

1. Mass of one atom of an element is  $6.64 \times 10^{-23}$  g. This is equal to  
 (a)  $6.64 \times 10^{-23}$  u (b) 40.0 u  
 (c)  $\frac{1}{40}$  u (d) 6.64 u
2. Point defects are present in  
 (a) ionic solids (b) amorphous solid  
 (c) molecular solids (d) liquids
3. The average molecular speed is greatest in which of the following gas samples?  
 (a) 1.0 mol of  $O_2$  at 560 K  
 (b) 0.50 mol of Ne at 500 K  
 (c) 0.20 mol of  $CO_2$  at 440 K  
 (d) 2.0 mol of He at 140 K
4. Elevation in boiling point of an aqueous urea solution is  $0.52^\circ C$  [ $K_b = 0.52^\circ \text{ mol}^{-1} \text{ kg}$ ]. Hence, mole fraction of urea in this solution is  
 (a) 0.982 (b) 0.567  
 (c) 0.943 (d) 0.018
5. Oxidation number of Cr in  $CrO_5$  is  
 (a) +10 (b) +8  
 (c) +6 (d) +4
6. For the reaction  

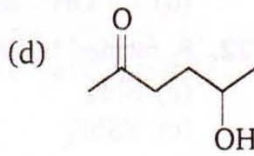
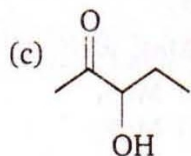
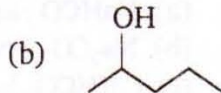
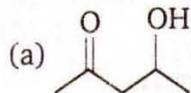
$$H_2(g) + CO_2(g) \rightleftharpoons CO(g) + H_2O(g)$$
 If the initial concentration of  $[H_2] = [CO_2]$  and  $x$  mol/L of hydrogen is consumed at equilibrium, the correct expression of  $K_p$  is  
 (a)  $\frac{x^2}{(1-x)^2}$  (b)  $\frac{x^2}{(2+x)^2}$   
 (c)  $\frac{x^2}{1-x^3}$  (d)  $\frac{(1+x)^2}{(1-x)^2}$
7. The solubility of AgI in NaI solution is less than that in pure water because  
 (a) AgI forms complex with NaI  
 (b) of common ion effect  
 (c) solubility product of AgI is less  
 (d) the temperature of the solution decrease
8. A buffer solution with pH 9 is to be prepared by mixing  $NH_4Cl$  and  $NH_4OH$ . Calculate the number of moles of  $NH_4Cl$  that should be added to 1 L of 1.0 M  $NH_4OH$ . [ $K_b = 1.8 \times 10^{-5}$ ]  
 (a) 3.4 (b) 2.6  
 (c) 1.5 (d) 1.99
9. The emf of the cell involving following changes,  

$$Zn(s) + Ni^{2+}(1M) \longrightarrow Zn^{2+}(1M) + Ni(s)$$
 is 0.5105 V. The standard emf of the cell is  
 (a) 0.540 V (b) 0.4810 V  
 (c) 0.5696 V (d) 0.5105 V
10. Chlorination of toluene in presence of light and heat followed by treatment with aqueous NaOH gives  
 (a) *o*-cresol  
 (b) *p*-cresol  
 (c) mixture of *o*-cresol and *p*-cresol  
 (d) benzoic acid
11. Identify the product in the following sequence  
 3, 4, 5-tribromoaniline  $\xrightarrow[\text{(ii) } H_3PO_2]{\text{(i) Diazotisation}}$  ?  
 (a) 3, 4, 5-tribromobenzene  
 (b) 1, 2, 3-tribromobenzene  
 (c) 3, 4, 5-tribromophenol  
 (d) 3, 4, 5-tribromonitrobenzene

12. The order of first ionization energies of the elements Li, Be, B, Na is  
 (a)  $\text{Li} > \text{Be} > \text{B} > \text{Na}$  (b)  $\text{Be} > \text{B} > \text{Li} > \text{Na}$   
 (c)  $\text{Na} > \text{Li} > \text{B} > \text{Be}$  (d)  $\text{Be} > \text{Li} > \text{B} > \text{Na}$
13. Effective magnetic moment of  $\text{Sc}^{3+}$  ion is  
 (a) 1.73 (b) zero  
 (c) 5.92 (d) 2.83
14. Potassium permanganate acts as an oxidant in alkaline and acidic medium. The final products formed from  $\text{KMnO}_4$  in the two conditions are respectively  
 (a)  $\text{MnO}^{2-}$  and  $\text{Mn}^{3+}$  (b)  $\text{Mn}^{3+}$  and  $\text{Mn}^{2+}$   
 (c)  $\text{Mn}^{2+}$  and  $\text{Mn}^{3+}$  (d)  $\text{MnO}_2$  and  $\text{Mn}^{2+}$
15. An alkene having the molecular formula  $\text{C}_9\text{H}_{18}$  on ozonolysis gives 2, 2-dimethyl propanal and butanone. The alkene is  
 (a) 2, 2, 2-trimethyl-3-hexene  
 (b) 2, 2, 6-trimethyl-3-hexene  
 (c) 2, 2, 4-trimethyl 3-hexene  
 (d) 2, 3, 4-trimethyl-2-hexene
16. The number of optical isomers of  $\text{CH}_3\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CHO}$  is  
 (a) 2 (b) 3  
 (c) 6 (d) 4
17. The amine which will not liberate nitrogen on reaction with nitrous acid is  
 (a) trimethyl amine (b) ethyl amine  
 (c) sec-butyl amine (d) iso-propyl amine
18. Find the two third life ( $t_{2/3}$ ) of a first order reaction in which  $k = 5.48 \times 10^{-14}$  per second.  
 (a)  $2.01 \times 10^{13}$  s (b)  $201 \times 10^{13}$  s  
 (c)  $201 \times 10^{20}$  s (d)  $0.201 \times 10^{10}$  s
19. Identify the compound Z in this reaction sequence  

