

JEE Main Chemistry Sample Paper 05

Subject: Chemistry

Structure: 20 Shuffled MCQs + 5 Pure Chemistry Numericals

Marking Scheme: Correct (+4) | Incorrect MCQ (-1) | Incorrect NVT (0)

Section A: Multiple Choice Questions (1-20)

1. Identify the strongest acid among the following:

- | | |
|-----------------------------------|-----------------------------------|
| A. (A) CH_3COOH | B. (B) ClCH_2COOH |
| C. (C) Cl_2CHCOOH | D. (D) Cl_3CCOOH |
-

2. The oxidation state of Chromium in $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}$ is:

- | | |
|-----------|-----------|
| A. (A) +2 | B. (B) +3 |
| C. (C) +4 | D. (D) +6 |
-

3. Milk is a colloidal system known as:

- | | |
|------------|-----------------|
| A. (A) Sol | B. (B) Emulsion |
| C. (C) Gel | D. (D) Foam |
-

4. Which of the following is an addition polymer?

- | | |
|------------------|------------------|
| A. (A) Nylon-6,6 | B. (B) Polythene |
| C. (C) Terylene | D. (D) Bakelite |
-

5. The monomer unit of Natural Rubber is:

- | | |
|--------------------|--------------------|
| A. (A) Chloroprene | B. (B) Isoprene |
| C. (C) Styrene | D. (D) Caprolactam |
-

6. The catalyst employed in the Ostwald's process is:

- | | |
|-----------|--------------------|
| A. (A) Fe | B. (B) Pt-Rh gauze |
|-----------|--------------------|

C. (C) V_2O_5

D. (D) Ni

7. Temporary hardness of water is caused by:

A. (A) Chlorides of Ca/Mg

B. (B) Bicarbonates of Ca/Mg

C. (C) Sulfates of Ca/Mg

D. (D) Nitrates of Na

8. The bond angle in a methane molecule is:

A. (A) 90°

B. (B) 109.5°

C. (C) 120°

D. (D) 180°

9. Which of the following acts as a Lewis base?

A. (A) AlCl_3

B. (B) NH_3

C. (C) BF_3

D. (D) FeCl_3

10. The functional isomer of Propanone is:

A. (A) Propan-1-ol

B. (B) Propanal

C. (C) Propanoic acid

D. (D) Dimethyl ether

11. Reaction of MnO_2 with fused KOH in presence of O_2 gives:

A. (A) KMnO_4

B. (B) K_2MnO_4

C. (C) Mn_2O_3

D. (D) MnO_2

12. The spin-only magnetic moment of Fe^{2+} ion is:

A. (A) 4.9 BM

B. (B) 5.9 BM

C. (C) 1.7 BM

D. (D) 2.8 BM

13. Which carbohydrate is the storage polysaccharide in animals?

- | | |
|------------------|--------------------|
| A. (A) Starch | B. (B) Glycogen |
| C. (C) Cellulose | D. (D) Amylopectin |
-

14. Transition from M-shell to L-shell emits λ . Transition from N-shell to L emits:

- | | |
|-----------------------|-----------------------|
| A. (A) $16/25\lambda$ | B. (B) $20/27\lambda$ |
| C. (C) $27/20\lambda$ | D. (D) $25/16\lambda$ |
-

15. The order of reaction where $t_{1/2} \propto 1/a$ is:

- | | |
|---------------------|--------------------|
| A. (A) Zero order | B. (B) First order |
| C. (C) Second order | D. (D) Third order |
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16. Which of the following is a diamagnetic species?

- | | |
|--------------|----------------|
| A. (A) O_2 | B. (B) B_2 |
| C. (C) N_2 | D. (D) O_2^+ |
-

17. Hybridization of carbon in diamond and graphite respectively are:

- | | |
|---------------------|---------------------|
| A. (A) sp^2, sp^3 | B. (B) sp^3, sp^2 |
| C. (C) sp^3, sp | D. (D) sp^2, sp |
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18. Which method is used to remove the anionic part of hard water?

- | | |
|------------------------|---------------------------|
| A. (A) Calgon process | B. (B) Ion exchange resin |
| C. (C) Clark's process | D. (D) Boiling |
-

19. The IUPAC name of $CH_3-CH(NH_2)-CH_2-CN$ is:

- | | |
|------------------------------|----------------------------------|
| A. (A) 2-aminobutanenitrile | B. (B) 3-aminobutanenitrile |
| C. (C) 1-cyano-2-propylamine | D. (D) 3-aminobutanecarbonitrile |
-

2. [B] Cr is in +3 state. Calculation: $x + 4(0) + 2(-1) = +1$.

3. [B] Milk is an emulsion (liquid fat in water).
4. [B] Polythene is formed by the repeated addition of ethylene monomers.
5. [B] Natural rubber's monomer is Isoprene (2-methyl-1,3-butadiene).
6. [B] Platinum-Rhodium gauze is used in Ostwald's process for Nitric acid.
7. [B] Bicarbonates of Calcium and Magnesium cause temporary hardness.
8. [B] Methane is tetrahedral with a bond angle of 109.5° .
9. [B] Ammonia (NH_3) has a lone pair of electrons to donate.
10. [B] Propanal (aldehyde) is the functional isomer of Propanone (ketone).
11. [B] Forms green Potassium Manganate (K_2MnO_4).
12. [A] Fe^{2+} has 4 unpaired electrons. $\mu = \sqrt{24} \approx 4.9 \text{ BM}$.
13. [B] Glycogen is the storage form of energy in animals.
14. [B] Using the Rydberg formula for $M \rightarrow L$ ($3 \rightarrow 2$) vs $N \rightarrow L$ ($4 \rightarrow 2$) results in 20/27.
15. [C] For a second-order reaction, $t_{1/2}$ is inversely proportional to initial concentration.
16. [C] N_2 is diamagnetic as all electrons are paired.

17. [B] Diamond is sp^3 ; Graphite is sp^2 .

18. [B] Ion exchange resins remove both anionic and cationic impurities.

19. [B] The longest chain has 4 carbons; amine is on the 3rd carbon.

20. [B] BF_3 is used in the Balz-Schiemann reaction.

21. [60] 80% to 10% is 3 half-lives (80-40-20-10). $3 \times 20 = 60$ min.

22. [12] S is +6 in Caro's and +6 in Marshall's acid. Sum = 12.

23. [0.5] $pH\ 12 = pOH\ 2$. $[OH^-] = 0.01M$. $Ca(OH)_2$ provides $2OH^-$, so molarity is $0.005M$. In 100mL, 0.5 mmol.

24. [3] Factor $x = 3$ based on stoichiometry calculations.

25. [3] Li (Red), Na (Yellow), K (Violet) show flame colors.