# 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.
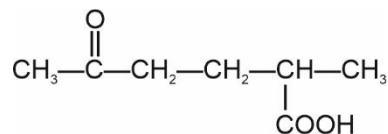
**Choose the correct answer:**

1. Which of the following acts as a stabilizer in the decomposition of $H_2O_2$.

   (1) Urea
   (2) Alkali
   (3) Glass
   (4) Dust
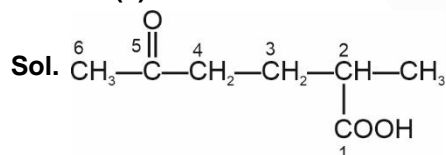
**Answer (1)**

**Sol.** Urea acts as a stabilizer in the decomposition of $H_2O_2$

2. IUPAC name of given compound is



   (1) 5-oxo-2-methyl hexanoic acid

   (2) 2-methyl-5-oxohexanoic acid

   (3) 5-oxo-2-methyl pentatonic acid
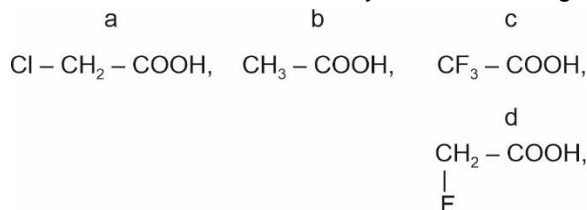
   (4) 5-carboxy-2-oxohexane

**Answer (2)**

**Sol.**



3. Order of van der waals constant a for Ar, $CH_4$, $H_2O$, and $C_6H_6$

   (1) $H_2O > C_6H_6 > Ar > CH_4$
   (2) $Ar > H_2O > CH_4 > C_6H_6$
   (3) $Ar > C_6H_6 > H_2O > CH_4$
   (4) $H_2O > C_6H_6 > CH_4 > Ar$

**Answer (4)**

**Sol.** $H_2O$ has hydrogen bonding.

4. Find the correct order of acidity for the following

   | a | b | c |
   |---|---|---|
   | $Cl - CH_2 - COOH$, | $CH_3 - COOH$, | $CF_3 - COOH$, |

   d
   $CH_2 - COOH$,
   $|$
   $F$

   (1) c > d > a > b
   (2) b > a > d > c
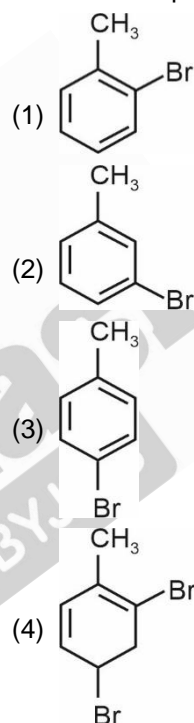   (3) a > b > c > d
   (4) b > c > a > d

**Answer (1)**

**Sol.** Correct order of acidity is
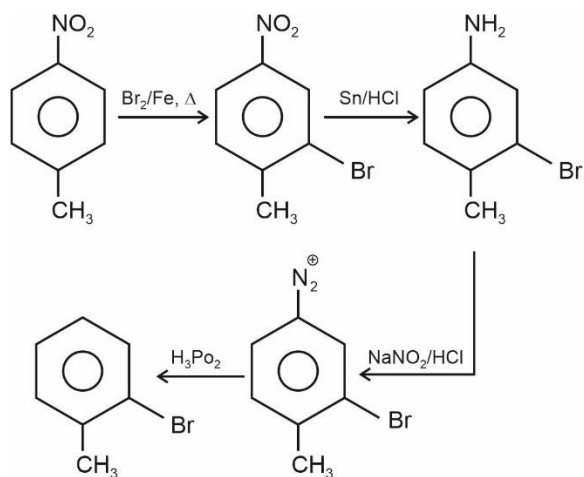
c > d > a > b (based on –I effect of –F & –Cl group)
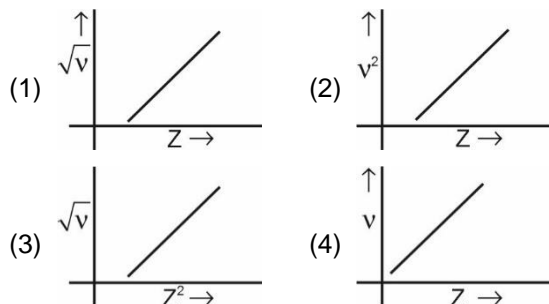
5.



