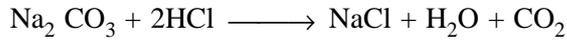


1. For the reaction

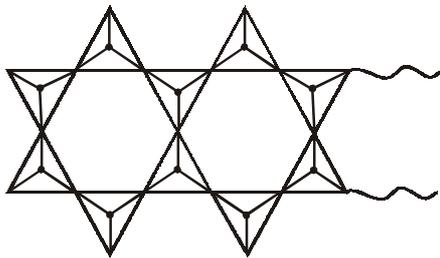


Equivalent weight of  $\text{Na}_2\text{CO}_3$  is

- (a)  $M/2$                       (b)  $M$                       (c)  $2M$                       (d)  $M/4$

**Sol: Ans [a]** Because 2 moles of  $\text{Na}^+$  being transferred per mole of  $\text{Na}_2\text{CO}_3$ .

2.



Silicate structure unit of

- (a)  $(\text{Si}_2\text{O}_{11})_n^{-6n}$               (b)  $(\text{Si}_2\text{O}_7)_n^{-2n}$               (c)  $(\text{Si}_2\text{O}_3)$               (d)  $(\text{SiO}_4)^{-4}$

**Sol: Ans [b]** Factual

3. Depression in freezing point is 6 K for NaCl solution if  $K_f$  for water is 1.86 K/kg mole amount of NaCl desolved in 1 kg water is

- (a) 3.42                      (b) 1.62                      (c) 3.24                      (d) 1.71

**Sol: Ans [b]**  $\Delta T_f = i \times K_f \times \frac{n}{W} \times 1000$

$$6 = 2 \times 1.86 \times \frac{n}{1} \times 1$$

$$n = \frac{6}{2 \times 1.86} = 1.62$$

4. Excited state configuration of  $\text{Mn}^{++}$  is

- (a)  $t_{2g}^4$                       (b)  $t_{2g}^3 e_g^2$                       (c)  $t_{2g}^4 e_g^2$                       (d)  $t_{2g}^5 e_g^0$

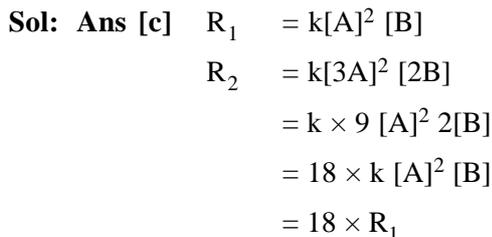
**Sol: Ans [b]** Configuration of  $\text{Mn}^{++}$  is  $[\text{Ar}] 3d^5$ . After CSFE splitting in excited state 3 electrons in  $t_{2g}$  ( $d_{xy}$ ,  $d_{yz}$  and  $d_{zx}$ ) and 2 electrons goes in  $e_g$  ( $d_{z^2}$  and  $d_{x^2-y^2}$ )

5. Main constituent of plants is

- (a) Cellulose                      (b) Starch                      (c) Fructose                      (d) Lipids

**Sol: Ans [a]** Factual

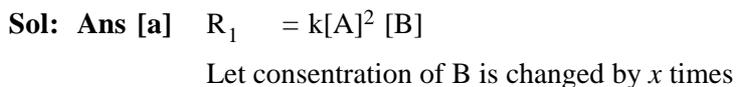




14. Rate of a reaction can be expressed by following rate expression

Rate =  $k[A]^2 [B]$  if concentration of A is reduced by half by what times concentration of B is to be increased to have same rate of reaction

- (a) 4 times                      (b) 2 times                      (c) 1/4 times                      (d) 8 times

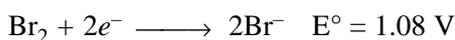


$$R_2 = k[A/2]^2 [x B]$$

$$= k \times x/4 [A]^2 [B]$$

$$= x/4 \times k [A]^2 [B]$$

as  $R_2 = R_1$  thus  $x$  is 4.



Calculate  $K_{\text{eq}}$  for the cell reaction for the cell formed by two electrodes.

