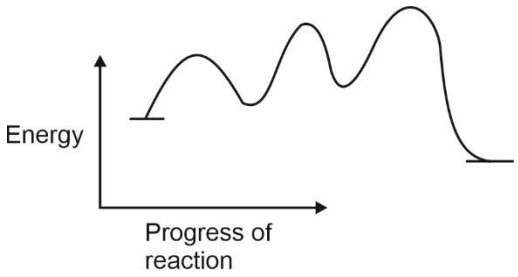
CHEMISTRY

SECTION - A

Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Choose the correct answer:

1. 

(P) Number of intermediates = 2

(Q) Number of transition states = 3

(R) Reaction is endothermic

Correct statement is

(1) P & Q only

(2) P & R only

(3) Q & R only

(4) P, Q, R

Answer (1)

Sol. 3-step reaction

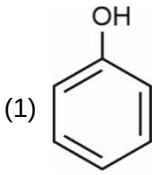
Number of transition states = 3

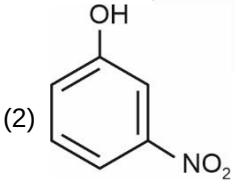
Number of intermediates = 2

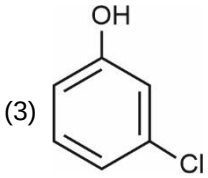
Reaction is exothermic

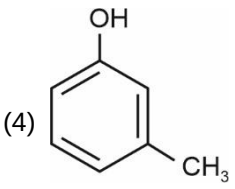
As $\Delta H < 0$

2. Which of the following compound is most acidic?

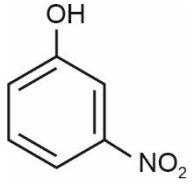
(1) 

(2) 

(3) 

(4) 

Answer (2)

Sol. 

is most acidic due to –I effect of $-NO_2$ group.

3. Which of the following is most basic

(1) Tl_2O_3

(2) Tl_2O

(3) Cr_2O_3

(4) B_2O_3

Answer (2)

Sol. Tl^+ oxide is more basic than Tl^{3+} Cr_2O_3 is amphoteric

4. Which of the following element is not present in Nessler's reagent?

(1) K

(2) Hg

(3) N

(4) I

Answer (3)

Sol. Nessler's reagent is alkaline solution of K_2HgI_4

5. Which of the following is not obtained on electrolysis of brine solution

(1) NaOH

(2) H_2 gas

(3) Cl_2 gas

(4) Na

Answer (4)

Sol. **Anode**

$$2Cl^- \longrightarrow Cl_2 + 2e^-$$

Cathode

$$2e^- + 2H_2O \longrightarrow H_2 + 2OH^-$$

Na metal is not obtained on electrolysis of brine.

6. $BeCl_2$ exists as in solid state, vapour phase and at high temperature of the order of 1200 K in that order.

(1) Polymer, Dimer and Monomer

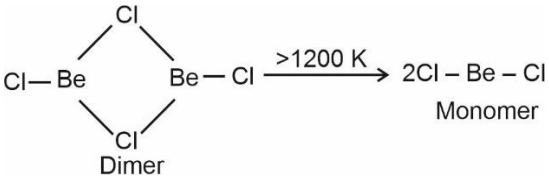
(2) Dimer, Polymer and Monomer

(3) Monomer, Dimer and Polymer

(4) Polymer, Monomer and Dimer

Answer (1)

Sol. $BeCl_2$ has a linear polymeric chain structure with Be-atom undergoing sp^3 hybridisation. In the vapour phase $BeCl_2$ tends to form a chloro-bridged dimer,



which dissociates into the linear monomer at high temperature of the order of 1200 K.

7. Which of the following has highest hydration energy.

(1) Be^{+2}

(2) Mg^{+2}

(3) Ca^{++}

(4) Ba^{+2}

Answer (1)

Sol. Hydration energy decreases down the group in the 2nd group metal cation.

8. Oxidation state of Mn in $KMnO_4$ changes by 3 units in which medium?

(1) Strongly acidic

(2) Strongly basic

(3) Aqueous neutral

(4) Weakly acidic

Answer (3)

Sol. $KMnO_4$ in aqueous neutral medium reduces to MnO_2.

$$2KMnO_4 + H_2O \rightarrow 2MnO_2 + 2KOH + \frac{3}{2}O_2$$

$\therefore$ Oxidation state of Mn in $KMnO_4$ changes from +7 to +4 i.e., by 3 units.