Find out final product of this reaction

(1)


(2)


(3)
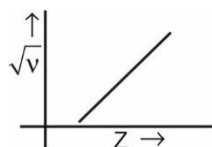

(4)


**Answer (1)**

**Sol.**

6. Find the correct plot

(1)   (2) 

(3)   (4) 

**Answer (1)**

**Sol.** As per Moseley's law, cannot plot is $\left[\sqrt{v} = a(Z - b)\right]$



7. Total spin only magnetic moment of the ion $[Mn(SCN)_6]^{x-}$ is 5.92 B.M. Find out the value of x.

   (1) 5
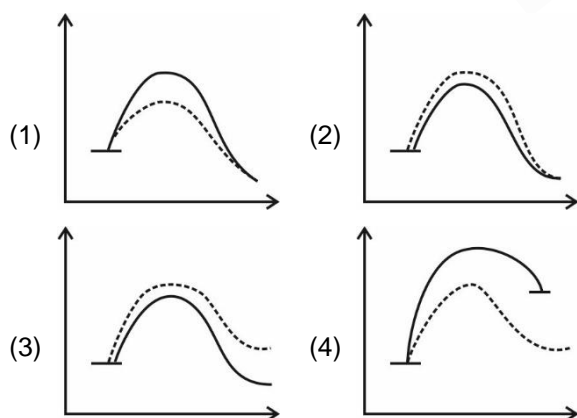   (2) 3
   (3) 2
   (4) 4

**Answer (4)**

**Sol.** The value of magnetic moment showing the presence of five unpaired electrons hence the central atom Mn will be at +2.

8. Find out the correct option by using +ve catalyst.

   _____ without catalyst

   -------- with catalyst

(1)   (2) 

(3)   (4) 

**Answer (1)**

**Sol.** $\Delta H$ doesn't change

   $E_a$ will decrease

9. Match Column-I with Column-II

|   | Column-I |   | Column-II (Unpaired Electrons) |
|---|----------|---|--------------------------------|
| A | $[Ni(NH_3)_6]^{2+}$ | P | O |
| B | $[Co(NH_3)_6]^{3+}$ | Q | 2 |
| C | $[Fe(CN)_6]^{3-}$ | R | 4 |
| D | $[CoF_6]^{3-}$ | S | 1 |

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

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

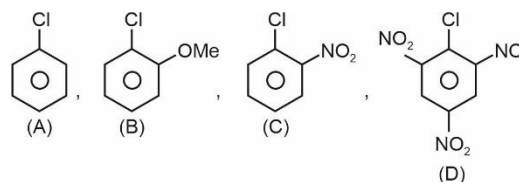(3) A-Q; B-P; C-S; D-R

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

**Answer (3)**

**Sol.** $[Ni(NH_3)_6]^{2+}$ : $sp^3d^2$    n = 2

$[Co(NH_3)_6]^{3+}$ : $d^2sp^3$    n = 0

$[Fe(CN)_6]^{3-}$ : $d^2sp^3$    n = 1

$[CoF_6]^{3-}$ : $sp^3d^2$    n = 4

10. The correct order of nucleophilic substitution of following compounds with NaOH



(1) A > B > C > D

(2) D > C > A > B

(3) D > C > B > A

(4) A > B > D > C

**Answer (2)**

**Sol.** Nucleophilic of substitution rate depends on the presence of E.W.G at ortho and para position of benzene ring. Hence the correct order of nucleophilic substitution will be D > C > A > B.

11. Statement-1 : Methyl orange is a weak acid

    Statement-2 : Benzenoid form of methyl orange is deeply coloured than quinonoid form

    (1) Statement-1 is correct and Statement-2 is wrong

    (2) Both the Statements-1 and Statement-2 are correct

    (3) Statement-1 is wrong and Statement-2 is correct

    (4) None of them

**Answer (1)**

**Sol.** Methyl orange is a weak acid. So, statement-1 is correct. In acidic medium, it exists in quinonoid form which is red in colour and in alkaline medium it exists in benzenoid form which is yellow in colour. Since red is more deeply coloured than yellow, Statement-2 is wrong.

12. Which of the following is correct?

    (I) Photocurrent $\alpha$ Intensity of photoelectrons

    (II) Kinetic energy is dependent on frequency

    (III) Kinetic energy is independent of frequency

    (1) I, II only

    (2) III, I only

    (3) II only

    (4) III only

**Answer (1)**

**Sol.** Photocurrent $\alpha$ Intensity of incident light. Kinetic energy of electron is dependent on frequency of incident light.
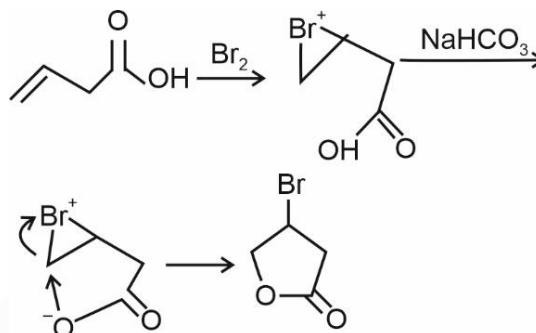
13.



    Find out final product of this reaction

    (1)



    (2)



    (3)
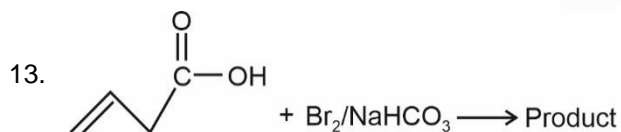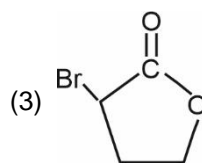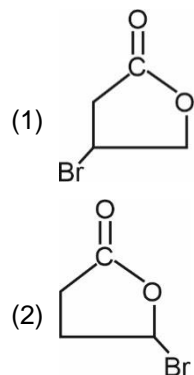


    (4) None

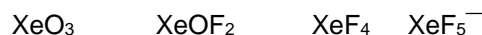**Answer (1)**

**Sol.**



14.

