

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 CO₂ in soft drink is 0.01 M. The volume of soft drink is 300 mL. Mass of CO₂ 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

$$\text{Mass} = 0.003 \times 44 = 0.132 \text{ gm}$$

3. During the qualitative analysis of SO₃²⁻ using dilute H₂SO₄, SO₂ gas evolved which turns K₂Cr₂O₇ solution (acidified H₂SO₄)

- (1) Green
- (2) Black
- (3) Blue
- (4) Red

Answer (1)

Sol. Orange colour of dichromate solution (K₂Cr₂O₇) converts to green (Cr³⁺).

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

- IF₇ → 0
- ICl₄ → 2
- XeF₂ → 3
- XeF₆ → 1

5. Which one of the following is water soluble?

- (a) BeSO₄
 - (b) MgSO₄
 - (c) CaSO₄
 - (d) SrSO₄
 - (e) BaSO₄
- (1) Only a and b
 - (2) Only a, b, c
 - (3) Only d and e
 - (4) Only a and e

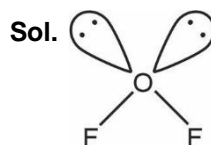
Answer (1)

Sol. Solubility of sulphates of group-2 elements decreases down the group. BeSO₄ and MgSO₄ are appreciably soluble in water. CaSO₄, SrSO₄ and BaSO₄ are practically insoluble in water.

6. Shape of OF₂ molecule is?

- (1) Bent
- (2) Linear
- (3) Tetrahedral
- (4) T-shaped

Answer (1)



It is sp³ 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 7th orbit is 3.6×10^6 m/s then find the speed in 3rd 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 $n = 3$

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

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

$$= 8.4 \times 10^6 \text{ m/s}$$

9. Match the following :

Atomic Number

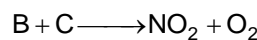
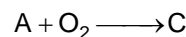
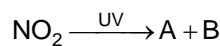
- | | |
|----------|-------------|
| (i) 52 | (p) s-block |
| (ii) 37 | (q) p-block |
| (iii) 65 | (r) d-block |
| (iv) 74 | (s) f-block |

- (1) (i) \rightarrow (q); (ii) \rightarrow (p); (iii) \rightarrow (r); (iv) \rightarrow (s)
- (2) (i) \rightarrow (q); (ii) \rightarrow (p); (iii) \rightarrow (s); (iv) \rightarrow (r)
- (3) (i) \rightarrow (s); (ii) \rightarrow (r); (iii) \rightarrow (p); (iv) \rightarrow (q)
- (4) (i) \rightarrow (r); (ii) \rightarrow (p); (iii) \rightarrow (q); (iv) \rightarrow (s)

Answer (2)

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

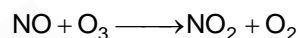
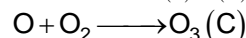
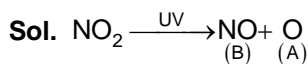
10. Consider the following reactions



A, B and C are respectively

- (1) O, NO, O₃
- (2) NO, O, O₃
- (3) NO, O₃, O
- (4) O₃, O, NO

Answer (1)



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

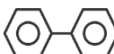


(List-I) (Reactions) (List-II) (Products)

- | | |
|------------------|---|
| (A) Wurtz | (P)  |
| (B) Fittig | (Q) R - R |
| (C) Wurtz Fittig | (R)  |
| (D) Sandmeyer | (S)  |

- (1) A \rightarrow Q; B \rightarrow P; C \rightarrow R; D \rightarrow S
- (2) A \rightarrow P; B \rightarrow Q; C \rightarrow R; D \rightarrow S
- (3) A \rightarrow S; B \rightarrow R; C \rightarrow Q; D \rightarrow P
- (4) A \rightarrow R; B \rightarrow S; C \rightarrow P; D \rightarrow Q

Answer (1)

Sol. The correct matches are

- (A) Wurtz \rightarrow R - R
- (B) Fittig \rightarrow 
- (C) Wurtz fittig \rightarrow 
- (D) Sandmeyer \rightarrow 

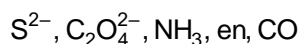
12. If volume of ideal gas is increased isothermally, then its internal energy

- (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.

