PAPER-1 (B.E./B. TECH.)

JEE (Main) 2020

COMPUTER BASED TEST (CBT)
Memory Based Questions & Solutions

Date: 02 September, 2020 (SHIFT-1) | TIME: (9.30 a.m. to 12.30 p.m)

Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

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Many Dreamers... Many Achievers...
Numerical Value Type (संख्यात्मक प्रश्न)
This section contains 5 Numerical value type questions.
इस खण्ड में 5 संख्यात्मक प्रश्न हैं।

1. Which metal is used in devising Photo-Chemical cell?
   (1) Li  (2) Na  (3) Rb  (4) Cs
   Ans. (4)
   Sol. Cesium has lowest ionisation enthalpy and hence it can show photoelectric effect to the maximum extent hence it is used in photo chemical cell.

2. 3 moles of O₂ and 5 moles of Ar are present in a closed container, find sum of their internal energy in terms of RT.
   (1) 15 RT  (2) 10 RT  (3) 5 RT  (4) 20 RT
   Ans. (1)
   Sol. \[ \Delta U = \frac{1}{2} nRT \]
   For O₂ \[ \Delta U = \frac{5}{2} \times 3(RT) = \frac{15}{2} RT \]
   For He \[ \Delta U = \frac{2}{2} \times 5(RT) = \frac{15}{2} RT \]
   So sum of internal energy = \( \frac{15}{2} + \frac{15}{2} = 15 RT \)

3. Among the following properties, which property trend (in magnitude) is different from other across a period?
   (1) Atomic Radius  (2) Electronegativity  (3) Ionisation Entalphy  (4) Electron gain enthalpy
   Ans. (4)
4. Graph between \( \frac{x}{m} \) Vs logP has a slope = 2 and intercept = 0.477. Find \( \frac{x}{m} \) at pressure 4 atm.

\[ \text{[Given log3} = 0.477] \]

(1) 6  (2) 3  (3) 48  (4) 9

**Ans.**

(1)

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**Sol.**

\[
\frac{x}{m} = kP^n
\]

\[
\log \left( \frac{x}{m} \right) = \log k + \frac{1}{n} \log P
\]

Slope = \( \frac{1}{n} \) = 2

So \( n = \frac{1}{2} \)

Intercept \( \Rightarrow \log k = 0.477 \)

So \( k = \text{Antilog}(0.477) = 3 \)

\[ \frac{x}{m} = kP^n = 3 \]

\[ \frac{1}{4} = 6 \]

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5. If a compound AB₄ is polar covalent, then its possible geometry is:

(1) Square planar  (2) Tetrahedral  (3) Sea-saw  (4) Square Pyramidal

**Ans.**

(3)

---

**Sol.**

For AB₄ compound possible geometry are:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Bond pair</th>
<th>Lone pair</th>
<th>Total</th>
<th>Hybridisation</th>
<th>Geometry</th>
<th>Polarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>SP³</td>
<td>Tetrahedral</td>
<td>non polar</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>SP³d</td>
<td>Sea-saw</td>
<td>Polar</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>sp³d²</td>
<td>Square Planar</td>
<td>non polar</td>
</tr>
</tbody>
</table>

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6. Which of the following statement about ozone is **INCORRECT**?

(1) Ozone acts as a protective layer against UV rays.

(2) It is toxic layer and converts NO to NO₂.

(3) It converts Cl free radical of CFC’s to chlorinedioxide.

(4) It acts as shield to our atmosphere.

**Ans.**

(3)

---

**Sol.**

In presence of sunlight CFC’s molecule divides & release chlorine free radical, which react with ozone give chlorine monoxide radical ( ClO*) and oxygen.

\[
\text{CF₂Cl(g)} \rightarrow \text{Cl(g)} + \text{CF₂Cl(g)}
\]

\[
\text{Cl}^*(g) + \text{O}_2(g) \rightarrow \text{ClO}^*(g) + \text{O}_2(g)
\]

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7. Which of the following graph is incorrect for an ideal gas?

(1) d  (2) d  (3) d  (4) T

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8. An example of solid sol is:
   (1) Butter       (2) gem stones       (3) Paints       (4) Cake

   Ans. (2)

   Soln. Solid sol has dispersed phase solid and dispersion medium solid.
   Example => Gem stones, some coloured glass

9. For following cell reaction:
   Cu(s) + Sn^2+(aq) → Cu^2+(aq) + Sn(s)
   [Cu^2+] = [Sn^2+] = 1M
   Find Gibb’s energy change (in KJ). Given [E^{0}_{Cu^2+}/Cu] = 0.34V, [E^{0}_{Sn^2+}/Sn] = -0.16V

   Soln.
   E^{0}_{cell} = E^{0}_{Sn^2+/Sn} - E^{0}_{Cu^2+/Cu}
   = 0.16 - (-0.34)
   = 0.50V
   \Delta G^{c} = -nF E^{0}_{cell}
   = -2 \times 96500 \times (-0.5)
   = 96500J
   = 96.5 KJ

10. Correct Structure of Dettol is?

    Ans. (C)

    Soln. Dettol (NCERT XII class)

    4-Chloro-3,5-dimethyl phenol.
11. Correct IUPAC name of following compound is

1. 2-Methyl-5-oxohex-3-enio acid.
2. 5-Formyl-2-methyl hex-3- enic acid.
3. 2,5-Dimethyl-5-oxo pent-3- enio acid.
4. 2,5-Dimethyl-5-formyl pent-3- enio acid.

Ans. (B)

Sol. 5-formyl-2-methyl pent-3- enio acid.

12. Find out end product of this reaction.

(1) OH
(2) CH
(3) CH
(4) CH

Ans. (C)

Sol. CH + CH₃ + CH₃ + CH₃ + OH + H²⁺

13. Most reactive with HCN out of following.

1. CHO
2. CHO
3. CHO
4. CHO

Ans. (C)

Sol. –I, –M effect of NO₂ increase reactivity towards nucleophilic addition reaction with HCN. and as steric crowding increase rate of NAR decrease.

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15. Glucose

(a) $\text{H}_2\text{Ni}$ (b) $\text{Ac}_2\text{O}$

$\to$ $\text{X}$

Calculate required moles of $(\text{Ac}_2\text{O})$ in $X$, $Y$, $Z$ product formation.

(A) 2, 3, 4  (B) 5, 5  (C) 4, 5, 6  (D) 5, 5, 6

(A) 2, 3, 4  (B) 5, 5  (C) 4, 5, 6  (D) 5, 5, 6
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