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. Caprolactam when heated at high temperature, gives

(1) Nylon 6, 6

(2) Dacron

(3) Teflon

(4) Nylon 6

Answer (4)

Sol. Caprolactam on heating at high temperature gives Nylon-6 polymer.

2. Molarity of CO_2 in soft drink is 0.01 M. The volume of soft drink is 300 mL. Mass of CO_2 in soft drink is

(1) 0.132 g

(2) 0.481 g

(3) 0.312 g

(4) 0.190 g

Answer (1)

Sol. Moles = 0.01 × 0.3 = 0.003

Mass = 0.003 × 44 = 0.132 gm

3. During the qualitative analysis of SO_3^{-2} using dilute H_2SO_4, SO_2 gas evolved which turns $K_2Cr_2O_7$ solution (acidified H_2SO_4)

(1) Green (2) Black

(3) Blue (4) Red

Answer (1)

Sol. Orange colour of dichromate solution ($K_2Cr_2O_7$) converts to green (Cr^{3+}).

4. Number of lone pair of electrons on central atom?

	Column-I		Column-II
(A)	IF_7	(P)	0
(B)	ICl_4^-	(Q)	1
(C)	XeF_2	(R)	2
(D)	XeF_6	(S)	3

Match the following

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

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

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

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

Answer (2)

Sol. Molecule/species No. of lone pair

IF_7 → 0

ICl_4 → 2

XeF_2 → 3

XeF_6 → 1

5. Which one of the following is water soluble?

(a) $BeSO_4$

(b) $MgSO_4$

(c) $CaSO_4$

(d) $SrSO_4$

(e) $BaSO_4$

(1) Only a and b (2) Only a, b, c

(3) Only d and e (4) Only a and e

Answer (1)

Sol. Solubility of sulphates of group-2 elements decreases down the group. $BeSO_4$ and $MgSO_4$ are appreciably soluble in water. $CaSO_4$, $SrSO_4$ and $BaSO_4$ are practically insoluble in water.

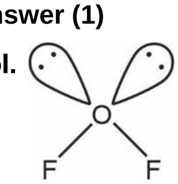
6. Shape of OF_2 molecule is?

(1) Bent (2) Linear

(3) Tetrahedral (4) T-shaped

Answer (1)

Sol.



It is sp^3 hybridised therefore its shape will be bent or V-shaped.

7. Inhibitor of cancer growth

(1) Cisplatin

(2) EDTA

(3) Cobalt

(4) Ethane 1, 2 - diamine

Answer (1)

Sol. Cisplatin acts as an anticancer agent.

8. Speed of e^- in 7^{th} orbit is 3.6×10^6 m/s then find the speed in 3^{rd} orbit

(1) 3.6×10^6 m/s

(2) 8.4×10^6 m/s

(3) 7.5×10^6 m/s

(4) 1.8×10^6 m/s

Answer (2)

Sol. Speed of electron in n^{th} orbit of a Bohr atom is given by

$$v_n = (v_1)_H \frac{Z}{n}$$

If n = 7

$$v_7 = (v_1)_H \frac{Z}{7} = 3.6 \times 10^6 \text{ m/s}$$

If n = 3

$$v_3 = (v_1)_H \frac{Z}{3}$$

$$= \frac{7 \times 3.6 \times 10^6}{3}$$

$= 8.4 \times 10^6$ m/s

9. Match the following :

Atomic Number

(i) 52	(p) s-block
(ii) 37	(q) p-block
(iii) 65	(r) d-block
(iv) 74	(s) f-block

(1) (i) → (q); (ii) → (p); (iii) → (r); (iv) → (s)

(2) (i) → (q); (ii) → (p); (iii) → (s); (iv) → (r)

(3) (i) → (s); (ii) → (r); (iii) → (p); (iv) → (q)

(4) (i) → (r); (ii) → (p); (iii) → (q); (iv) → (s)

Answer (2)

Sol. 37 is Rubidium belonging to 1^{st} group of s-block.