- (a)  $10^{41}$                       (b)  $10^{32}$                       (c)  $10^{-32}$                       (d)  $10^{-42}$

**Sol: Ans [b]** Cell reaction is



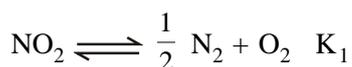
$$E^\circ_{\text{cell}} = \frac{0.059}{2} \log K_{\text{eq}}$$

$$0.95 = \frac{0.059}{2} \log K_{\text{eq}}$$

$$\frac{0.95 \times 2}{0.059} = \log K_{\text{eq}}$$

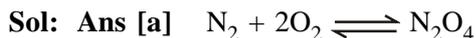
$$K_{\text{eq}} \approx 10^{32}$$

16. Consider the reactions



Give the equilibrium constant for the formation of  $\text{N}_2\text{O}_4$  from  $\text{N}_2$  and  $\text{O}_2$

- (a)  $\frac{1}{K_1^2 K_2}$                       (b)  $\frac{1}{K_1 K_2}$                       (c)  $\sqrt{\frac{1}{K_1 K_2}}$                       (d)  $\frac{K_2}{K_1}$



Reaction is obtained by  $(-2 \times \text{equation 1}) + (-1 \times \text{equation 2})$ .

17. Half life of radioactive element is 16 hrs what time it will take for 75% disintegration.

- (a) 32 days                      (b) 32 hrs                      (c) 48 hrs                      (d) 16 hrs

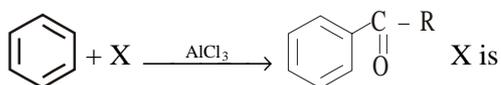
**Sol: Ans [b]**  $N_t = N_0 \left(\frac{1}{2}\right)^n$

$$N_0 - \frac{3N_0}{4} = N_0 \left(\frac{1}{2}\right)^n$$

$$n = 2$$

thus 32 hrs.

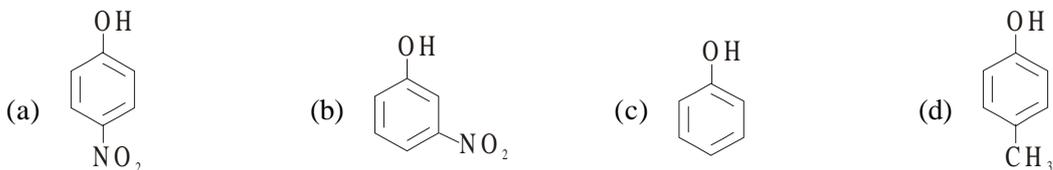
18. Fridal-craft acylation can be given by



- (a)  $R - \overset{\overset{O}{\parallel}}{C} - Cl$                       (b)  $R - \overset{\overset{O}{\parallel}}{C} - R$                       (c)  $R - \overset{\overset{O}{\parallel}}{C} - H$                       (d)  $R - O - R$

**Sol: Ans [a]** Factual.

19. Which of the following is having maximum acidic strength



**Sol: Ans [a]** -M NO<sub>2</sub> group is para to phenolic OH.

20. What is the reaction for unusual high B.P. of water.

- (a) due to the presence H<sup>+</sup> and OH<sup>-</sup> ions in water  
 (b) due to dipole-dipole interactions.  
 (c) due to London forces.  
 (d) strong London forces.

**Sol: Ans [b]** Factual.

21. Shine at freshly cut sodium is because of

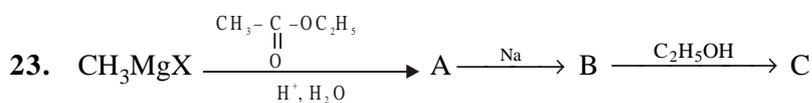
- (a) due to oscilation of free electrons  
 (b) deu to weak metallic bonding  
 (c) due by absorption of light in crystal lattice  
 (d) due to presence of free valency at the surface