$$\text{CH}_3\text{CH}_2\text{COOH} \xrightarrow{\text{NH}_3} \text{X} \xrightarrow{\text{Br}_2 + \text{KOH}} \text{Y} \xrightarrow{\text{HNO}_2} \text{Z}$$
  
 (a)  $\text{CH}_3\text{OH}$  (b)  $\text{CH}_3\text{CH}_2\text{NH}_2$   
 (c)  $\text{CH}_3\text{CH}_2\text{OH}$  (d)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
20. The orbital angular momentum of an electron revolving in p-orbital is  
 (a) zero (b)  $\frac{h}{\sqrt{2}\pi}$   
 (c)  $\frac{h}{2\pi}$  (d)  $\frac{h}{2\sqrt{2}\pi}$
21. The pair whose both species are used in antacid medicinal preparations is  
 (a)  $\text{NaHCO}_3$  and  $\text{Mg}(\text{OH})_2$   
 (b)  $\text{Na}_2\text{CO}_3$  and  $\text{Ca}(\text{HCO}_3)_2$   
 (c)  $\text{Ca}(\text{HCO}_3)_2$  and  $\text{Mg}(\text{OH})_2$   
 (d)  $\text{Ca}(\text{OH})_2$  and  $\text{NaHCO}_3$
22.  $\text{F}_2$  formed by reacting  $\text{K}_2\text{MnF}_6$  with  
 (a)  $\text{SbF}_5$  (b)  $\text{MnF}_3$   
 (c)  $\text{KSbF}_6$  (d)  $\text{MnF}_4$
23. Four successive members of the first row of transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionisation enthalpy?  
 (a) Vanadium ( $Z = 23$ )  
 (b) Chromium ( $Z = 24$ )  
 (c) Iron ( $Z = 26$ )  
 (d) Manganese ( $Z = 25$ )
24. Which of the following reactions is an example of redox reactions?  
 (a)  $\text{AgNO}_3 + \text{NaCl} \longrightarrow \text{AgCl} + \text{NaNO}_3$   
 (b)  $\text{Na}_2\text{CO}_3 + \text{SiO}_2 \longrightarrow \text{Na}_2\text{SiO}_3 + \text{CO}_2$   
 (c)  $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 \longrightarrow$   
 $2\text{CaCO}_3 + 2\text{H}_2\text{O}$   
 (d)  $10\text{HNO}_3 + \text{I}_2 \longrightarrow 2\text{HIO}_3 + 10\text{NO}_2$   
 $+ 4\text{H}_2\text{O}$
25.  $\text{PCl}_3$  and cold water reacts to produce which of the following?  
 (a)  $\text{H}_3\text{PO}_3$   
 (b)  $\text{H}_3\text{PO}_2$   
 (c)  $\text{H}_4\text{P}_2\text{O}_7$   
 (d)  $\text{H}_3\text{PO}_4$
26. Which of the following is not an ore of magnesium?  
 (a) Magnesite  
 (b) Dolomite  
 (c) Gypsum  
 (d) Carnallite
27. Brown ring in the test of  $\text{NO}_3^-$  is formed due to the formation of  
 (a)  $[\text{Fe}(\text{H}_2\text{O})_5 \cdot \text{NO}]\text{SO}_4$   
 (b)  $[\text{Fe}(\text{SO}_4)_2 \cdot \text{NO}]\text{H}_2\text{O}$   
 (c)  $\text{Fe}_2(\text{SO}_4)_3 \cdot \text{NO}$   
 (d) None of the above

28. Which one of the following will most readily be dehydrated in acidic conditions?



29. Sulphide ores of metals are usually concentrated by froth floatation process. Which one of the following sulphide ores offers an exception and is concentrated by chemical leaching?

