JEE (Main) 2021

COMPUTER BASED TEST (CBT)

Date: 25 July, 2021 (SHIFT-2) | TIME: (3.00 p.m. to 6.00 p.m)
Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

Resonance Eduventures Ltd.

RESULT: JEE (Advanced), JEE (Main), NEET

HIGHEST No. of Classroom Selections
1. 3 gm of X dissolve in 100 gm of CCl₄ which increases the boiling point by 0.6. Find molar mass of X.

Given Kₓ of CCl₄ = 5 K gmol⁻¹.

Ans. 250

Sol. 

\[ \Delta T_b = 100 \times \frac{W_X \times 1000}{M_M \times \text{Mass of solvent (g)}} \]

\[ = 5 \times \frac{3 \times 1000}{M_M \times M \times 100} \]

\[ = 150 \text{K} \]

\[ = \frac{150}{M_M} \text{K} \times \text{mol}^{-1} \]

\[ = 0.6 \text{K} \times \text{mol}^{-1} \]

2. In the following ions, the spin only magnetic moment of T²⁺, Sc³⁺, V²⁺ respectively are

(1) 1.73, 0, 3.87
(2) 1.73, 3.87, 0
(3) 3.87, 0, 1.73
(4) 0, 1.73, 3.87

Ans. (3)

Sol. T²⁺ [Unpaired electron = 1]
Sc³⁺ [Unpaired electron = 0]
3. Heat given to a system is 150 joules and work done by the system is 200 joules. The magnitude of the change in the internal energy is:

**Ans.**

\[ \Delta E = q + w \]

First law of thermodynamics

\[ \Delta E = 150 + (-200) \]

\[ \Delta E = -50 \text{ Joule} \]
7. In Ho²⁺ [Atomic No = 67], number of 4f electrons are:

**Ans.** 10

**Sol.** Holmium (Z = 67): 4f¹¹, 5d²

Ho²⁺: 4f¹²

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8. The correct option is:

1. a-(iv) b-(ii) c-(i) d-(i)
2. a-(ii) b-(ii) c-(iv) d-(i)
3. a-(i) b-(ii) c-(i) d-(ii)
4. a-(iv) b-(ii) c-(ii) d-(i)

**Ans.** (2)

**Sol.**

(i) Li₂CO₃ → Li₂O + CO₂
(ii) NaHCO₃ is used in dry fire extinguishers.

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9. The concentration of H₃O⁺ ions in 0.005 M solution of Ba(OH)₂ at 288 K is [x] x 10⁻¹². Assume that Ba(OH)₂ is completely ionized under given conditions.

**Ans.** 1

**Sol.**

Ba(OH)₂

0.005 M Ba²⁺ + 2OH⁻

0.005 M 0.010 M
10. Which form interstitial hydride easily?

(1) Fe  (2) Cr  (3) Ni  (4) Co

Ans. (2)

Sol. These are formed by many d-block and f-block elements. However, the metals of group 7, 8 and 9 do not form hydrides. Even from group 5, only chromium forms CrH.

11. Match List-I with List-II

<table>
<thead>
<tr>
<th>Column-I</th>
<th>Column-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Fromm Flotation</td>
<td>(i) Sulphide ore</td>
</tr>
<tr>
<td>(b) Bessemer converter</td>
<td>(ii) Pig iron</td>
</tr>
<tr>
<td>(c) Blast furnace</td>
<td>(iii) Ag</td>
</tr>
<tr>
<td>(d)</td>
<td>(iv)</td>
</tr>
</tbody>
</table>

(3) a-(iv)  b-(vi)  c-(iii)  d-(i)

Ans. (2)

12. In which of the following reaction oxidation state changes by 5.

(1) $\text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Cr}^{3+}$
(2) $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$
(3) $\text{C}_2\text{O}_4^{2-} \rightarrow \text{CO}_2$
(4) $\text{CrO}_4^{2-} \rightarrow \text{Cr}^{3+}$

Ans. (2)

Sol. $\text{MnO}_4^- \rightarrow \text{Mn}^{2+} + 5$

13. In which of the following compounds one σ bond is present and maximum canonical structures possible.

(1) $\text{SO}_3$  (2) $\text{CO}_2$  (3) $\text{O}_2$  (4) $\text{SO}_2$

Ans. (2)

Sol. $\text{SO}_3$

3 canonical structures
14. An object moving with a velocity of $2 \times 10^3$ m/s. If the speed can be measured with an accuracy of 0.02%, calculate the uncertainty in its position is $1.45 \times 10^{-2}$ m. The value of x

**Ans.** (7)

\[
\Delta x = \frac{\hbar}{4\pi} \Delta v = \frac{6.63 \times 10^{-34}}{4\pi \times 3.14 \times 9.1 \times 10^{-33} \times 400 \text{ m/s}} = 1.45 \times 10^{-2} \text{ m}
\]

15. A $\longrightarrow$ B
In this reaction, concentration of B changes by 0.2 in 30 minutes. The average rate of the reaction is $x \times 10^{-4}$ moles per litre per hour. The value of x is:

