QUESTIONS & SOLUTIONS
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📅 24 JUNE, 2022
⏰ 9:00 AM to 12:00 Noon

SHIFT - 1

Duration : 3 Hours
Maximum Marks : 300

SUBJECT - CHEMISTRY

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Tel. : +91-744-2665544 | Website : www.reliablekota.com | E-mail : info@reliablekota.com
1. Difference in oxidation number of Cr in chromate and dichromate is:
   Ans. (0)
   Sol. \( \text{CrO}_4^{2-} \); \( \text{Cr}_2\text{O}_7^{2-} \)

2. Which cation will give deep red ppt with dmg reagent in basic medium?
   Ans. Ni\(^{+2}\)
   Sol. \([\text{Ni(dmg)}_2]\)

3. Most stable among the following is:
   (A) NF\(_3\)    (B) NCl\(_3\)    (C) NBr\(_3\)    (D) NI\(_3\)
   Ans. (A)
   Sol. Fact from NCERT

4. In Co\(_2\)(CO)\(_8\),
   Number of Co-Co bond = x
   Number of terminal CO groups = y
   then \( x + y = ? \)
   Ans. 7
   Sol. \( x = 1, \ y = 6 \)
   \( x + y = 7 \)

5. Na\(_2\)O, As\(_2\)O\(_3\), N\(_2\)O, NO
   Number of amphoteric oxides in above are ……..
   Ans. 1
   Sol. As\(_2\)O\(_3\)
6. Match the column

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Hybridisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) BrF$_5$</td>
<td>(p) sp$^3$d$^2$</td>
</tr>
<tr>
<td>(2) [Co(NH$_3$)$_6$]$^{2+}$</td>
<td>(q) dsp$^2$</td>
</tr>
<tr>
<td>(3) PCl$_5$</td>
<td>(r) sp$^3$d</td>
</tr>
<tr>
<td>(4) [PtCl$_4$]$^{2-}$</td>
<td>(s) d$^2$sp$^3$</td>
</tr>
</tbody>
</table>

Ans. (1)-p, (2)-s, (3)-r, (4)-q

7. Osmotic pressure is 7.47 atm at T = 300 K
R = 0.083 L atm K$^{-1}$ mol$^{-1}$
Solute is glucose (molecular weight 180 u)
Calculate concentration in g/L.

Ans. (54)

Sol. \[ \pi = CRT \]
\[ 7.47 = \left( \frac{\text{conc.}}{180} \right) \times 0.083 \times 300 \]
Conc. = 54 g/L

8. H$_2$(g) is used with which of the following elements to produce an industrially important compound?

Ans. N

9. \[ A(g) \rightleftharpoons B(g) + \frac{1}{2} C_2(g) \]
Relationship between $K_P$, $P$ and $\alpha$ is ....

Sol. \[
\begin{align*}
A(g) \quad & \quad B(g) + \frac{1}{2} C_2(g) \\
\text{a mole} \quad & \quad 0 \quad 0 \\
\text{a–a} \alpha \quad & \quad a \alpha \quad \frac{a \alpha}{2}
\end{align*}
\]

at equilibrium, \[ n_T = a + \frac{a \alpha}{2} \]

\[
K_P = \frac{\alpha \left( \frac{\alpha}{2} \right)^{1/2}}{(1-\alpha) \left( 1 + \frac{\alpha}{2} \right)^{1/2}} \frac{P^{1/2}}{\sqrt{2}} = \frac{\alpha^{3/2} P^{1/2}}{\sqrt{2} \left( 1 - \alpha \right) \left( 1 + \frac{1}{\alpha} \right)^{1/2}}
\]

If $\alpha << 1$
\[ K_P = \frac{\alpha^{3/2} P^{1/2}}{\sqrt{2}} \]
10. Match listing :
   (1) Calamine (P) ZnCO₃
   (2) Siderite (Q) FeCO₃
   (3) Galana (R) PbS
   (4) Sphalerite (S) ZnS
   Ans. (1) → (P); (2) → (Q); (3) → (R); (4) → (S)

11. S₁ → O/W is an unstable emulsion.
    S₂ → Excess of electrolyte are added for stability.
    Ans. S₁ → True
        S₂ → False