10. Consider the following reactions

$$NO_2 \xrightarrow{UV} A + B$$

$$A + O_2 \longrightarrow C$$

$$B + C \longrightarrow NO_2 + O_2$$

A, B and C are respectively

(1) O, NO, O_3

(2) NO, O, O_3

(3) NO, O_3, O

(4) O_3, O, NO

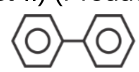
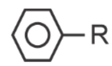
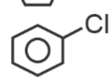
Answer (1)

Sol. $NO_2 \xrightarrow{UV} \underset{(B)}{NO} + \underset{(A)}{O}$

$$O + O_2 \longrightarrow O_3 (C)$$

$$NO + O_3 \longrightarrow NO_2 + O_2$$

11. Which of the following option contains the correct match:

(List-I) (Reactions)	(List-II) (Products)
(A) Wurtz	(P) 
(B) Fittig	(Q) R – R
(C) Wurtz Fittig	(R) 
(D) Sandmeyer	(S) 

(1) A → Q; B → P; C → R; D → S

(2) A → P; B → Q; C → R; D → S

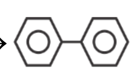
(3) A → S; B → R; C → Q; D → P

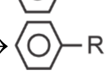
(4) A → R; B → S; C → P; D → Q

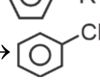
Answer (1)

Sol. The correct matches are

(A) Wurtz → R – R

(B) Fittig → 

(C) Wurtz fittig → 

(D) Sandmeyer → 

12. If volume of ideal gas is increased isothermally, then its internal energy

(1) Increased

(2) Remains constant

(3) Is decreased

(4) Can be increased or decreased

Answer (2)

Sol. Internal energy of ideal gas depends only upon temperature.

13. Arrange the following ligands according to their increasing order of field strength

$S^{2-}, C_2O_4^{2-}, NH_3, en, CO$

(1) $S^{2-} < CO < NH_3 < en < C_2O_4^{2-}$

(2) $S^{2-} < NH_3 < en < CO < C_2O_4^{2-}$

(3) $S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$

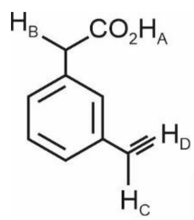
(4) $CO < en < NH_3 < C_2O_4^{2-} < S^{2-}$

Answer (3)

Sol. The correct order of field strength is

$S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$

14. Consider the following molecule



Select the correct order of acidic strength

(1) $H_A > H_D > H_B > H_C$ (2) $H_B > H_A > H_D > H_C$

(3) $H_A > H_B > H_C > H_D$ (4) $H_C > H_B > H_D > H_A$

Answer (1)

Sol. The correct order of acidic strength is

$H_A > H_D > H_B > H_C$

15. Which of the following compound is used as the antacid?

(1) Ranitidine

(2) Prontosil

(3) Norethindrone

(4) Codeine

Answer (1)

Sol. Ranitidine is used as the antacid.

16. The role of SiO_2 in Cu extraction is

(1) Converts FeO to $FeSiO_3$

(2) Converts CaO to $CaSiO_3$

(3) Reduces Cu_2S to Cu

(4) None of these

Answer (1)

Sol. It converts FeO to $FeSiO_3$

17. Assertion: Ketoses gives seliwanoff test.

Reason : Ketoses undergo β- elimination to form furfural.

(1) Assertion and reason both are correct and reason is the correct explanation of assertion

(2) Assertion and reason both are correct but reason is not the correct explanation of assertion.

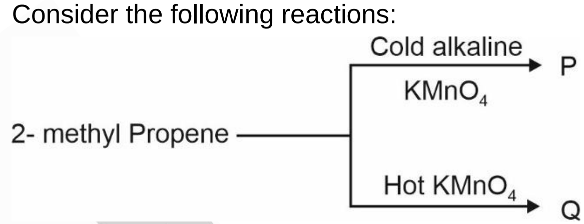
(3) Assertion is correct and reason is incorrect

(4) Assertion is incorrect but reason is correct.

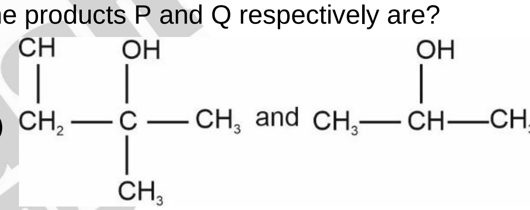
Answer (1)

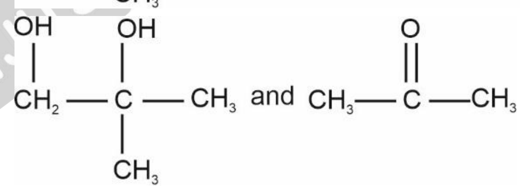
Sol. Assertion and reason both are correct and reason is the correct explanation of assertion.

