

**SECTION – 1 : (Maximum Marks : 80)**

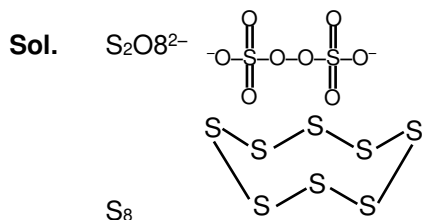
**Straight Objective Type**

This section contains **20 multiple choice questions**. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which **Only One** is correct.

1. Number of S–O bond in  $S_2O_8^{2-}$  and number of S–S bond in Rhombic sulphur are respectively:

- (1) 8, 8                      (2) 6, 8                      (3) 2, 4                      (4) 4, 2

**Ans. (1)**



2. Following vanderwaal forces are present in ethyl acetate liquid

- (1) H-bond, London forces.  
 (2) dipole-dipole interaction, H-bond  
 (3) dipole –dipole interaction, London forces  
 (4) H-bond, dipole-dipole interaction, London forces

**Ans. (3)**

**Sol.** Ethyl acetate is polar molecule so dipole-dipole interaction will be present there.

3. Given, for H-atom

$$\bar{\nu} = R_H \left[ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$$

Select the correct options regarding this formula for Balmer series.

- (A)  $n_1 = 2$   
 (B) Ionization energy of H atom can be calculated from above formula.  
 (C)  $\lambda_{\text{maximum}}$  is for  $n_2 = 3$ .  
 (D) If  $\lambda$  decreases then spectrum lines will converge.

**Ans. (3)**

**Sol.** Theory based.

4. Correct order of first ionization energy of the following metals Na, Mg, Al, Si in  $\text{KJ mol}^{-1}$  respectively are:

(1) 497, 737, 577, 786

(2) 497, 577, 737, 786

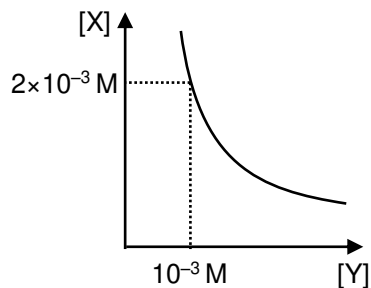
(3) 786, 739, 577, 497

(4) 739, 577, 786, 487

**Ans. (1)**

**Sol.** Correct order of ionisation energy will be :  $\text{Na} < \text{Al} < \text{Mg} < \text{Si}$

5. Select the correct stoichiometry and its  $K_{\text{sp}}$  value according to given graphs.



(1)  $\text{XY}$ ,  $K_{\text{sp}} = 2 \times 10^{-6}$

(2)  $\text{XY}_2$ ,  $K_{\text{sp}} = 4 \times 10^{-9}$

(3)  $\text{X}_2\text{Y}$ ,  $K_{\text{sp}} = 9 \times 10^{-9}$

(4)  $\text{XY}_2$ ,  $K_{\text{sp}} = 1 \times 10^{-9}$

**Ans. (1)**

**Sol.**  $\text{XY(s)} \longrightarrow \underset{2 \times 10^{-3}}{\text{X}^+(\text{aq})} + \underset{10^{-3}}{\text{Y}^-(\text{aq})}$

$$K_{\text{sp}} = [\text{X}^+][\text{Y}^-]$$

$$\text{or, } K_{\text{sp}} = 2 \times 10^{-3} \times 10^{-3}$$

$$\text{or, } K_{\text{sp}} = 2 \times 10^{-6}$$

6. According to Hardy Schultz rule, correct order of flocculation value for  $\text{Fe}(\text{OH})_3$  sol is :

- (1)  $\text{K}_2\text{CrO}_4 > \text{K}_3[\text{Fe}(\text{CN})_6] > \text{KNO}_3 > \text{KBr} = \text{AlCl}_3$
- (2)  $\text{K}_3[\text{Fe}(\text{CN})_6] > \text{K}_2\text{CrO}_4 > \text{KNO}_3 = \text{KBr} = \text{AlCl}_3$
- (3)  $\text{K}_3[\text{Fe}(\text{CN})_6] < \text{K}_2\text{CrO}_4 < \text{KNO}_3 = \text{KBr} = \text{AlCl}_3$
- (4)  $\text{KNO}_3 > \text{KBr} = \text{K}_2\text{CrO}_4 > \text{AlCl}_3 = \text{K}_3[\text{Fe}(\text{CN})_6]$