**Sol: Ans [a]** Factual.

22. Most Acidic oxide amount following is

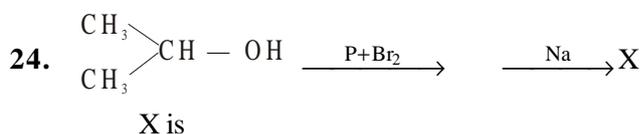
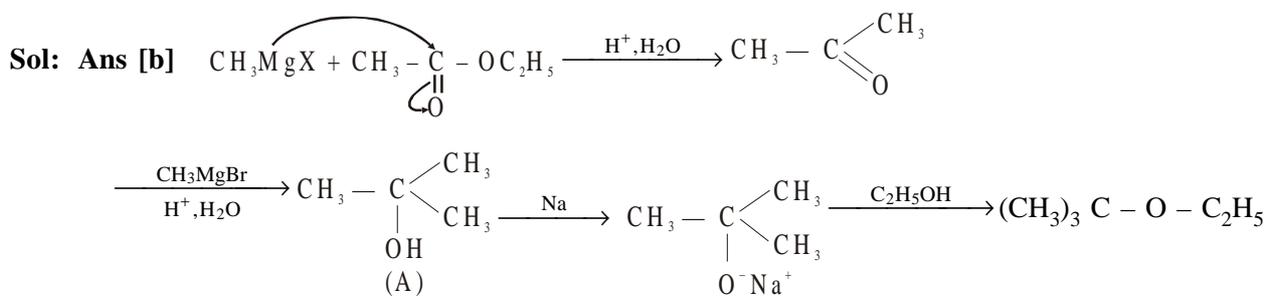
- (a)  $\text{Cl}_2\text{O}_5$                       (b)  $\text{Cl}_2\text{O}$                       (c)  $\text{Cl}_2\text{O}_3$                       (d)  $\text{Cl}_2\text{O}_7$

Sol: Ans [d] Having highest oxygen content.



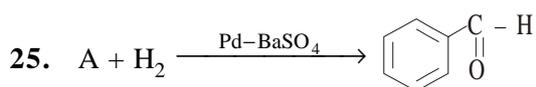
C is

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



- (a)  $\text{CH}_3-\overset{\text{CH}_3}{\text{C}}-\text{CH}_2-\text{CH}_3$                       (b)  $\text{CH}_3-\overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}}-\text{CH}_3$   
 (c)  $\text{CH}_3-\overset{\text{CH}_3}{\text{C}}-\text{CH}-\overset{\text{CH}_3}{\text{C}}-\text{CH}_3$                       (d)  $\text{CH}_3-\overset{\text{CH}_3}{\text{C}}-\text{CH}_2\text{CH}_2\text{CH}_3$

Sol: Ans [c] By Wurtz reaction.



- (a)  $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{Cl}$                       (b)  $\text{C}_6\text{H}_5-\text{CN}$                       (c)  $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$                       (d)  $\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$

Sol: Ans [a] By Rosenmund reduction.



A is

- (a) AgCN (b) KCN (c) NaCN (d) HCN

**Sol: Ans [a]** Nucleophilic substitution in presence of  $Ag^+$ .

27. In evaporation of water  $\Delta H$  and  $\Delta S$  are

- (a) +, + (b) +, - (c) -, - (d) -, +

**Sol: Ans [a]** Process is endothermic and randomness increases.



- (a)  ${}_8^{18}O$  (b)  ${}_8^{17}O$  (c)  ${}_8^{14}N$  (d)  ${}_7^{15}N$

**Sol: Ans [b]** Self explanatory.

29. Which of the following is correct for the reaction  $\Delta H = +ve$  and  $\Delta S = +ve$

- (a) Spontaneous at high temperature (b) spontaneous at low temperature  
(c) non spontaneous at high temperature (d) non spontaneous at all temperatures

**Sol: Ans [a]**  $|T \Delta S| > |\Delta H|$  for reaction to be spontaneous under these conditions.

30. Petroleum is obtained from water gas, name of the reaction involved is

- (a) Fischer-Tropsch (b) Bangoic (c) Dow's (d) Kjeldahl's

**Sol: Ans [a]** Factual

31. Which of the following statements is wrong?

- (a) metals are more than nonmetals  
(b) there are only few Metalloids  
(c) hydrogen can be placed with alkali metals as well as with halogen in periodic table  
(d) non metals are more than metals

**Sol: Ans [d]** Factual

32. What volume of M/10 NaOH is to added in 50 ml M/10 acetic acid solution to get a buffer solution having highest buffer capacity