9. IUPAC name of the compound $K_3[Co(C_2O_4)_3]$ is

(1) Potassium trioxalatocobalt (III)

(2) Potassium trioxalatocobaltate (III)

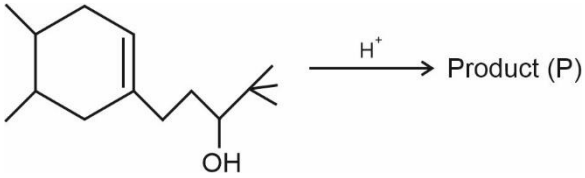
(3) Potassium cobalttrioxalate (II)

(4) Potassium oxalatocobaltate (III)

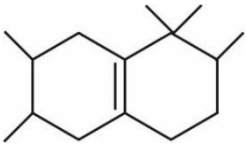
Answer (2)

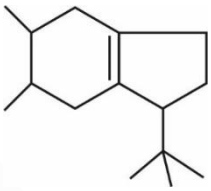
Sol. IUPAC name of $K_3[Co(C_2O_4)_3]$ is Potassium trioxalatocobaltate (III).

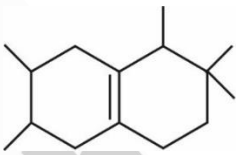
10. Consider the following reaction

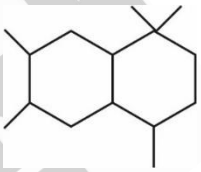


Select the P.

(1) 

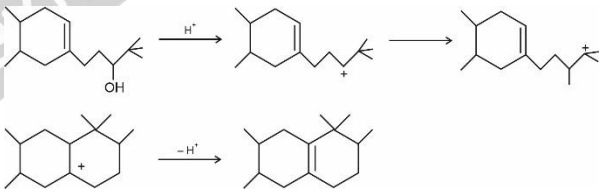
(2) 

(3) 

(4) 

Answer (1)

Sol.



11. During detection of Lead.

Formation of which of following compound is not used as confirmatory test.

(1) $PbSO_4$

(2) $Pb(NO_3)_2$

(3) $PbCrO_4$

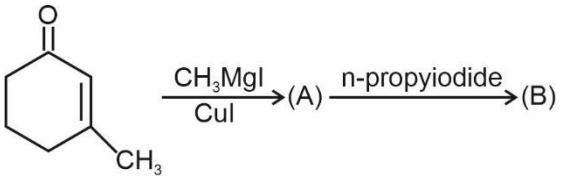
(4) PbI_2

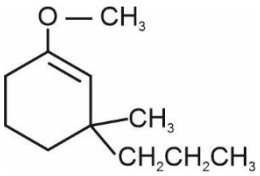
Answer (2)

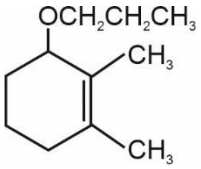
Sol.

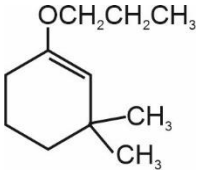
$PbSO_4$	-	White ppt
$PbCrO_4$	-	Yellow ppt
PbI_2	-	Yellow ppt
$Pb(NO_3)_2$	-	Soluble

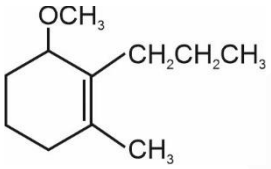
12. Identify the final product (B) formed in the following sequence of reactions.



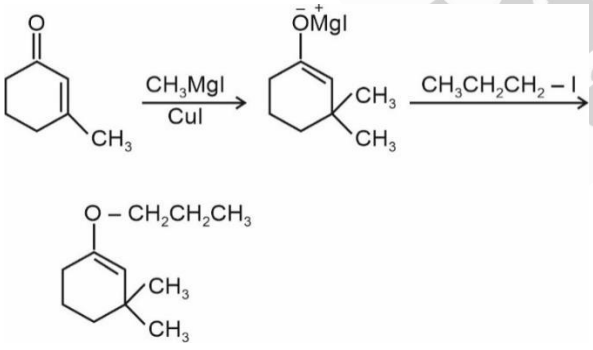
(1) 

(2) 

(3) 

(4) 

Answer (3)

Sol. 

13. Consider the following:

(i) D.D.T.

(ii) Aldrin

(iii) Sodium arsenite

(iv) Sodium chlorate

How many of these are pesticides?