**Ans.** (3)

**Sol.** According to hardy-schultz rule,

$$\text{Coagulation value or flocculation value} \propto \frac{1}{\text{Coagulation power}}$$

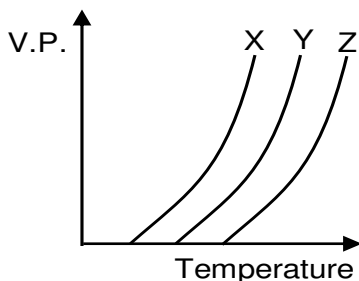
7. Which of the following complex exhibit facial meridional geometrical isomerism.

- (1)  $[\text{Pt}(\text{NH}_3)\text{Cl}_3]^-$
- (2)  $[\text{PtCl}_2(\text{NH}_3)_2]$
- (3)  $[\text{Ni}(\text{CO})_4]$
- (4)  $[\text{Co}(\text{NO}_2)_3(\text{NH}_3)_3]$

**Ans.** (4)

**Sol.**  $[\text{Ma}_3\text{b}_3]$  type complex shows facial and meridional isomerism

8.



- (A) Intermolecular force of attraction of  $X > Y$ .
  - (B) Intermolecular force of attraction of  $X < Y$ .
  - (C) Intermolecular force of attraction of  $Z < X$ .
- Select the correct option(s).

- (1) A and C
- (2) A and B
- (3) B only
- (4) B and C

**Ans.** (3)

**Sol.** At a particular temperature as intermolecular force of attraction increases vapour pressure decreases.

9. Rate of a reaction increases by  $10^6$  times when a reaction is carried out in presence of enzyme catalyst at same temperature. Determine change in activation energy.

6

- Ans.** (1)  $-6 \times 2.303 RT$       (2)  $+6 \times 2.303 RT$       (3)  $+ 6RT$       (4)  $-6RT$

**Sol.** (1)

$$K = Ae^{-E/RT} \dots\dots\dots(1)$$

$$10^6 k = Ae^{-E_c/RT} \dots\dots\dots(2)$$

$$\frac{\text{equation 2}}{\text{equation 1}} \Rightarrow 10^6 = e^{(E-E_c)/RT}$$

or

$$6 \ln 10 = (E-E_c)/RT$$

or या

$$\frac{(E-E_c)}{RT} = 2.303 \times 6$$

$$\text{or, } E-E_c = 2.303 \times 6RT$$

$$\text{or, } \Delta E_a = E_c - E = \boxed{-2.303 \times 6RT}$$

10. Gypsum on heating at 393K produces  
 (1) dead burnt plaster      (2) Anhydrous  $\text{CaSO}_4$   
 (3)  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$       (4)  $\text{CaSO}_4 \cdot 5\text{H}_2\text{O}$

**Ans.** (3)

**Sol.** Theory based.

11. Among the following least 3<sup>rd</sup> ionization energy is for

- Ans.** (1) Mn      (2) Co      (3) Fe      (4) Ni

**Sol.**  ${}_{26}\text{Fe} = [\text{Ar}]3d^6 4s^2$

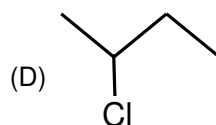
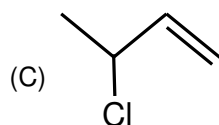
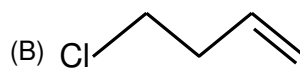
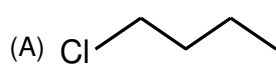
12. Accurate measurement of concentration of NaOH can be performed by following titration:

- (1) NaOH in burette and oxalic acid in conical flask  
 (2) NaOH in burette and concentrated  $\text{H}_2\text{SO}_4$  in conical flask  
 (3) NaOH in volumetric flask and concentrated  $\text{H}_2\text{SO}_4$  in conical flask  
 (4) Oxalic acid in burette and NaOH in conical flask

