

CHEMISTRY – 3

1. White lead is
  - A.  $\text{PbCO}_3$
  - B.  $\text{Pb(OH)}_2 \cdot 2\text{PbCO}_3$
  - C.  $\text{Pb(OH)}_2 \cdot \text{Pb(CH}_3\text{COOO)}_2$
  - D.  $\text{Pb(OH)}_2$
2. When tin is boiled with concentrated nitric acid, the compound formed is
  - A. stannous nitrate
  - B. stannic nitrate
  - C. m-stannic acid
  - D. stannic oxide
3. All the metals form oxides of the type MO except
  - A. copper
  - B. barium
  - C. silver
  - D. lead
4. The element exhibiting most stable + 2 oxidation state from among the following is
  - A. Sn
  - B. Fe
  - C. Pb
  - D. Ag
5. German silver is
  - A. silver made in Germany
  - B. an alloy of silver
  - C. an alloy of copper
  - D. a silvery white paint
6. Aluminium is obtained by
  - A. heating red bauxite
  - B. heating alumina with carbon
  - C. electrolysing a mixture of alumina and cryolite
  - D. heating alumina in  $\text{H}_2$  atmosphere
7. Concentrated  $\text{H}_2\text{SO}_4$  cannot be used to prepare HBr from NaBr because it
  - A. reduces HBr
  - B. reacts slowly with NaBr
  - C. oxidises HBr
  - D. disproportionates HBr
8.  $\text{N}_2$  is diamagnetic and  $\text{O}_2$  is paramagnetic. Both the molecules have even number of electrons ( $\text{N}_2$  : 14;  $\text{O}_2$  : 16). It is not true that
  - A. the energy of the two orbitals  $\pi_x$  and  $\pi_y$  in  $\text{O}_2$  is the same
  - B. there are two unpaired electrons in  $\text{O}_2$
  - C. the bond order in  $\text{N}_2$  is 3
  - D. the bond order in  $\text{O}_2$  is 3
9. Heavy water
  - A. contains dissolved  $\text{Ca}^{2+}$  and  $\text{Mg}^{+}$  ions
  - B. contains dissolved  $\text{Ca}^{2+}$  ions only
  - C. is made up of  $^1\text{H}^2$  and  $^{16}\text{O}$  atoms
  - D. is water with maximum density at  $4^\circ\text{C}$

10. It is not true that  
 A. phosphine is more stable than ammonia    B. phosphorus is less reactive than nitrogen  
 C.  $\text{HNO}_3$  is stronger acid than  $\text{HPO}_3$     D. Nitrogen is more electronegative than phosphorus
11. The number of electrons that are paired in an oxygen molecule is  
 A. 7    B. 14    C. 8    D. 16
12. Which is the correct arrangement of boiling points of the following compounds?  
 A.  $\text{H}_2\text{O} > \text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S}$     B.  $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Te} > \text{H}_2\text{Se}$   
 C.  $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$     D.  $\text{H}_2\text{O} > \text{H}_2\text{S} < \text{H}_2\text{Se} > \text{H}_2\text{Te}$
13. Amongst the following, the weakest base is  
 A. potassium hydroxide    B. sodium hydroxide    C. magnesium hydroxide    D. calcium hydroxide
14. The dissociation of water at  $25^\circ\text{C}$  is  $1.9 \times 10^{-6}$  percent and the density of water is  $1.0 \text{ g cm}^{-3}$ . The ionisation constant of water is  
 A.  $3.42 \times 10^{-6}$     B.  $2.00 \times 10^{-16}$     C.  $3.42 \times 10^{-8}$     D.  $1.00 \times 10^{-14}$
15. An aqueous solution contains the following ions:  $\text{Hg}_2^{2+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Pb}^{2+}$  and  $\text{Cd}^{2+}$ . It precipitates  
 A.  $\text{Hg}_2\text{Cl}_2$  and  $\text{PbCl}_2$     B.  $\text{Hg}_2\text{Cl}_2$  only    C.  $\text{PbCl}_2$  only    D.  $\text{PbCl}_2$  and  $\text{HgCl}_2$
16. Which of the following salts is most acidic in water?  
 A.  $\text{NiCl}_2$     B.  $\text{BeCl}_2$     C.  $\text{FeCl}_3$     D.  $\text{AlCl}_3$
17. The type of hybridisation in tetrahedral complexes of metal atoms is  
 A.  $\text{dsp}^2$     B.  $\text{d}^2\text{sp}$     C.  $\text{sp}^3$     D.  $\text{sp}^2$
18. Pick out the electronic configuration of the most electropositive element.  
 A.  $\text{ns}^2\text{np}^3$     B.  $\text{ns}^2\text{np}^0$     C.  $\text{ns}^2\text{np}^1$     D.  $\text{ns}^2\text{np}^4$
19. The designation of the orbital with  $n = 3$  and  $l = 2$  is  
 A. 4d    B. 5d    C. 3d    D. 5s
20. CsBr crystal has bcc structure. It has an edge length of  $4.3 \text{ \AA}$ . The shortest inter Br-ions is  
 A.  $3.72 \text{ \AA}$     B.  $4.3 \text{ \AA}$     C.  $1.86 \text{ \AA}$     D.  $7.44 \text{ \AA}$