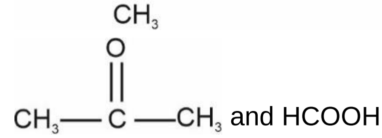
18. Consider the following reactions:

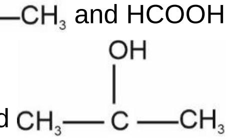


The products P and Q respectively are?

(1) 

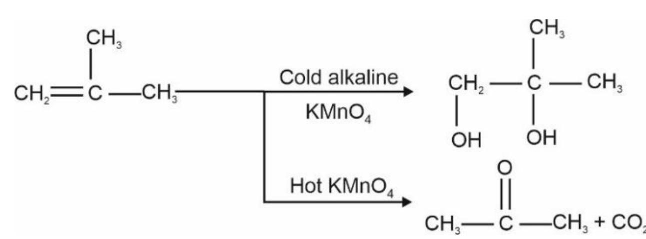
(2) 

(3) 

(4) HCOOH and 

Answer (2)

Sol.



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. For given cell, at T K

$$\underset{(1\,\text{bar})}{Pt\,|\,H_2(g)}\,|\,\underset{(1\,M)}{H^+}\,||\,Fe^{3+};Fe^{2+}\,|\,Pt$$

$E_{cell} = .712$ V

$E^{\circ}_{cell} = .770$ V

if $\frac{[Fe^{2+}]}{[Fe^{3+}]}$ is t $\left(\frac{2.303\,RT}{F} = .058\right)$

then find $\left(\frac{t}{5}\right)$

Answer (2)

Sol. $.712 = .770 - \frac{.058}{2}\log\left[\frac{Fe^{2+}}{Fe^{3+}}\right]^2$

$$-.058 = -.058\log\frac{[Fe^{2+}]}{[Fe^{3+}]}$$

$$\frac{Fe^{2+}}{Fe^{3+}} = 10 = t$$

$$\frac{t}{5} = 2$$

22. How many moles of electrons are required to reduce 1 mole of permanganate ions into manganese dioxide

Answer (3)

Sol. $\underbrace{\underset{+7}{MnO_4^-} \longrightarrow \underset{+4}{MnO_2}}_{\boxed{n = 3}}$

3 mole of e^- are required

23. 600 mL of 0.04 M HCl is mixed with 400 mL of 0.02 M H_2SO_4. Find out the pH of resulting solution (Nearest integer).

Answer (01.00)

Sol. m moles of H^+ from HCl = 0.04 × 600

= 24

m moles of H^+ from H_2SO_4 = 0.02 ×2 × 400

= 16

Total m moles of H^+ = 24 + 16 = 40

Final volume of solution = 1000 mL

$$[H^+] = \frac{40}{1000} = 0.04\text{ M}$$

pH = – log 0.04 = 1.4

24. A solution of 2 g of a solute and 20 g water has boiling point 373.52 K. Then find the molar mass of solute in grams? [Given : K_b = 0.52 K kg/mole and solute is non-electrolyte].

Answer (100)

Sol. $\Delta T_b = K_b.m$

$$0.52 = 0.52 \times \frac{2/M}{.02}$$

M = 100 g

25. When first order kinetic, rate constant is 2.011×10^{-3} sec^{-1}, the time taken in decomposition of substance from 7 g to 2 g will be. [Use log7 = 0.845 and log2 = 0.301]

Answer (623)

Sol. A $\rightarrow$ Products

Initial moles of A $= \frac{7}{M}$ (M is molar mass of A)

Final moles of A $= \frac{2}{M}$

Rate constant K = 2.011×10^{-3} s^{-1}

$$t = \frac{2.303}{k}\log\frac{7}{2}$$

$$= \frac{2.303}{2.011\times10^{-3}}[0.845 - 0.301]$$

= 623 s

26.

27.

28.

29.

30.