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(for students moving from XI to XII)

Two Year Classroom Program
JEE/NEET-2022
(for students moving from X to XI)

Three Year Integrated Classroom Program
JEE/NEET-2023
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JEE/NEET-2024
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- Relative performance (All India Ranking)
- Question wise Analysis
- Unlimited Practice Test
- Grand Test

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1. Identify end product of following reaction sequence?

\[
\text{C}_6\text{H}_5\text{NH}_2 \xrightarrow{\text{NaNO}_2(0-5^\circ \text{C})/\text{HCl}} \text{P} \xrightarrow{\text{Cl}_2 \text{h}_0} \text{Q} \xrightarrow{\text{Na/ether}} \text{R}
\]

\[
\begin{align*}
1) & \quad \text{Cl} \quad \text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{Cl} \\
2) & \quad \text{Cl} \quad \text{Cl} \\
3) & \quad \text{H}_3\text{C} \\
4) & \quad \text{Cl} \quad \text{H}_3\text{C} - \text{CH}_2 - \text{CH}_2 - \text{Cl}
\end{align*}
\]

Ans: 2

Sol:
2. During roasting and calcination emitted gases produce which of the following effects.
   1) Photochemical smog, acid rain
   2) Acid rain, global warming
   3) Photochemical smog, global warming
   4) Acid Rain, ozone depletion

   Ans: 2

   Sol: NCERT

3. Synthetic drug (seldane) Terfenadine work Histamine.
   1) Increase stimulation of Histamine
   2) Drug bind to the receptor site and inhibit natural function of histamine.
   3) Increase reactivity of Histamine
   4) This drugs mimic the natural messenger by switching on the receptor

   Ans: 2

   Sol: Seldane act as antihistamines and interfere with the natural action of histamine by competing with histamine for binding sites of receptor.

4. Find out major product of following reaction sequence

   Find out major product of following reaction sequence

   \[
   \begin{align*}
   &\text{CH}_3 \\
   &\text{H}_3\text{C}-\text{CH}_2-\text{CH}-%
   \\
   &\text{H}_2\text{SO}_4/\Delta \quad \text{conc. H}_2\text{SO}_4/\Delta
   \\
   &\text{B} \\
   &\text{H}_3\text{C}-\text{CH}_2-\text{CH}-%
   \\
   &\text{H}_2\text{SO}_4/\Delta \quad \text{conc. H}_2\text{SO}_4/\Delta
   \\
   &\text{B} \\
   &\text{H}_3\text{C}-\text{CH}_2-\text{CH}-%
   \\
   &\text{H}_2\text{SO}_4/\Delta \quad \text{conc. H}_2\text{SO}_4/\Delta
   \\
   &\text{B} \\
   &\text{H}_3\text{C}-\text{CH}_2-\text{CH}-%
   \\
   &\text{H}_2\text{SO}_4/\Delta \quad \text{conc. H}_2\text{SO}_4/\Delta
   \\
   &\text{B} \\
   &\text{H}_3\text{C}-\text{CH}_2-\text{CH}-%
   \\
   &\text{H}_2\text{SO}_4/\Delta \quad \text{conc. H}_2\text{SO}_4/\Delta
   \\
   &\text{B}
   \end{align*}
   \]

   Find out major product of following reaction sequence

   1) \( \text{CH}_3 \)
   2) \( \text{CH}_3 \)
   3) \( \text{CH}_3 \)
   4) \( \text{CH}_3 \)

   Ans: 2
5. Find product of following reaction sequence?

Ans: 2
6. Which one is most reactive towards $\text{aq.AgNO}_3$?

1) \[
\begin{array}{c}
\text{N} \\
\text{Br}
\end{array}
\]

2) \[
\begin{array}{c}
\text{O} \\
\text{Br}
\end{array}
\]

3) \[
\begin{array}{c}
\text{N} \\
\text{Br}
\end{array}
\]

4) \[
\begin{array}{c}
\text{N} \\
\text{Br}
\end{array}
\]

Ans: 1

Sol: Given reaction is an example of $\text{SN}_1$ reaction. Which depend upon stability of carbocation.

Most stable by $+M$ effect of $-\text{N}$ (amine)
7. In colloidal solution of blue ink following reagent are mixed H₂O, Egg albumin, CH₃COOH and HCl then which of the above reagent ensure the stability of Blue ink.

1) H₂O 2) Egg albumin 3) CH₃COOH 4) HCl

Ans: 2

Sol: Blue ink is a colloidal so, so it can be stabilised by material like natural gum or Egg albumin.