21. A mixture of equal volumes of  $\text{H}_2$  and  $\text{Cl}_2$  was exposed to ultraviolet light at constant pressure. Pick out the correct statement.

- A. The volume of the gas mixture increases by a factor of 2
- B. The volume of the gas mixture decreases by a factor of 2
- C. The volume remains unchanged, as there is no chemical reaction
- D. A chemical reaction occurs but there is no change in volume

22. Correct set of four quantum numbers for the valence electrons of rubidium ( $z = 37$ ) is

- A. 5, 0, 0,  $+\frac{1}{2}$
- B. 5, 1, 0,  $+\frac{1}{2}$
- C. 5, 1, 1,  $+\frac{1}{2}$
- D. 6, 0, 0,  $+\frac{1}{2}$

23. The linear structure is assumed by

- A.  $\text{SnCl}_2$
- B.  $\text{NCO}^-$
- C.  $\text{SO}_2$
- D.  $\text{NH}_3$

24. While P reacts with caustic soda, the products are  $\text{PH}_3$  and  $\text{NaH}_2\text{PO}_2$ . This is an example of

- A. oxidation
- B. reduction
- C. oxidation and reduction
- D. neutralisation

25. Which of the following compounds is covalent?

- A.  $\text{H}_2$
- B.  $\text{CaO}$
- C.  $\text{KCl}$
- D.  $\text{Na}_2\text{S}$

26. The concentration of solution remains independent of temperature in

- A. molarity
- B. normality
- C. formality
- D. molality

27. Precipitation takes place when the product of concentration of ions

- A. equals their solubility product
- B. exceeds their solubility product
- C. less than their solubility product
- D. none of the above

28. Which one of the following elements has maximum electron affinity?

- A. F
- B. Cl
- C. Br
- D. I

29. Most probable velocity, average velocity, and RMS velocity are related as

- A.  $1 : 1.128 : 1.234$
- B.  $1 : 1.234 : 1.128$
- C.  $1.128 : 1 : 1.234$
- D.  $1.128 : 1.234 : 1$

30. Which of the following compounds corresponds Vant Hoff's factor ( $i$ ) to be equal to 2 for dilute solution?

- A.  $\text{K}_2\text{SO}_4$
- B.  $\text{Na}_2\text{SO}_4$
- C. Sugar
- D.  $\text{MgSO}_4$

31. Amongst the following hydroxides, the one that has the lowest value of  $K_{sp}$  at ordinary temperature (about.  $25^\circ\text{C}$ ) is

- A.  $\text{Mg}(\text{OH})_2$
- B.  $\text{Ca}(\text{OH})_2$
- C.  $\text{Ba}(\text{OH})_2$
- D.  $\text{Be}(\text{OH})_2$

32. The rate of reaction between A and B increases by a factor of 100. When the concentration of A is increased 10 folds, the order of reaction with respect to A is

