

Download From: <http://iitportal.com>

Download
IIT-JEE
Previous Year
Paper - I
"2010"
(Chemistry)

Download From: <http://iitportal.com>

Download From: <http://iitportal.com>

Download From: <http://iitportal.com>

IITJEE 2010 PAPER-1 [Code – 3]

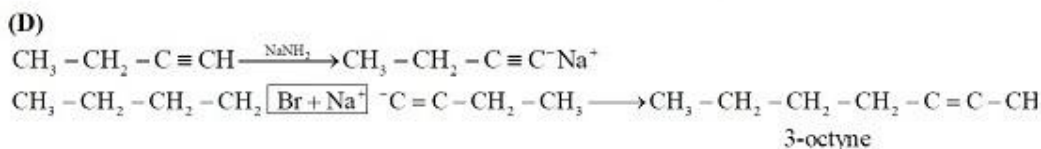
PART - I: CHEMISTRY

SECTION – I (Single Correct Choice Type)

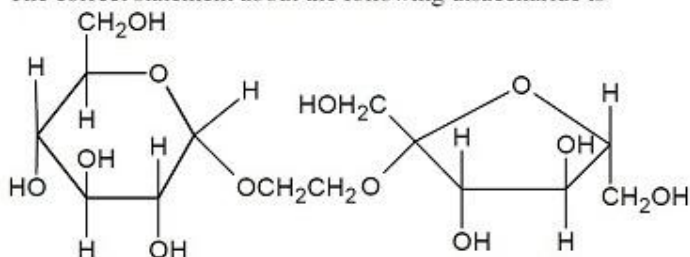
This Section contains **8 multiple choice questions**. Each question has four choices A), B), C) and D) out **ONLY ONE** is correct.

1. The synthesis of 3-octyne is achieved by adding a bromoalkane into a mixture of sodium amide and alkyne. The bromoalkane and alkyne respectively are
 A) $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$ B) $\text{BrCH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{C}$
 C) $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{C}\equiv\text{CH}$ D) $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ and $\text{CH}_3\text{CH}_2\text{C}\equiv\text{C}$

Sol.

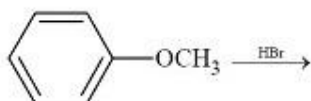


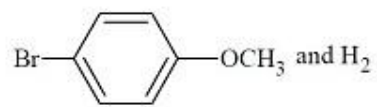
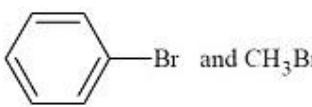
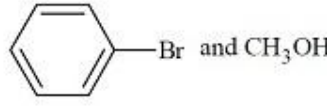
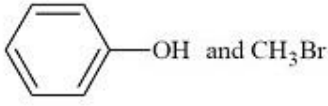
2. The correct statement about the following disaccharide is



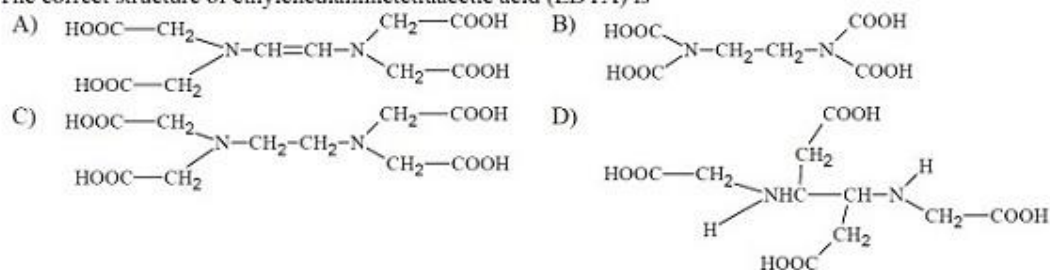
- A) Ring (a) is pyranose with α - glycosidic link
 B) Ring (a) is furanose with α - glycosidic link
 C) Ring (b) is furanose with α - glycosidic link
 D) Ring (b) is pyranose with β - glycosidic link