**Ans.** (4)

**Sol.** Oxalic acid is a primary standard solution while  $\text{H}_2\text{SO}_4$  is a secondary standard solution.

13. Arrange the following compounds in order of dehydrohalogenation (E1) reaction.



(1) C > B > D > A

(2) C > D > B > A

(3) B > C > D > A

(4) A > B > C > D

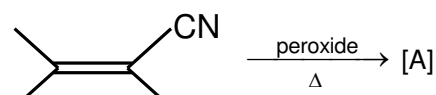
**Ans.**

(2)

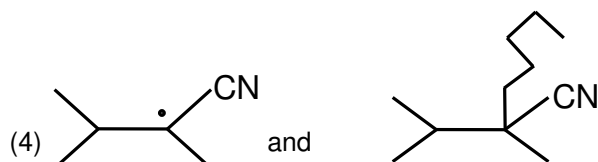
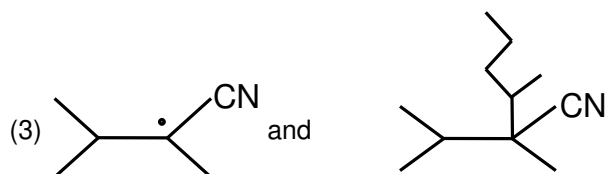
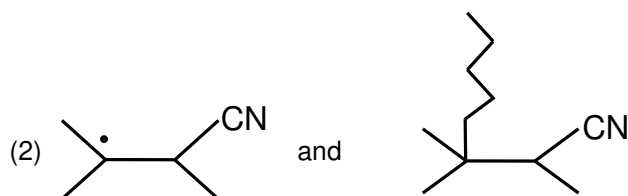
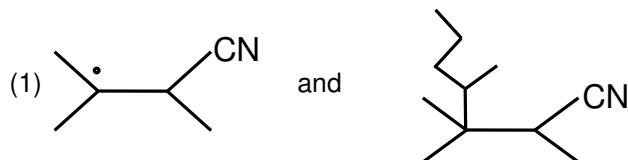
**Sol.**

E1 reaction proceeds via carbocation formation, therefore greater the stability of carbocation, faster the E1 reaction.

14.

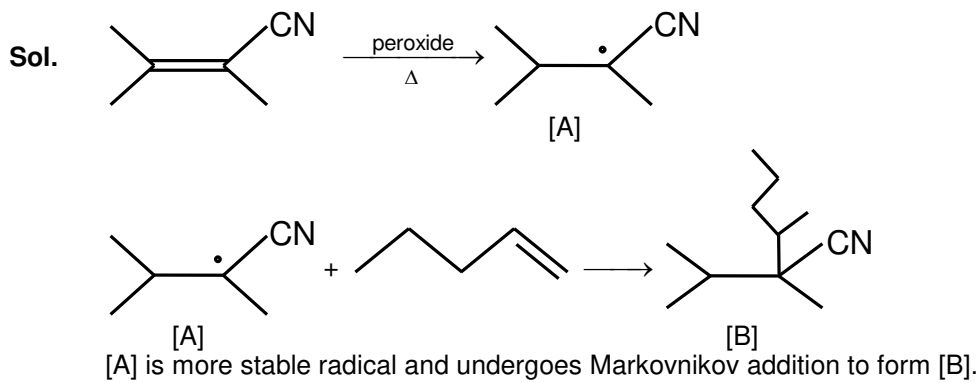


Product A and B are respectively :