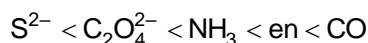
13. Arrange the following ligands according to their increasing order of field strength



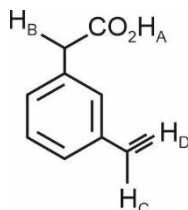
- (1) $S^{2-} < CO < NH_3 < en < C_2O_4^{2-}$
- (2) $S^{2-} < NH_3 < en < CO < C_2O_4^{2-}$
- (3) $S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$
- (4) $CO < en < NH_3 < C_2O_4^{2-} < S^{2-}$

Answer (3)

Sol. The correct order of field strength is



14. Consider the following molecule

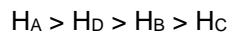


Select the correct order of acidic strength

- (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



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 selivanoff test.

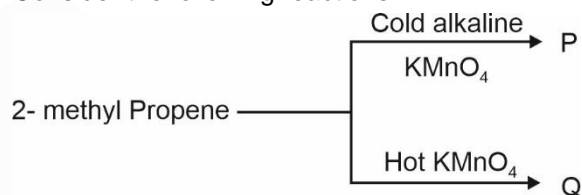
Reason : Ketoses undergo β - elimination to form furfural.

- (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:

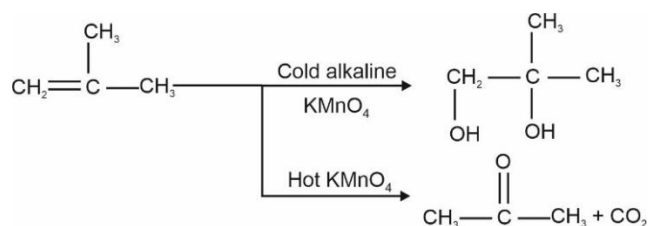


The products P and Q respectively are?

- (1) $\begin{array}{c} \text{CH} \quad \text{OH} \\ | \quad | \\ \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$ and $\begin{array}{c} \text{OH} \\ | \\ \text{CH}_3 - \text{CH} - \text{CH}_3 \end{array}$
- (2) $\begin{array}{c} \text{OH} \quad \text{OH} \\ | \quad | \\ \text{CH}_2 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$ and $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array}$
- (3) $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array}$ and HCOOH
- (4) HCOOH and $\begin{array}{c} \text{OH} \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array}$

Answer (2)

Sol.



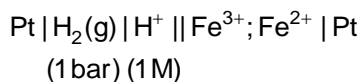
19.

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



$$E_{\text{cell}} = .712 \text{ V}$$

$$E_{\text{cell}}^{\circ} = .770 \text{ V}$$

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

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

Answer (2)

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

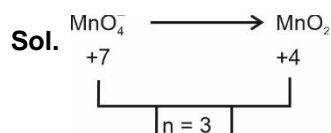
$$-.058 = -.058 \log \left[\frac{\text{Fe}^{2+}}{\text{Fe}^{3+}} \right]$$

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

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

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

Answer (3)



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)

$$\text{Sol. m moles of H}^+ \text{ from HCl} = 0.04 \times 600 = 24$$

$$\text{m moles of H}^+ \text{ from H}_2\text{SO}_4 = 0.02 \times 2 \times 400 = 16$$

$$\text{Total m moles of H}^+ = 24 + 16 = 40$$

$$\text{Final volume of solution} = 1000 \text{ mL}$$

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

$$\text{pH} = -\log 0.04 = 1.4$$

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 : $K_b = 0.52 \text{ K kg/mole}$ and solute is non-electrolyte].

Answer (100)

$$\text{Sol. } \Delta T_b = K_b \cdot m$$

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

$$M = 100 \text{ g}$$

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

Answer (623)

$$\text{Sol. } A \rightarrow \text{Products}$$

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

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

$$\text{Rate constant } K = 2.011 \times 10^{-3} \text{ s}^{-1}$$

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

$$= \frac{2.303}{2.011 \times 10^{-3}} [0.845 - 0.301]$$

$$= 623 \text{ s}$$

26.

27.

28.

29.

30.