A. 1

B. 2

C. 3

D. 4

33. In a reversible reaction, a catalyst

A. increases the rate of forward reaction

B. increases the rate of backward reaction

C. alters the rates of both reactions equally

D. increases the rate of forward reaction more than that of backward reaction

34. The cathodic reaction in electrolysis of dil.  $\text{H}_2\text{SO}_4$  with platinum electrode is

A. oxidation

B. reduction

C. both oxidation and reduction

D. neutralisation

35. The oxide that gives  $\text{H}_2\text{O}_2$  on treatment with a dilute acid is

A.  $\text{PbO}_2$

B.  $\text{Na}_2\text{O}_2$

C.  $\text{MnO}_2$

D.  $\text{TiO}_2$

36. A naturally occurring substance from which a metal can be profitably extracted is called

A. mineral

B. gangue

C. ore

D. flux

37. The metallic lustre exhibited by sodium is explained by

A. diffusion of sodium ion

B. oscillation of loose electrons

C. excitation of free protons

D. existence of body centred cubic lattice

38. A pair of compounds, which cannot exist together in solution, is

A.  $\text{NaHCO}_3$  and  $\text{NaOH}$

B.  $\text{NaHCO}_3$  and  $\text{H}_2\text{O}$

C.  $\text{NaHCO}_3$  and  $\text{Na}_2\text{CO}_3$

D.  $\text{Na}_2\text{CO}_3$  and  $\text{NaOH}$

39. A solution of sodium metal in liquid ammonia is strongly reducing due to the presence of

A. sodium atoms

B. sodium hydride

C. sodium amide

D. solvated electron

40. If two compounds have the same crystal structure and analogous formulae, they are called

A. allotropes

B. isotopes

C. isomers

D. isobars

41. When Benzene diazonium chloride reacts with hypophosphorous acid, it produces

A. benzene

B. phenol

C. phenylphosphite

D. phenylphosphate

42. The reaction of aliphatic primary amine with nitrous acid in cold produces

A. nitrile

B. alcohol

C. diazonium salt

D. secondary amine

43. Ethylamine can be prepared by the action of bromine and caustic potash on

- A. acetamide      B. propionamide      C. formamide      D. methyl cyanide
44. The aldol condensation of acetaldehyde results in the formation of  
 A.  $\text{CH}_3\text{COCHOHCH}_3$       B.  $\text{CH}_3\text{CHOHCH}_2\text{CHO}$   
 C.  $\text{CH}_3\text{CH}_2\text{CHOHCHO}$       D.  $\text{CH}_3\text{CH}_2\text{OH} + \text{CH}_3\text{COOH}$
45. Which compound reacts fastest with Lucas reagent at room temperature?  
 A. Butan-1-ol      B. Butan-2-ol      C. 2-Methyl propan-1-ol      D. 2-Methyl propan-2-ol
46. The reaction with  $\text{D}_2\text{O}$ ,  $(\text{CH}_3)_3\text{CMgCl}$  produces  
 A.  $(\text{CH}_3)_3\text{CD}$       B.  $(\text{CH}_3)_3\text{CO}$       C.  $(\text{CD}_3)_3\text{CD}$       D.  $(\text{CD}_3)_3\text{COD}$
47. The reaction with alcoholic potash, 1-chlorobutane gives  
 A. 1-Butene      B. 1-Butanol      C. 2-Butene      D. 2-Butanol
48. The active nitrating agent during nitration of benzene is  
 A.  $\text{NO}_3^-$       B.  $\text{HNO}_2^-$       C.  $\text{NO}_2^-$       D.  $\text{HNO}_3$
49. The number of sigma and pi bonds in 1-buten-3-yne are  
 A. 5 sigma and 5 pi      B. 7 sigma and 3 pi      C. 8 sigma and 2 pi      D. 6 sigma and 4 pi
50. The most stable carbonium ion among the cations is  
 A. sec-butyl      B. ter-butyl      C. n-butyl      D. none of these
51. How many optically active stereo-isomers are possible for butane-2, 3-diol?  
 A. 1      B. 2      C. 3      D. 4
52. B.P. and M.P. of inert gases are  
 A. high      B. low      C. very high      D. very low
53.  $[\text{CO}(\text{NH}_3)_5\text{Br}] \text{SO}_4$  and  $[\text{CO}(\text{NH}_3)_5 \text{SO}_4] \text{Br}$  are examples of which type of isomerism?  
 A. Linkage      B. Geometrical      C. Ionization      D. Optical
54. The valency of Cr in the complex  $[\text{Cr}(\text{H}_2\text{O})_4 \text{Cl}_2]^+$  is  
 A. 3      B. 1      C. 6      D. 5
55. In Nessler's reagent, the ion is  
 A.  $\text{Hg}^+$       B.  $\text{Hg}^{2+}$       C.  $\text{HgI}_2^{2-}$       D.  $\text{HgI}_4^{2-}$

56. In solid  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , copper is co-ordinated to

- A. five water molecules      B. four water molecules      C. one sulphate ion      D. one water molecule

57. Which of the following is a weak acid?

- A.  $\text{HCl}$       B.  $\text{HBr}$       C.  $\text{HP}$       D.  $\text{HI}$

58. When  $\text{SO}_2$  is passed through acidified  $\text{K}_2\text{Cr}_2\text{O}_7$  solution,

- A. the solution turns blue      B. the solution is decolourised  
C.  $\text{SO}_2$  is reduced      D. green  $\text{Cr}_2(\text{SO}_4)_3$  is formed