8. Which of the following complex show maximum paramagnetism?

[PPh₃ = triphenyl phosphine, ox = oxalato, gly= glycinato]

1) \([\text{Co(ox)}₂(\text{NH₃})₂]^-\) 2) \([\text{Fe(en)}(\text{bpy})(\text{NH₃})₂]^{2+}\)

3) \([\text{Pd(gly)}(\text{PPh₃})₂]^+\) 4) \([\text{Ti(H₂O)}₆]^{3+}\)

Ans: 4

Sol:

<table>
<thead>
<tr>
<th>Complex</th>
<th>Electronic configuration</th>
<th>No. of unpaired electron</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) ([\text{Co(OX₂})(\text{NH₃})₂]^-)</td>
<td>Co³⁺ = 3d⁶ (\Rightarrow t_{₂g⁶}, e_{g⁰})</td>
<td>0</td>
</tr>
<tr>
<td>2) ([\text{Fe(en)}(\text{bpy})(\text{NH₃})₂]^{2+})</td>
<td>Fe²⁺ = 3d⁶ (\Rightarrow t_{₂g⁶}, e_{g⁰})</td>
<td>0</td>
</tr>
<tr>
<td>3) ([\text{Pd(gly)}(\text{PPh₃})₂]^+)</td>
<td>Pd²⁺ = 4d⁸</td>
<td>0</td>
</tr>
<tr>
<td>4) ([\text{Ti(H₂O)}₆]^{3+})</td>
<td>Ti³⁺ = 3d¹ (\Rightarrow t_{₂g¹}, e_{g⁰})</td>
<td>1</td>
</tr>
</tbody>
</table>

9. Identify the complex in which has only one d orbital is used in the hybridisation

1) \([\text{Ni(CN)}₄]^{2-}\) 2) \([\text{Fe(CN)}₆]^{3-}\) 3) \([\text{Co(en)}₃]^{3+}\) 4) \([\text{FeF₆}]^{3-}\)

Ans: 1

Sol:

<table>
<thead>
<tr>
<th>Complex</th>
<th>EC</th>
<th>Hybridisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) ([\text{Ni(CN)}₄]^{2-})</td>
<td>Ni²⁺ = 3d⁸</td>
<td>dsp²</td>
</tr>
<tr>
<td>2) ([\text{Fe(CN)}₆]^{3-})</td>
<td>Fe³⁺ = 3d⁵ (\Rightarrow t_{₂g²,2,1}, e_{g⁰})</td>
<td>d²sp³</td>
</tr>
<tr>
<td>3) ([\text{Co(en)}₃]^{3+})</td>
<td>Co³⁺ = 3d⁶ (\Rightarrow t_{₂g²,2,2}, e_{g⁰})</td>
<td>d²sp³</td>
</tr>
<tr>
<td>4) ([\text{FeF₆}]^{3-})</td>
<td>Fe³⁺ = 3d⁵ (\Rightarrow t_{₂g¹,1}, e_{g¹})</td>
<td>sp³d²</td>
</tr>
</tbody>
</table>
10. In hydrogen spectrum shortest wave length for Lyman series line is \( \lambda \), then find longest wave length of Balmer series line in \( \text{He}^+ \) ion spectrum.

\[
1) \lambda \\
2) \frac{9}{5}\lambda \\
3) \frac{5}{9}\lambda \\
4) \frac{4}{9}\lambda
\]

Ans: 2

Sol: for hydrogen atom:

For Lyman series

\[
n_1 = 1 \text{ & } n_2 = \infty
\]

\[
\frac{1}{\lambda_H} = R_H \left[ \frac{1}{1} - \frac{1}{\infty} \right] \text{ so, } \lambda = \frac{1}{R_H}
\]

For \( \text{He}^+ \) ion

Balmer series \( n_1 = 2 \text{ & } n_2 = 3 \)

\[
\frac{1}{\lambda_{\text{He}}} = R_{\text{He}} \times 4 \times \frac{5}{36}
\]

\[
\frac{1}{\lambda_{\text{He}}} = \frac{5}{9} R_{\text{He}} = \left( \frac{5}{9} \right) \frac{1}{\lambda}
\]

\[
|\lambda_{\text{He}}| = \frac{9}{5}\lambda
\]

11. Which of the following process is not endothermic?

1) \( \text{H}_\text{(g)} + e^- \rightarrow \text{H}_\text{(g)}^- \)  
2) \( \text{Ar}_\text{(g)} + e^- \rightarrow \text{Ar}_\text{(g)}^- \)  
3) \( \text{O}_\text{(g)}^- + e^- \rightarrow \text{O}_\text{(g)}^{2-} \)  
4) \( \text{Na}_\text{(g)} \rightarrow \text{Na}_\text{(g)}^+ + e^- \)