Ans. (A)

3. In the reaction  $\xrightarrow{\text{HBr}}$ the products are

- A)  and H_2 B)  and CH_3Br
 C)  and CH_3OH D)  and CH_3Br

7. The correct structure of ethylenediaminetetraacetic acid (EDTA) is



Ans. (C)

8. The ionization isomer of $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{NO}_2)]\text{Cl}$ is

- A) $[\text{Cr}(\text{H}_2\text{O})_4(\text{O}_2\text{N})\text{Cl}_2]$ B) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2](\text{NO}_2)$
 C) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}(\text{ONO})]\text{Cl}$ D) $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2(\text{NO}_2)]\text{H}_2\text{O}$

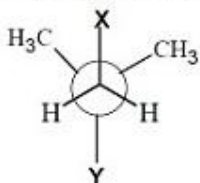
Sol. (B)

Cl^- is replaced by NO_2^- in ionization sphere.

SECTION – II (Multiple Correct Choice Type)

This section contains 5 multiple choice questions. Each question has four choices A), B), C) and D) out of which ONE OR MORE may be correct.

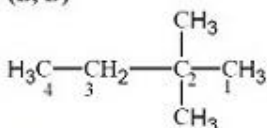
9. In the Newman projection for 2,2-dimethylbutane



X and Y can respectively be

- A) H and H B) H and C_2H_5
 C) C_2H_5 and H D) CH_3 and CH_3

Sol. (B, D)



On $\text{C}_2 - \text{C}_3$ bond axis

X = CH_3

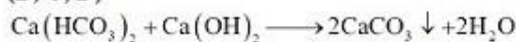
Y = CH_3

On $\text{C}_1 - \text{C}_2$ bond axis

X = H

Y = C_2H_5

Sol. (B, C, D)



[Clarke's method]



13. Among the following, the intensive property is (properties are)
- | | |
|-----------------------|------------------------|
| A) molar conductivity | B) electromotive force |
| C) resistance | D) heat capacity |

Sol. (A, B)

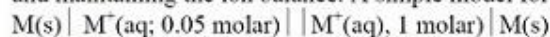
Resistance and heat capacity are mass dependent properties, hence extensive.

SECTION-III (Paragraph Type)

This section contains **2 paragraphs**. Based upon the first paragraph 2 multiple choice questions and based upon the second paragraph **3 multiple choice questions** have to be answered. Each of these questions has four choices A), B), C) and D) out of **WHICH ONLY ONE CORRECT**.

Paragraph for Question Nos. 14 to 15

The concentration of potassium ions inside a biological cell is at least twenty times higher than the outside. The resulting potential difference across the cell is important in several processes such as transmission of nerve impulses and maintaining the ion balance. A simple model for such a concentration cell involving a metal M is:



For the above electrolytic cell the magnitude of the cell potential $|E_{\text{cell}}| = 70 \text{ mV}$.

14. For the above cell
- | | |
|--|--|
| A) $E_{\text{cell}} < 0; \Delta G > 0$ | B) $E_{\text{cell}} > 0; \Delta G < 0$ |
| C) $E_{\text{cell}} < 0; \Delta G^\circ > 0$ | D) $E_{\text{cell}} > 0; \Delta G^\circ > 0$ |

Sol. (B)



According to Nernst equation,

$$E_{\text{cell}} = 0 - \frac{2.303RT}{F} \log \frac{\text{M}_{0.05\text{M}}^+}{\text{M}_{1\text{M}}^+}$$

$$= 0 - \frac{2.303RT}{F} \log(5 \times 10^{-2})$$

= +ve

Hence, $|E_{\text{cell}}| = E_{\text{cell}} = 0.70 \text{ V}$ and $\Delta G < 0$ for the feasibility of the reaction.