59. Which of the following has lowest boiling point?

- A.  $\text{H}_2\text{O}$       B.  $\text{H}_2\text{S}$       C.  $\text{H}_2\text{Se}$       D.  $\text{H}_2\text{Te}$

60. Nitric oxide is prepared by the action of dil.  $\text{HNO}_3$  on

- A.  $\text{Fe}$       B.  $\text{Cu}$       C.  $\text{Zn}$       D.  $\text{Sn}$

61. The laughing gas is

- A. nitrous oxide      B. nitric oxide      C. nitrogen trioxide      D. nitrogen pentaoxide

62. Ordinary glass is

- A. sodium silicate      B. calcium silicate  
C. calcium and Sodium silicate      D. copper silicate

63. The chemical name of phosgene is

- A. Phosphene      B. Carbonyl chloride  
C. Phosphorous oxychloride      D. Phosphorous trichloride

64. Which one of the following is strongest Lewis acid?

- A.  $\text{BF}_3$       B.  $\text{BCl}_3$       C.  $\text{BBr}_3$       D.  $\text{BI}_3$

65. Three centred bond is present in

- A.  $\text{NH}_3$       B.  $\text{B}_2\text{H}_6$       C.  $\text{BCl}_3$       D.  $\text{AlCl}_3$

66. Plaster of Paris is

- A.  $\text{CaSO}_4 \cdot \text{H}_2\text{O}$       B.  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$       C.  $\text{CaSO}_4 \cdot 1/2 \text{H}_2\text{O}$       D.  $\text{CaSO}_4 \cdot 3/2 \text{H}_2\text{O}$

67. Rocky impurities present in a mineral are called

- A. flux      B. gangue      C. matte      D. slag

68. Free hydrogen is found in

- A. acids                      B. water                      C. marsh gas                      D. water gas
69. When zeolite, which is hydrated sodium aluminium silicate, is treated with hard water; the sodium ions are exchanged with  
A.  $H^+$                       B.  $K^+$                       C.  $SO_4^{2-}$                       D.  $Mg^{2+}$
70. On passing 0.3 faraday of electricity through aluminium chloride, the amount of aluminium metal deposited on cathode is (Al = 27)  
A. 0.27 g                      B. 0.3 g                      C. 2.7 g                      D. 0.9 g
71. The migration of colloidal particles under influence of an electric field is known as  
A. Electro-osmosis                      B. Brownian movement                      C. Cataphoresis                      D. Dialysis
72. In a colloidal state, particle size ranges from  
A. 1 to 10  $\text{\AA}$                       B. 20 to 50  $\text{\AA}$                       C. 10 to 1000  $\text{\AA}$                       D. 1 to 280  $\text{\AA}$
73. The half-life of a first order reaction is 69.35. The value of rate constant of the reaction is  
A.  $1.05^{-1}$                       B.  $0.15^{-1}$                       C.  $0.015^{-1}$                       D.  $0.0015^{-1}$
74. Heat of neutralisation of a strong acid and strong base is always  
A. 13.7 Kcal/mol                      B. 9.6 Kcal/mol                      C. 6 Kcal/mol                      D. 11.4 Kcal/mol
75. In exothermic reactions,  
A.  $H_R = H_P$                       B.  $H_R > H_P$                       C.  $H_R < H_P$                       D. None of the above
76. Which is a buffer solution?  
A.  $CH_3COOH + CH_3COONa$                       B.  $CH_3COOH + CH_3COONH_4$   
C.  $CH_3COOH + NH_4Cl$                       D.  $NaOH + NaCl$
77. The pH of 0.01 M solution of HCl is  
A. 1.0                      B. 2.0                      C. 10.0                      D. 11.0
78. In which of the following case does the reaction go fastest to completion?  
A.  $k = 10^2$                       B.  $k = 10^{-2}$                       C.  $k = 10$                       D.  $k = 1$
79. What quantity of limestone ( $CaCO_3$ ) on heating will give 28 kg of  $CaO$ ?  
A. 1000 kg                      B. 56 kg                      C. 44 kg                      D. 50 kg