**Ans.** 4

16. Which among the following compounds is most stable:
   (1) $\text{Cr}^{3+} (\text{en})_2 \text{Cl}_3$
   (2) $\text{Cr}^{3+} (\text{en}) \text{Cl}_4$
   (3) $\text{Cr} (\text{en})_2 (\text{NH}_3)_4 \text{Cl}_3$
   (4) $\text{Cr} (\text{NH}_3)_2 \text{Cl}_3$

**Ans.** (2)

**Sol.** Chelation due to bidentate ligand. Greater the chelation greater is the stability.

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**Resonance Eduventures Ltd.**

Reg. Office & Corp. Office – CG Tower, A-46 & 52, JAL, Near City Mall, Jhalawar Road, Kota (Raj.) – 324005
Ph. No: +91-44-2777777, 2777778 | Fax No: +91-22-39187222

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**JEE MAIN-2021 | DATE: 25-07-2021 (SHIFT-2) | PAPER-1 | MEMORY BASED | CHEMISTRY**

17. In Hjelmslev's method, 0.8 g of organic compound is used. The percentage of Nitrogen came out to be 4%. The _____ ml of 1M $\text{H}_2\text{SO}_4$ used to neutralize ammonia

(1) 17
(2) 20
(3) 30
(4) 12

**Ans.** (4)

\[
4\% \times 0.8 \text{ g} = 1.44 \text{ mmol} \Rightarrow V = 12 \text{ ml}
\]

18. Find the product 'P'

\[
\text{NO}_2 + \text{Sn} + \text{HCl} \rightarrow (A) \rightarrow (P)
\]

(1) $\text{H}_2\text{N} \quad \text{N} \quad \text{N} \quad \text{H}_2\text{N}$
(2) $\text{H}_2\text{N} \quad \text{N} \quad \text{N} \quad \text{H}_2\text{N}$

**Ans.** (1)
19. Total no. of stereo isomeric products:

Ans. (2)

20. Biodegradable polyamide is formed by:

(1) Glycine + isoprene
(2) Glycine + Aminocaproic acid
(3) Alanine + chloroprene
(4) Acrylonitrile + Aminocaproic acid

Ans. (2)

Sol. Nylon 2-Nylon 8 (Polyamide copolymer) is biodegradable polymer. Its monomer units are: Glycine + Aminocaproic acid

\[
\text{Glycine} + \text{Aminocaproic acid} = \text{H}_2\text{N} - \text{CH}_3 - \text{COOH} + \text{NH}_2(\text{CH}_2)_5 - \text{COOH} \]

21. Benzeneitrile with grignard reagent form product (P), which of the following chemical test given by product (P)

(1) Catalytic amount
(2) Hydrogen
(3) Hidrogenation
(4) Treatment with

Ans. (2)

Sol. Acidic strength or stability of enolates base

22. Correct order of acidic strength form following compounds:

(a) CH\(_2\)CH\(_2\)CH\(_3\)
(b) CH\(_3\)
(c) CH\(_3\)CH\(_2\)CH\(_3\)
(d) CH\(_3\)CH\(_2\)CH\(_2\)CH\(_3\)

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

Ans. (2)

Sol. Acidic strength or stability of enolates base

23. Structure of cytosine is:

(1) Cytosine (C)
(2) Thymine (T)
(3) Uracil (U)
(4) Adenine (A)
24. \[
\begin{array}{c}
\text{CH}_3 \\
\text{CH} = \text{CH} - \text{CH} \text{CH} = \text{CH} - \text{CH} \text{CH} - \text{CH}_2 \\
\text{(1) CH}_3 \text{NO}_2 \text{HCl} \text{H}_3 \text{O} \\
\text{Product P is :} \\
\text{CH}_2 \\
\end{array}
\]

Anas. (3)

Sol. \[
\begin{array}{c}
\text{CH}_3 \\
\text{CH} = \text{CH} - \text{CH} \text{CH} = \text{CH} - \text{CH} \text{CH} - \text{CH}_2 \\
\text{(1) CH}_3 \text{NO}_2 \text{HCl} \text{H}_3 \text{O} \\
\text{CH}_2 \text{-shift} \\
\text{CH}_2 \\
\text{H}_2 \text{O} \\
\end{array}
\]

25. \[S_1: \text{CFCs are dissociated with \text{Cl radical by radiation of visible region}}\]
\[S_2: \text{Os reacts with nitric oxide to form \text{N}_2 \text{O}_2}\]

(1) False, True
(2) False, False
(3) True, False
(4) True, True

Anas. (2)

Sol. \[
\begin{array}{c}
\text{CFCs + UV} \\
\text{C}^* \\
\text{N}_2 \text{O}_2 \\
\end{array}
\]

26. Increasing order of density:
(1) Benzene
(II) 1,3-Dichlorobenzene
(III) Chloro benzene
(IV) 1-Ethoxy-3-chlorobenzene

(1) IV > II > III > I
(2) IV > II > III > I
(3) III > II > IV > I
(4) I > II > III > IV

Anas. (1)

Sol. Higher the molecular weight higher will be density.

27. Maleic anhydride can be prepared by:
(1) Treating cis but-2-ene-1,4-dicarboxylic acid with alcohol.
(2) Heating cis but-2-ene-1,4-dicarboxylic acid
(3) Treating trans but-2-ene-1,4-dicarboxylic acid with alcohol and acid
(4) Heating trans but-2-ene-idic acid

Anas. (2)

Sol. Maleic acid