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.

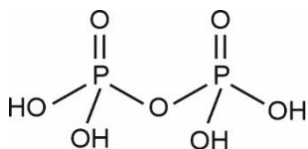21. Compounds of Xenon having one electron pair on central atom

    $XeO_3$    $XeOF_2$    $XeF_4$    $XeF_5^-$

**Answer (01.00)**

**Sol.**

 have 1 lone pair on central atom
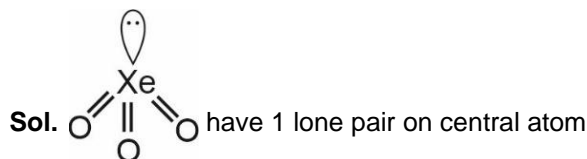
22. What is the ratio of $\sigma$ and $\pi$ bonds in pyrophosphoric acid?

**Answer (06)**

**Sol.** Pyrophosphoric acid is $H_4P_2O_7$



$\sigma$ bonds = 12

$\pi$ bonds = 2

Ratio of $\dfrac{\sigma}{\pi} = \dfrac{12}{2} = 6$

23. Find out oxidation number of central metal atom of $Fe(CO)_5$, $VO^{2+}$ and $WO_3$. Then calculate the sum of their oxidation states.

**Answer (10.00)**

**Sol.**

| Compound | Oxidation state of central metal atoms |
|---|---|
| $Fe(CO)_5$ | 0 |
| $VO^{2+}$ | +4 |
| $WO_3$ | +6 |

Sum of oxidation states = 0 + 4 + 6 = 10

24. How many of the following have five radial nodes?

5$s$, 6$s$, 7$s$, 6$p$ and 4$p$

**Answer (01)**

**Sol.** Radial nodes is given by $(n - l - 1)$

For 5$s$, Radial node = 4

For 6$s$, Radial node = 5

For 7$s$, Radial node = 6

For 6$p$, Radial node = 4

For 4$p$, Radial node = 2

25. In good quality cement ratio of lime total oxides of Si($SiO_2$), Aluminium($Al_2O_3$) and Iron($Fe_2O_3$) should be as close as possible to_____.

**Answer (2)**

**Sol.** Fact

Reference NCERT Page-304 NCERT.

26. The boiling points of two solvents X and Y are in the ratio 2 : 1 (in K) and their enthalpy of vaporisation is in the ratio 1 : 2. Find the ratio of elevation in boiling point when same moles of solute are added to same mass of both the solvents, if the molar mass of X is twice that of Y
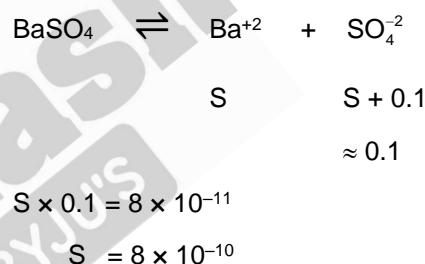
**Answer (16.00)**

**Sol.** $K_b = \dfrac{RTb^2M}{1000\Delta H}$

$\dfrac{(K_b)_X}{(K_b)_Y} = \dfrac{(Tb)_X^2}{(Tb)_Y^2} \times \dfrac{M_X}{M_Y} \times \dfrac{(\Delta H)_Y}{(\Delta H)_X}$

$= \dfrac{4}{1} \times 2 \times 2 = 16$

27. $K_{sp}$ of $BaSO_4$ is $8 \times 10^{-11}$. If the solubility in presence of 0.1 M $CaSO_4$ is $X \times 10^{-10}$ M, Find X.

**Answer (8)**

**Sol.** 'X' $\times 10^{-10}$M, X is :

$$BaSO_4 \rightleftharpoons Ba^{+2} + SO_4^{-2}$$

$$\phantom{BaSO_4 \rightleftharpoons} S \quad\quad S + 0.1$$

$$\phantom{BaSO_4 \rightleftharpoons Ba^{+2} +} \approx 0.1$$

$S \times 0.1 = 8 \times 10^{-11}$

$S = 8 \times 10^{-10}$

$\therefore$ X = 8

28. For $As_2S_3$ colloidal solution, the coagulation value of $AlCl_3$ & NaCl are 0.09 and 50.04 respectively. If coagulation power of $AlCl_3$ is x times of NaCl then tell the value of x.

**Answer (556)**

**Sol.** For a given colloid

$\dfrac{\text{Coagulation value of NaCl}}{\text{Coagulation value of } AlCl_3} =$

$\dfrac{\text{Coagulation power of } AlCl_3}{\text{Coagulation power of NaCl}}$

$\dfrac{50.04}{0.09} = x$

29.

30.