15. If the 0.05 molar solution of M^+ is replaced by 0.0025 molar M^+ solution, then the magnitude of the cell potential would be
- | | |
|-----------|-----------|
| A) 35 mV | B) 70 mV |
| C) 140 mV | D) 700 mV |

Sol. (C)

$$\text{From above equation } \frac{2.303RT}{F} = 0.0538$$

$$\text{So, } E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0538}{1} \log 0.0025$$

$$= 0 - \frac{0.0538}{1} \log 0.0025$$

$$\approx 0.13988 \text{ V}$$

$$\approx 140 \text{ mV}$$

Paragraph for Question Nos. 16 to 18

Copper is the most noble of the first row transition metals and occurs in small deposits in several countries. Ores of copper include chalcantite ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$), atacamite ($\text{Cu}_2\text{Cl}(\text{OH})_3$), cuprite (Cu_2O), copper glance (Cu_2S) and malachite ($\text{Cu}_2(\text{OH})_2\text{CO}_3$). However, 80% of the world copper production comes from the ore of chalcopyrite (CuFeS_2). The extraction of copper from chalcopyrite involves partial roasting, removal of iron and self-reduction.

16. Partial roasting of chalcopyrite produces

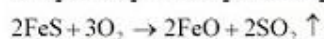
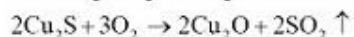
A) Cu_2S and FeO

C) CuS and Fe_2O_3

B) Cu_2O and FeO

D) Cu_2O and Fe_2O_3

Sol. (B)



17. Iron is removed from chalcopyrite as

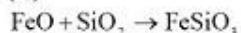
A) FeO

C) Fe_2O_3

B) FeS

D) FeSiO_3

Sol. (D)



(slag)

18. In self-reduction, the reducing species is

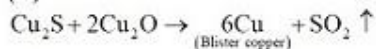
A) S

C) S^{2-}

B) O^{2-}

D) SO_2

Sol. (C)



$\text{S}^{2-} \rightarrow \text{S}^{4+}$ is oxidation, i.e., S^{2-} is reducing agent.

SECTION-IV (Integer Type)

This section contains **TEN** questions. The answer to each question is a single digit integer ranging from 0 to 9. The correct digit below the question number in the **ORS** is to be bubbled.

19. A student performs a titration with different burettes and finds titre values of 25.2 mL, 25.25 mL and 25.0 mL. The number of significant figures in the average titre value is

Ans. **3**

20. The concentration of R in the reaction $R \rightarrow P$ was measured as a function of time and the following data is obtained:

[R] (molar)	1.0	0.75	0.40	0.10
t (min.)	0.0	0.05	0.12	0.18

The order of the reaction is

Sol. **0**

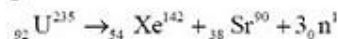
From two data, (for zero order kinetics)

$$K_1 = \frac{x}{t} = \frac{0.25}{0.05} = 5$$

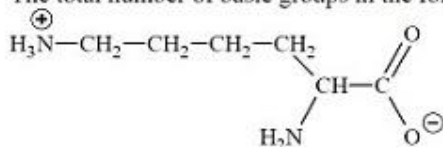
$$K_2 = \frac{x}{t} = \frac{0.60}{0.12} = 5$$

21. The number of neutrons emitted when ${}_{92}^{235}\text{U}$ undergoes controlled nuclear fission to ${}_{54}^{142}\text{Xe}$ and ${}_{38}^{90}\text{Sr}$ is

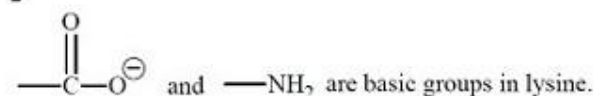
Sol. **3**



22. The total number of basic groups in the following form of lysine is



Sol. **2**



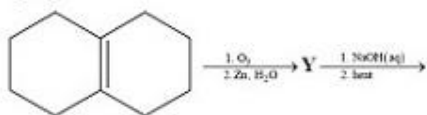
23. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C_4H_6 is

