) Peptization
 - (b) Dialysis
 - (c) Electrodispersion
 - (d) Dissolution
55. Freundlich equation for the adsorption of a solid at constant temperature is
- (a) $\log x/m = \log p + 1/n \log k$
 - (b) $\log n/m = \log k + 1/n \log p$



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(c) $\log n/m = 1/n \log k + \log p$ these (d) none of these

56. Delta formation at meeting place of river and sea can be explained in terms of
- (a) Emulsification (b) Coagulation
(c) Adsorption (d) Absorption
57. The colloidal particles of starch are
- (a) Electrically neutral
(b) Positively charged
(c) Negatively charged
(d) Positively charged in strongly acidic medium and negatively charged in alkaline solution
58. A colloidal solution obtained by peptizing graphite in oil is known as
- (a) Oil drag (b) Aqua drag
(c) Protargol (d) Gum arabic
59. Which one of the following cannot be peptized using water
- (a) Gelatin (b) Gum arabic
(c) Egg albumin (d) Cellulose
60. Cellulose nitrate, peptized by a mixture of ethanol and ether is known as
- (a) A detergent (b) Collodion
(c) Gelatin (d) An emulsion
61. A dispersion of liquid soap in water is an example of a colloidal
- (a) Aerosol (b) Emulsion
(c) Gel (d) None of these
62. Tinctures are solutions in which the solvent is
- (a) alcohol (b) ether
(c) oil (d) water
63. A sol of As_2S_3 is most rapidly coagulated by the addition of 1 N solution of which are of the following
- (a) NaCl (b) $BaCl_2$
(c) Na_2PO_4 (d) $Al_2(SO_4)_3$



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Answer



- | | | | |
|---------|---------|---------|---------|
| 1. (c) | 17. (b) | 33. (a) | 49. (b) |
| 2. (a) | 18. (d) | 34. (b) | 50. (c) |
| 3. (d) | 19. (b) | 35. (a) | 51. (b) |
| 4. (d) | 20. (d) | 36. (d) | 52. (d) |
| 5. (a) | 21. (a) | 37. (b) | 53. (b) |
| 6. (a) | 22. (b) | 38. (c) | 54. (a) |
| 7. (c) | 23. (c) | 39. (a) | 55. (b) |
| 8. (c) | 24. (d) | 40. (b) | 56. (b) |
| 9. (a) | 25. (c) | 41. (d) | 57. (d) |
| 10. (c) | 26. (d) | 42. (b) | 58. (a) |
| 11. (c) | 27. (c) | 43. (c) | 59. (d) |
| 12. (b) | 28. (a) | 44. (b) | 60. (b) |
| 13. (c) | 29. (c) | 45. (a) | 61. (b) |
| 14. (d) | 30. (a) | 46. (c) | 62. (a) |
| 15. (a) | 31. (a) | 47. (b) | 63. (d) |
| 16. (c) | 32. (a) | 48. (b) | |