- (a) 50 ml (b) 25 ml (c) 10 ml (d) 40 ml

**Sol: Ans [b]** For highest buffer capacity  $pH = pK_a$

For this  $[salt] = [acid]$

thus 25 ml

33. Monomer of nucleic acid

- (a) Nucleotides (b) Nucleoxides (c) Aminoacids (d) carboxylic acid

**Sol: Ans [a]** Factual

34. (A)  $\longrightarrow$  Acetyl CO. A in aerobic condition and if conditions are anaerobic then ethyl alcohol is formed A is

- (a) Pyruvate (b) Citrate (c) Fumerate (d) Ascorbate

**Sol: Ans [a]** Factual

35. If volume containing gas is compressed to half, how many moles of gas remained in the vessel  
 (a) just double (b) just half (c) same (d) more than double

**Sol: Ans [c]** As gas is not escaped or injected number of moles remain the same.

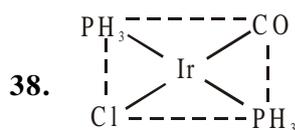
36. At same temperature calculate the ratio of average velocity of  $\text{SO}_2$  to  $\text{CH}_4$   
 (a) 2 : 3 (b) 3 : 4 (c) 1 : 2 (d) 1 : 6

**Sol: Ans [c]**  $U_{\text{Av}} \propto \frac{1}{\sqrt{M}}$  at constant temperature.

37. If temperature of 1 mole of gas is increased by  $50^\circ\text{C}$  calculate the change in kinetic energy of the system.  
 (a) 623.25 J (b) 6.235 J (c) 623.5 J (d) 6235.0 J

**Sol: Ans [a]**  $\text{K.E.} = \frac{3}{2}RT$  for 1 mole of gas.

$$\Delta \text{K.E.} = \frac{3}{2}R\Delta T$$



Give name of the complex name should specify the position of ligands.

- (a) bistransphosphinecarbonylchloroiridium [II]  
 (b) carbonylchlorobistransphosphineiridium [III]  
 (c) carbonylchlorobistransphosphineiridium [I]  
 (d) chlorocarbonylbistransphosphineiridium [I]
- Sol: Ans [c]** Factual

39. Ozonolysis products of an olefin are  $\begin{array}{c} \text{CHO} \\ | \\ \text{CHO} \end{array}$  and  $\begin{array}{c} \text{CH}_2\text{CHO} \\ | \\ \text{CH}_2\text{CHO} \end{array}$ . Olefin is



**Sol: Ans [c]** Self explanatory.

40. 10 g each of  $\text{CH}_4$  and  $\text{O}_2$  are kept in cylinders of same volume under same temperatures give the pressure ratio of two gases  
 (a) 2 : 1 (b) 1 : 4 (c) 2 : 3 (d) 3 : 4

**Sol: Ans [a]**  $P \propto n$

$$\text{for same mass } P \propto \frac{1}{M}$$

41. A Bubble of volume  $V_1$  is in the bottom of a pond at  $15^\circ\text{C}$  and 1.5 atm. pressure when it comes at the surface it observes a pressure of 1 atm. at  $25^\circ\text{C}$  and have volume  $V_2$  give  $V_2/V_1$
- (a) 15.5                      (b) 0.155                      (c) 155.0                      (d) 1.55

**Sol: Ans [d]**  $V = \frac{nRT}{P}$

$$\text{thus } \frac{V_2}{V_1} = \frac{T_2}{T_1} \times \frac{P_1}{P_2}$$

by putting values  $\frac{V_2}{V_1}$  is 1.55.

42. Consider the reaction  $2 \text{SO}_2 + \text{O}_2 \longrightarrow 2 \text{SO}_3$  if we start with 3 L of  $\text{SO}_2$  and 2L of  $\text{O}_2$  final change in volume is
- (a) increases by one litre                      (b) increases by 1.5 litre  
(c) decreases by 1 litre                      (d) decreases by 1.5 litre
43. Oxidation state of sulphur in  $\text{Na}_2\text{S}_2\text{O}_3$  and  $\text{Na}_2\text{S}_4\text{O}_6$
- (a) 4 and 6                      (b) 3 and 5                      (c) 2 and 2.5                      (d) 6 and 6

**Sol: Ans [c]** Self Explanatory.