12. Select the correct statement regarding B₂H₆
    (a) Lewis acid
    (b) It contains four 3 centre –2 electron bond
    (c) All B–H bond length are equivalent
    (d) It can be prepared by reaction between BF₃ and NaBH₄
    (e) It is planar
    (1) a, d  (2) a, c, d  (3) c, d, e  (4) a, b
    Ans. (1)

13. X = hcp; Y = \( \begin{pmatrix} 2 \\ 3 \end{pmatrix} \)³ of tetrahedral void.
    Mole percent of X in compound = ? (Nearest integer)
    Ans. (43)
    Sol. \( X_6 Y_{\frac{2}{3}\times12} = X_3 Y_4 \)
    Mole percent of X = \( \frac{3}{7} \times 100 \approx 43 \% \)

14. (1) LiCl & MgCl₂ both are soluble in ethanol.
    (2) Oxides of Li₂O and MgO combine with excess O₂ to form superoxides.
    (3) LiF is comparatively much less soluble in water than corresponding compound of other alkali metals.
    Ans. (T, F, T)
1. Not a broad spectrum antibiotic
   (1) Ofloxacin     (2) Ampicillin     (3) Penicillin-G     (4) Amoxycillin
   Ans. (3)
   Sol. Penicillin-G is narrow spectrum antibiotic

2. Carbohydrate $\xrightarrow{\text{H}_2\text{SO}_4, \Delta} Product$ gives Gluonic acid with Br$_2$/H$_2$O
   (β-linkage only)
   Carbohydrate is
   (1) Starch     (2) Glycosen     (3) Cellulose     (4) Sucrose
   Ans. (3)
   Sol. Cellulose $\xrightarrow{\text{H}_2\text{SO}_4, \Delta} Glucose \xrightarrow{\text{Br}_2, \text{H}_2\text{O}} Gluonic$ acid,
   Cellulose has β-Glycosidic linkage.

3. Which is a conjugated dione

   (1) $\begin{array}{c} \text{O} \\ - \text{C} \end{array}$
   (2) $\begin{array}{c} \text{O} \\ \text{O} \\ \text{O} \\ \text{O} \\ - \text{C} \end{array}$
   Ans. (1)

4. The vitamin which cannot be supplied to the organism through food is:
   (1) Vitamin B$_{12}$     (2) Vitamin C
   (3) Vitamin D     (4) Vitamin E
   Ans. (3)
5. Number of lone pairs in melamine are?  
Ans. (6)  
Sol. 

6. 2,7-dimethylocta-2,6-diene \[ \text{H}^\oplus \]  
Sol.  

7. Which of the following has ester linkage:  
   (1) Buna-S    (2) PHBV    (3) Buna-N    (4) Nylon-6  
Ans. (2)  
Sol.
8. \[ \ce{OCH_3} \quad \text{(i) NaCN} \quad \ce{Br} \quad \text{(ii) OH} \quad \ce{Br} \quad \text{(iii) Cyclohexanone} \quad \text{(iv) H_2/Ni} \rightarrow \text{Major Product} \]

Sol. 

\[
\begin{align*}
\text{(i) NaCN} & \quad \ce{OCH_3} \\
\text{OH} & \quad \ce{H-CN} \\
\text{H} & \quad \ce{CN} \\
\text{H} & \quad \ce{OCH_3} \\
\text{OCH_3} & \quad \ce{CH_2NH_2} \quad \text{H_2/Ni} \\
\end{align*}
\]
9. Statement –I : Melting point of carboxylic acid decreases from even number of carbon to odd number of carbon atoms on increasing molecular mass.

Statement –II : On increasing molecular mass solubility of carboxylic acid decreases

(1) S₁ and S₂ are correct
(2) S₁ is wrong S₂ is correct
(3) S₁ is correct, S₂ is incorrect
(4) S₁ and S₂ both are incorrect

Ans. (1)

10. \[ \text{C}_8\text{H}_{10} \xrightarrow{\text{HNO}_3, \text{H}_2\text{SO}_4} (A) \xrightarrow{\text{Br}_2, \Delta} (B) \xrightarrow{\text{Alc. KOH}} (C) \]

Sol. \[ \text{(C}_8\text{H}_{10}) \xrightarrow{\text{HNO}_3, \text{H}_2\text{SO}_4} \xrightarrow{\text{Br}_2, \Delta} \xrightarrow{\text{Alc. KOH}} \]
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