Sol. **5**

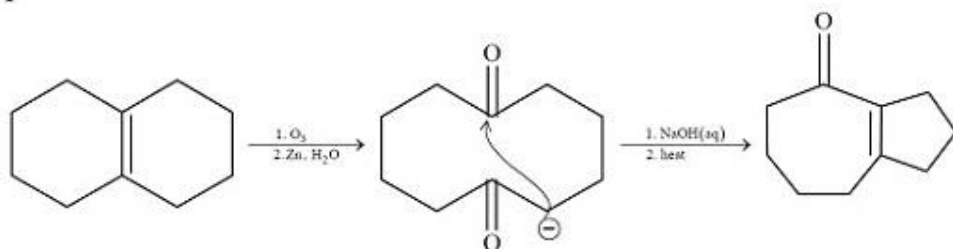
In C_4H_6 , possible cyclic isomers are



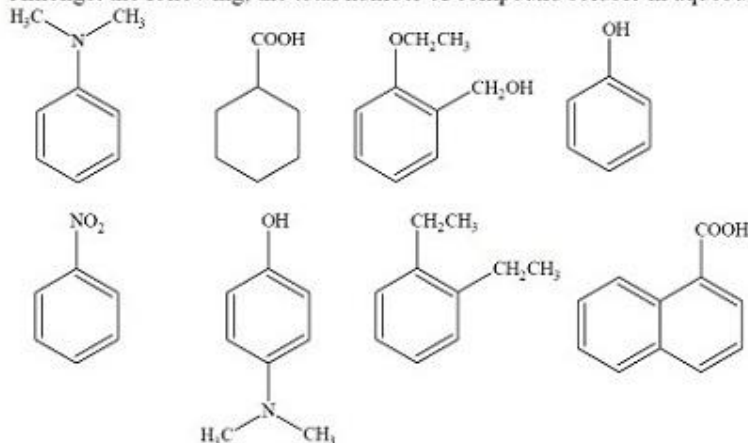
24. In the scheme given below, the total number of intra molecular aldol condensation products formed from 'Y' is



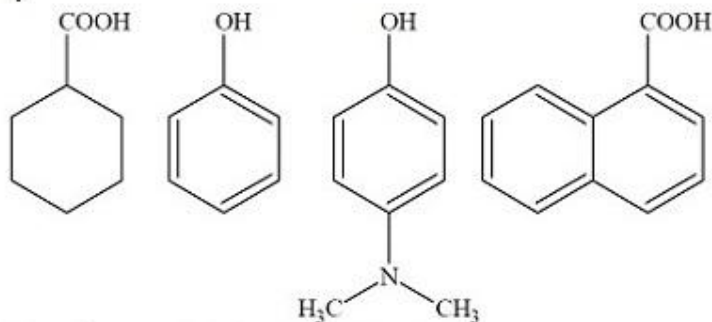
Sol. 1



25. Amongst the following, the total number of compound soluble in aqueous NaOH is

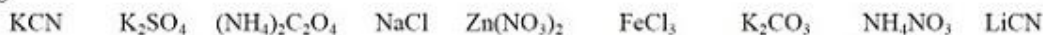


Sol. 4



These four are soluble in aqueous NaOH.

26. Amongst the following, the total number of compounds whose aqueous solution turns red litmus paper blue is

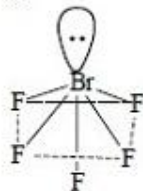


Sol. 3

KCN, K₂CO₃, LiCN are basic in nature and their aqueous solution turns red litmus paper blue.

27. Based on VSEPR theory, the number of 90 degree F-Br-F angles in BrF₅ is

Sol. 0



All four planar bonds (F-Br-F) will reduce from 90° to 84.8° after ℓp - bp repulsion.

28. The value of n in the molecular formula Be_nAl₂Si₆O₁₈ is

Sol.

3
Be₃Al₂Si₆O₁₈ (Beryl)
(according to charge balance in a molecule)
 $2n + 6 + 24 - 36 = 0$
 $n = 3$