(1) 1

(2) 2

(3) 3

(4) 4

Answer (2)

Sol. D.D.T. and Aldrin are pesticides while sodium arsenite and sodium chlorate are herbicides.

14.

	Amino Acid	Letter code
A.	Alanine	P. N
B.	Asparagine	Q. A
C.	Aspartic acid	R. R
D.	Arginine	S. D

(1) A - Q; B - S; C - P; D - R

(2) A - Q; B - S; C - R; D - P

(3) A - S; B - P; C - R; D - Q

(4) A - S; B - P; C - P; D - R

Answer (1)

Sol. Alanine - A

Arginine - R

Aspartic acid - D

Asparagine - N

15.

16.

17.

18.

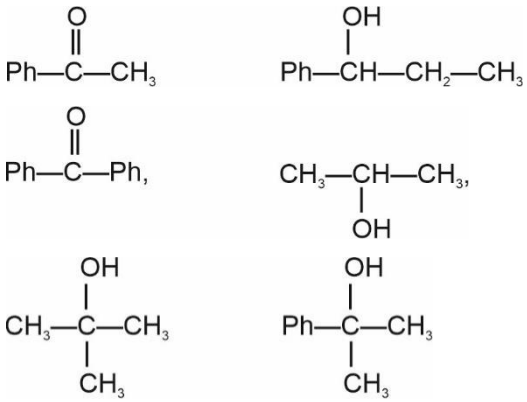
19.

20.

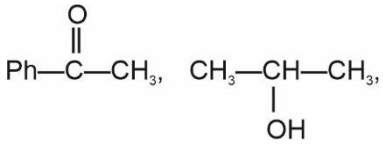
SECTION - B

Numerical Value Type Questions: This section contains 10 questions. In Section B, attempt any five questions out of 10. The answer to each question is a **NUMERICAL VALUE.** For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g., 06.25, 07.00, –00.33, –00.30, 30.27, –27.30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer.

21. The number of compounds that give iodoform test



Answer (02.00)

Sol. 

give iodoform test.

22. If a_0 is the radius of H-atom de-Broglie wavelength of e^- in 3rd orbit of Li^{2+} ion is $x\pi a_0$. Find out x.

Answer (02.00)

Sol. $r_3 = \frac{a_0 \times (3)^2}{(3)} = 3a_0$

$2\pi r = 3\lambda$

$2\pi(3a_0) = 3\lambda$

$\Rightarrow \quad \lambda = 2\pi a_0$

x = 2

23. How many of the following will have same relative lowering in vapour pressure?

(A) 1 M NaCl

(B) 1 M Urea

(C) 1.5 M $AlCl_3$

(D) 2 M Na_2SO_4

Answer (02.00)

Sol. $\frac{\Delta P}{p_{solvent}} = i(x_{solute})$

i.M should be same

(A) 1 × 2 = 2

(B) 1 × 1 = 1

(C) 1.5 × 4 = 6

(D) 2 × 3 = 6

(C) & (D) will have same RLVP

24. We are given with 7 type of lattice.

A. Cubic

B. tetragonal

C. Orthorhombic

D. Hexagonal

E. Rhombohedral

F. Monoclinic

G. Triclinic

How many of them can have BCC unit cell?

Answer (03.00)

Sol. Cubic, tetragonal and orthorhombic can have BCC unit cell.

25. How many of the given molecules are square planar in shape?

XeF_4, SF_4, $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, $[NiCl_4]^{2-}$, $[FeCl_4]^{2-}$, $[Cu(NH_3)_4]^{2+}$, $[PdCl_4]^{2-}$

Answer (04.00)

Sol. XeF_4 : square planar

SF_4 : see saw

$[Ni(CO)_4]$: tetrahedral

$[Ni(CN)_4]^{2-}$: square planar

$[NiCl_4]^{2-}$: tetrahedral

$[FeCl_4]^{2-}$: tetrahedral

$[Cu(NH_3)_4]^{2+}$: square planar

$[PdCl_4]^{2-}$: square planar

26. Volume of HBr (0.02 M) (in ml) needed to completely neutralise $Ba(OH)_2$ (0.01 M, 10 ml)

Answer (10)

Sol. mEq of HBr = mEq of $Ba(OH)_2$

$0.02 \times V = 0.01 \times 10 \times 2$

$V = \frac{0.02 \times 10}{0.02} = 10 \text{ ml}$

27.

28.

29.

30.