80. The percentage of oxygen in NaOH is  
A. 40                      B. 16                      C. 18                      D. 10
81. If we take 44 g of CO<sub>2</sub> and 14 g of N<sub>2</sub>, what will be the mole fraction of CO<sub>2</sub> in the mixture?  
A. 1/5                      B. 1/3                      C. 1/2                      D. 1/4
82. The molarity of a solution of Na<sub>2</sub>CO<sub>3</sub> having 5.3 g/250 ml of solution is  
A. 0.2 M                      B. 2 M                      C. 20 M                      D. 0.02 M
83. A gas is initially at 1 atm pressure. To compress it to 1/2th of its initial volume, pressure to be applied is  
A. 1 atm                      B. 4 atm                      C. 2 atm                      D. 1/4 atm
84. The value of  $R$  in calorie/degree/mole is  
A. 0.0831                      B. 8.31                      C.  $8.31 \times 10^7$                       D. 1.987
85. Which of the following possesses zero resistance at 0 K?  
A. Conductors                      B. Semi-conductors                      C. Super-conductors                      D. Insulators
86. CsCl has lattice of the type  
A. ccp                      B. fcc                      C. bcc                      D. hcp
87. In the reaction between sodium and chlorine to form sodium chloride,  
A. sodium atom is reduced                      B. sodium ion is reduced  
C. chlorine atom is reduced                      D. chloride ion is reduced
88. Octahedral molecular shape exists in \_\_\_\_\_ hybridisation.  
A. sp<sup>3</sup>d                      B. sp<sup>3</sup>d<sup>2</sup>                      C. sp<sup>3</sup>d<sup>3</sup>                      D. sp<sup>2</sup>d<sup>2</sup>
89. NH<sub>3</sub> and BF<sub>3</sub> form an adduct readily because they form  
A. a co-ordinate bond                      B. a covalent bond                      C. an ionic bond                      D. a hydrogen bond
90. Diagonal relationship exists between  
A. Li and Mg                      B. Na and Mg                      C. K and Mg                      D. Al and Mg
91. Which element has the highest electro-negativity?  
A. F                      B. He                      C. Ne                      D. Na
92. Loss of a  $\alpha$ -particle is equivalent to  
A. loss of two neutrons only                      B. loss of two protons only  
C. loss of two neutrons and loss of two protons                      D. none of the above



93. Stable compounds in + 1 oxidation state are formed by  
A. B                      B. Al                      C. Ga                      D. Th
94. Sodium hexametaphosphate is used as  
A. a cleansing agent   B. an insecticide   C. a water softner   D. an iron exchange resin
95. The strongest acid is  
A.  $\text{ClO}_3(\text{OH})$               B.  $\text{ClO}_2(\text{OH})$               C.  $\text{SO}(\text{OH})_2$               D.  $\text{SO}_2(\text{OH})_2$
96. Which one among the following pairs of ions cannot be separated by  $\text{H}_2\text{S}$  in dilute hydrochloric acid?  
A.  $\text{Bi}^{3+}$ ,  $\text{Sn}^{4+}$               B.  $\text{Al}^{3+}$ ,  $\text{Hg}^{2+}$               C.  $\text{Zn}^{2+}$ ,  $\text{Cu}^{2+}$               D.  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$
97. The alkane would have only the primary and tertiary carbon is  
A. Pentane              B. 2-methylbutane              C. 2, 2-dimethylpropane              D. 2, 3-dimethylbutane
98. The product of reaction of alcoholic silver nitrite with ethyl bromide is  
A. ethane              B. ethene              C. nitroethane              D. ethyl alcohol
99. Formyl chloride has not been so prepared. Which one of the following can function as formyl chloride in formulation?  
A.  $\text{HCHO} + \text{HCl}$               B.  $\text{HCOOCH}_3 + \text{HCl}$               C.  $\text{CO} + \text{HCl}$               D.  $\text{HCONH}_2 + \text{HCl}$
100. Amongst the following, the most basic compound is  
A. Benzylamine              B. Aniline              C. Acetanilide              D. p-Nitroaniline

### Solutions:

1	2	3	4	5	6	7	8	9	10
B	B	C	C	C	C	C	C	C	B
11	12	13	14	15	16	17	18	19	20
A	C	C	D	D	C	A	C	C	A
21	22	23	24	25	26	27	28	29	30
C	A	B	C	A	D	B	C	A	D
31	32	33	34	35	36	37	38	39	40



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D	D	C	B	B	C	A	A	D	A
41	42	43	44	45	46	47	48	49	50
A	B	B	B	D	A	A	C	B	B
51	52	53	54	55	56	57	58	59	60
B	D	C	A	D	B	C	D	B	B
61	62	63	64	65	66	67	68	69	70
A	C	B	D	B	C	B	D	D	C
71	72	73	74	75	76	77	78	79	80
C	C	C	A	B	A	B	A	D	A
81	82	83	84	85	86	87	88	89	90
C	A	C	D	C	C	C	B	A	A
91	92	93	94	95	96	97	98	99	100
A	C	D	C	A	A	D	C	C	A