- (a) Argentite (b) Galena  
(c) Copper pyrite (d) Sphalerite

30. Soldiers of Napoleon army which at Alps during freezing winter suffered a serious problem as regards to the tin buttons of their uniforms. White metallic tin buttons got covered to grey powder. This transformation is related to

- (a) an interaction with nitrogen of the air at very low temperatures  
(b) a change in the partial pressure of oxygen in the air  
(c) a change in the crystalline structure of tin  
(d) an interaction with water vapour contained in the humid air

31. Which of the following is a mixed oxide?

- (a)  $\text{Fe}_2\text{O}_3$  (b)  $\text{PbO}_2$   
(c)  $\text{BaO}_2$  (d)  $\text{Pb}_3\text{O}_4$

32. The structure of  $\text{XeOF}_4$  is

- (a) planar (b) tetrahedral  
(c) square pyramidal (d) pyramidal

33. A metal  $M$  forms chlorides in its +2 and +4 oxidation states. Which of the following statements about these chlorides is correct?

- (a)  $\text{MCl}_2$  is more volatile than  $\text{MCl}_4$   
(b)  $\text{MCl}_2$  is more soluble in anhydrous ethanol than  $\text{MCl}_4$   
(c)  $\text{MCl}_2$  is more ionic than  $\text{MCl}_4$   
(d)  $\text{MCl}_2$  is more easily hydrolysed than  $\text{MCl}_4$

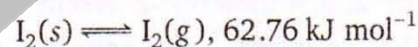
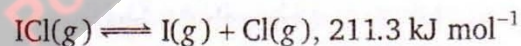
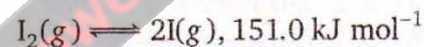
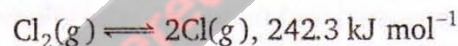
34. Atomic emission spectra of an element can not be used to

- (a) identify the atom  
(b) determine the mass number of the nucleus of atom  
(c) measure the difference in energy between pairs of stationary state of atom  
(d) All of the above

35. For the reaction of one mole of zinc dust with one mole of sulphuric acid in a bomb calorimeter,  $\Delta U$  and  $W$  corresponds to

- (a)  $\Delta U < 0, W = 0$  (b)  $\Delta U < 0, W < 0$   
(c)  $\Delta U > 0, W = 0$  (d)  $\Delta U > 0, W > 0$

36. The enthalpy changes for the following processes are listed below



Given that the standard states for iodine and chlorine are  $\text{I}_2(s)$  and  $\text{Cl}_2(g)$ , the standard enthalpy of formation of  $\text{ICl}(g)$  is

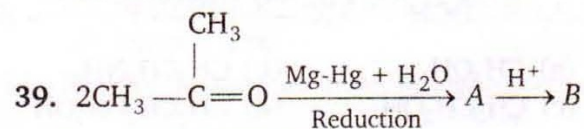
- (a)  $-14.6 \text{ kJ mol}^{-1}$  (b)  $-16.8 \text{ kJ mol}^{-1}$   
(c)  $+16.8 \text{ kJ mol}^{-1}$  (d)  $+244.8 \text{ kJ mol}^{-1}$

37. When glucose reacts with bromine water, the main product is

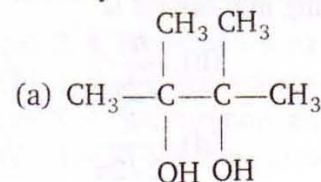
- (a) acetic acid  
(b) saccharic acid  
(c) glyceraldehyde  
(d) gluconic acid

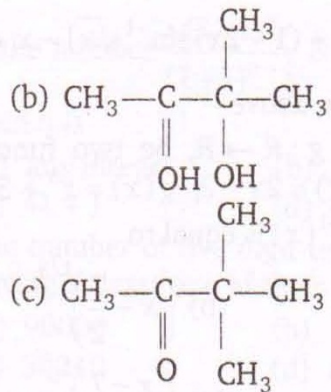
38. Amylopectin is a polymer of

- (a)  $\alpha$ -D-glucose (b)  $\alpha$ -D-fructose  
(c) lactose (d) amylose



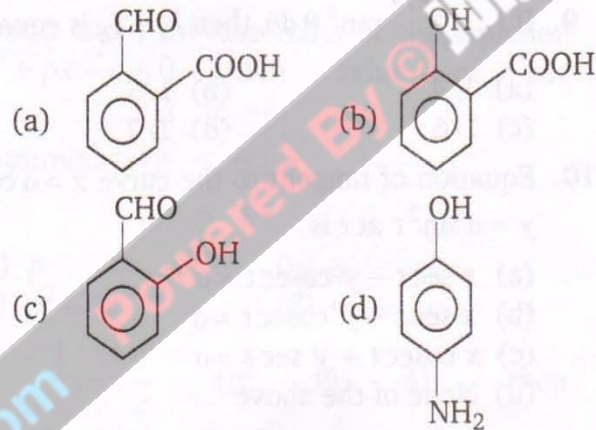
Identify the  $B$  in the above sequence





(d) None of the above

40. Which one of the following compound gives aspirin on reacting with acetic anhydride in presence of  $\text{H}_2\text{SO}_4$ ?



### Answer – Key

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