Ans: 1

Sol: \( \text{H}_\text{(g)} + e^- \xrightarrow{\text{extermic}} \text{H}_\text{(g)}^- \) \( \Delta H_{eg} = -72 \text{ KJ/mol} \)

\( \text{O}_\text{(g)}^- + e^- \xrightarrow{\text{endothermic}} \text{O}_\text{(g)}^{2-} \) \( \Delta H_{eg} = +744 \text{ KJ/mol} \)

\( \text{Ar}_\text{(g)} + e^- \xrightarrow{\text{endothermic}} \text{Ar}_\text{(g)}^- \) \( \Delta H_{eg} = +96 \text{ KJ/mol} \)

\( \text{Na}_\text{(g)} \xrightarrow{\text{endothermic}} \text{Na}_\text{(g)}^+ + e^- \) \( \text{IE} = 495.8 \text{ KJ/mol} \)
12. Calculate CFSE for complex \([\text{Co(H}_2\text{O)}_3\text{F}_3]\) [Given \(\Delta_0 < P\)]

1) \(-0.8\Delta_0 + 2P\)  
2) \(-0.4\Delta_0 + P\)  
3) \(-0.8\Delta_0\)  
4) \(-0.4\Delta_0\)

Ans: 4

Sol: \([\text{Co(H}_2\text{O)}_3\text{F}_3]\) \(\text{Co}^{3+} = 3d^6 4s^0 \Rightarrow t_{2g}^{2}, t_{1g}, e_{g}\).

\[
\text{CFSE} = \left[-0.4n_t_{2g} + 0.6n_{e_{g}}\right]\Delta_0 + n(P)
\]

\[= \left[-0.4 \times 4 + 0.6 \times 2\right]\Delta_0 + 0\]

\[= -0.4\Delta_0\]

13. 5 mole of an ideal gas of volume \(V\) is expanded against vacuum to make its volume 2 times, then work done by the gas is:

1) \(-RT(V_2 - V_1)\)  
2) \(-RT\ln\left(\frac{V_2}{V_1}\right)\)  
3) zero  
4) \(C_V [T_2 - T_1]\)

Ans: 3

Sol: \(W = -P_{\text{ext}}\Delta V\)

In expansion against vacuum \(P_{\text{ext}} = 0\)

So work done is zero.

14. 100 ml solution of each 0.1 M AuCl and 0.1 M AgCl is electrolysed by passing 1 amp current for 15 min, then which of the following will be deposited?

[Given \(\text{Au}^+(aq) + e^- \longrightarrow \text{Au} \quad E^0 = 1.69 \text{V}\)]

\[\text{Au}^+(aq) + e^- \longrightarrow \text{Ag} \quad E^0 = 0.80 \text{V}\]

1) Only Au  
2) Only Ag  
3) Both Au and Ag  
4) None of Au and Ag

Ans: 1
Sol:  Charge (q) = \frac{15 \times 60}{96500} = \frac{900}{96500} = \frac{9}{965} F = 0.0093 F

No. of moles of \( \text{Au}^+\) = 0.01 & No. of moles of \( \text{Ag}^+\) = 0.01

Species with higher value of SRP will get deposited first at cathode.

(i) \( \text{Au}^+ (\text{aq}) + e^- \rightarrow \text{Au}(s) \)

So only Au will get deposited.

15. An alkaline earth metal, sulphate is soluble in water while its hydroxide is not soluble in water and its oxide does not form rock salt structure, then metal is:

1) Be  
2) Mg  
3) Ca  
4) Sr

Ans: 1

Sol: \( \text{BeSO}_4\) soluble in water

\( \text{Be(OH)}_2\) insoluble in water

Structure of BeO is Hexagonal Wurtzite.