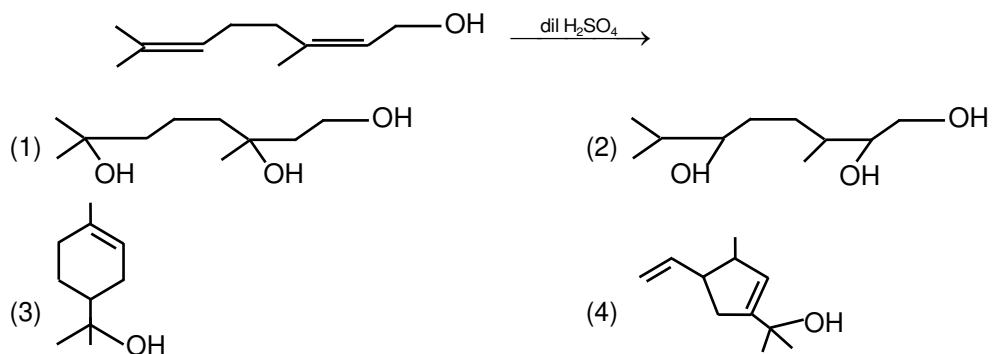


**Ans.**

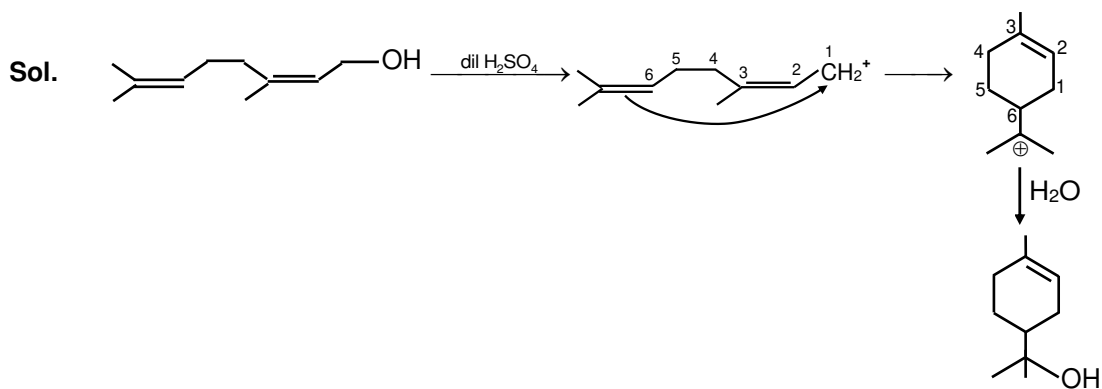
(3)



15. Major product in the following reaction is



Ans. (3)

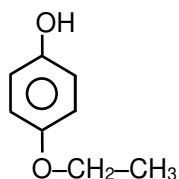
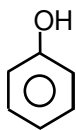


16. Arrange the order of C—OH bond length of the following compounds.

Methanol (A) Phenol (B) p-Ethoxyphenol (C)

Ans. (1) A > B > C (2) A > C > B (3) C > B > A (4) B > C > A

Sol. CH<sub>3</sub>—OH



A B C  
There is not any resonance in CH<sub>3</sub>—OH. Resonance is poor in p-Ethoxyphenol than phenol.

17. Which of the following are "green house gases" ?

- (a) CO<sub>2</sub> (b) O<sub>2</sub> (c) O<sub>3</sub>  
(d) CFC (e) H<sub>2</sub>O  
(1) a, b and d (2) a, b, c and d (3) a, c and d (4) a, c, d and e

Ans. (4)  
Sol. CO<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>O vapours and CFC's are green house gases.

18. Two liquids isohexane and 3-methylpentane has boiling point 60°C and 63°C. They can be separated by

- (1) Simple distillation and isohexane comes out first.  
(2) Fractional distillation and isohexane comes out first.  
(3) Simple distillation and 3-Methylpentane comes out first.  
(4) Fractional distillation and 3-Methylpentane comes out first.

Ans. (2)  
Sol. Liquid having lower boiling point comes out first in fractional distillation. Simple distillation can't be used as boiling point difference is very small.

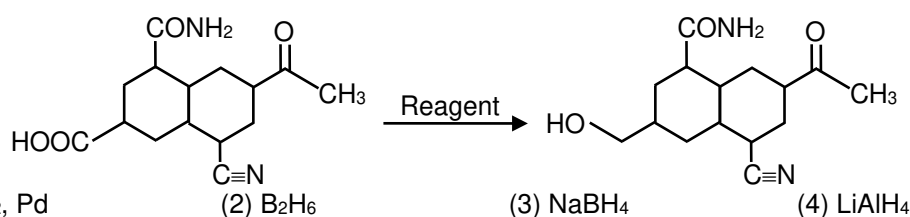
19. Which of the given statement is incorrect about glucose?

- (1) Glucose exists in two crystalline forms  $\alpha$  and  $\beta$ .
- (2) Glucose gives schiff's test.
- (3) Penta acetate of glucose does not form oxime.
- (4) Glucose forms oxime with hydroxyl amine.

Ans. (2)

Sol. Open chain form of glucose is very very small, hence does not gives Schiff's test.

20. Reagent used for the given conversion is:



Ans. (2)

Sol.  $\text{B}_2\text{H}_6$  is very selective and usually used to reduce acid to alcohol.

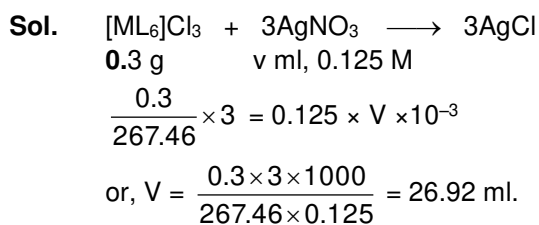
### SECTION – 2 : (Maximum Marks : 20)

- ❖ This section contains **FIVE (05)** questions. The answer to each question is **NUMERICAL VALUE** with two digit integer and decimal upto one digit.
- ❖ If the numerical value has more than two decimal places **truncate/round-off** the value upto **TWO** decimal places.
  - Full Marks : **+4** If **ONLY** the correct option is chosen.
  - Zero Marks : **0** In all other cases

21. 0.3 g  $[\text{ML}_6]\text{Cl}_3$  of molar mass 267.46 g/mol is reacted with 0.125 M  $\text{AgNO}_3(\text{aq})$  solution, calculate volume of  $\text{AgNO}_3$  required in ml.

Ans. 26.92





**22.** Given :  $2\text{H}_2\text{O} \longrightarrow \text{O}_2 + 4\text{H}^+ + 4\text{e}^- \quad E^\ominus = -1.23 \text{ V}$   
 Calculate electrode potential at pH = 5.

**Ans.** **-00.93**

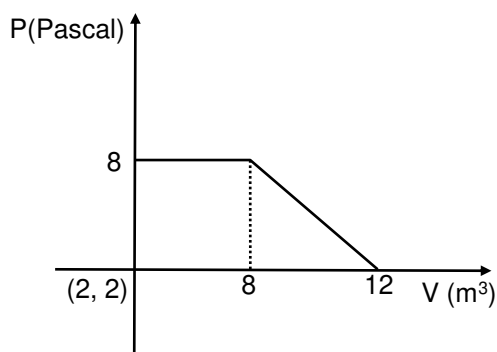
**Sol.**  $E = -1.23 - \frac{0.0591}{4} \log [\text{H}^+]^4$   
 $= -1.23 + 0.0591 \times \text{pH} = -1.23 + 0.0591 \times 5$   
 $= -1.23 + 0.2955 = -0.9345 \text{ V} = -0.93 \text{ V}$

**23.** Calculate the mass of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ , which must be added in 100 kg of wheat to get 10 PPM of Fe.

**Ans.** **04.96**

**Sol.**  $10 = \frac{\text{Mass of Fe (in g)}}{100 \times 1000} \times 10^6$   
 or या, mass Fe = 1 g  
 $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  (M = 278)  
 56 g in 1 mole  
 $1 \text{ g} \text{ — } \frac{1}{56} \text{ mole} \quad \quad \quad \frac{1}{56} \times 278 \text{ g} = 4.96 \text{ g Ans.}$

**24.** A gas undergoes expansion according to the following graph. Calculate work done by the gas.



**Ans.** **48.00**

**Sol.**  $|W| = \frac{1}{2}(6 + 10) \times 6 = 48 \text{ J}$

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25. Number of chiral centres in Pencillin is

Ans. 03.00