16. In which of the following reaction, hybridisation of underline atom gets changed?

1) \( \text{XeF}_4 + \text{SbF}_5 \rightarrow \)  
2) \( \text{H}_3\text{PO}_2 \) disproportionation \( \rightarrow \)

3) \( \text{H}_2\text{SO}_4 + \text{NaCl} \rightarrow \)  
4) \( \text{NH}_3 + \text{BF}_3 \rightarrow \)

Ans: 1

Sol: 1) \( \text{XeF}_4 + \text{SbF}_5 \rightarrow [\text{XeF}_3]^{+} [\text{SbF}_6]^{-} \)

2) \( \text{H}_3\text{PO}_2 \) disproportionation \( \rightarrow \text{H}_3\text{PO}_4 + \text{PH}_3 \)

3) \( \text{H}_2\text{SO}_4 + 2\text{NaCl} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{HCl} \)

4) \( \text{NH}_3 + \text{BF}_3 \rightarrow \text{H} - \text{N} \rightarrow \text{B} - \text{F} \)
17. Given

(i) \[ A \rightleftharpoons B + C \quad K_{eq} \ (1) \]

(ii) \[ B + C \rightleftharpoons P \quad K_{eq} \ (2) \]

Then \( K_{eq} \) for reaction \( A \rightleftharpoons P \) is

\[ 1) \ K_{eq} \ (1) \cdot K_{eq} \ (2) \quad 2) \ \frac{K_{eq} \ (1)}{K_{eq} \ (2)} \quad 3) \ K_{eq} \ (1) + K_{eq} \ (2) \quad 4) \ K_{eq} \ (1) - K_{eq} \ (2) \]

Ans: 1

Sol: On adding reaction 1st and reaction 2nd we get.

\[ A \rightleftharpoons P \quad K_{eq} = K_{eq} \ (1) \cdot K_{eq} \ (2) \]

18. Osmotic pressure of NaCl solution is 0.1 atm and Glucose solution is 0.2 atm. If 1 L of NaCl solution and 2 L of Glucose solution is mixed at same temperature, then osmotic pressure of resulting solution is 'X' \( \times 10^{-3} \) atm, then value of 'X' in nearest integer is

Ans: 166.66 or 166.67

Sol: \[ \Pi = iCRT = i \left( \frac{n}{N} \right)RT \]

\[ \Pi_{final} = \frac{\left( \pi_1 V_1 \right) + \left( \pi_2 V_2 \right)}{V_1 + V_2} \]

\[ \Pi_{final} = \frac{(0.1 \times 1) + (0.2 \times 2)}{3} \]

\[ = \frac{(0.1 + 0.4)}{3} = \frac{0.5}{3} = \frac{500}{3} \times 10^{-3} \text{ atm} \]

So \( X = 166.66 \) or \( 166.67 \)

19. If temperature changed from 27°C to 42°C then no. of molecule having energy greater than threshold energy become five times, then find activation energy (Ea) of reaction (in kJ)

\[ \text{[Given } \ln 5 = 1.60 \text{ & } R = 8.314 \frac{\text{J}}{\text{Mole K}} \text{]} \]
Ans: 88.80

Sol: \( k = A e^{\frac{E_a}{RT}} \)

\[
\ln \left( \frac{K_2}{K_1} \right) = \frac{E_a}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)
\]

\[
\ln(5) = \frac{E_a}{8.314} \left( \frac{1}{300} - \frac{1}{315} \right)
\]

\[
1.6094 = \frac{E_a}{8.314} \left( \frac{15}{300 \times 315} \right)
\]

\( E_a = 84.30 \text{ kJ} \)

20. In 100 mL, 0.1 N \( \text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O} \) solution. Mass of solute is 1.43 gram, then value of \( X \) is:

Ans: 10.00

Sol: Equivalent of solute = 0.1 \times 0.1

Mole of solute (\( \text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O} \)) = \([0.1 \times 0.1] \frac{1}{2}\)

Mass of \( \text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O} = [0.1 \times 0.1] \frac{1}{2} \times [106 + 18x] = 1.43\)

\( \Rightarrow 106 + 18x = 286 \)

\( x = 10 \)

21. For the following redox reactions

(i) \( 2\text{Fe}^{2+} + \text{H}_2\text{O}_2 + 2\text{H}^+ \longrightarrow x\text{A} + y\text{B} \)

(ii) \( 2\text{MnO}_4^- + 6\text{H}^+ + 5\text{H}_2\text{O}_2 \longrightarrow x'\text{A} + y'\text{B} + z'\text{C} \)

Find the sum of coefficient \((x + y + x' + y' + z')\)

Ans: 19.00

Sol: (i) \( 2\text{Fe}^{2+} + \text{H}_2\text{O}_2 + 2\text{H}^+ \longrightarrow 2\text{Fe}^{3+} + 2\text{H}_2\text{O} \)
(ii) $2\text{MnO}_4^- + 5\text{H}_2\text{O}_2 + 6\text{H}^+ \rightarrow 2\text{Mn}^{2+} + 5\text{O}_2 + 8\text{H}_2\text{O}$

So sum of $(x + y + x' + y' + z') = 2 + 2 + 2 + 5 + 8 = 19$

22. How many chiral centres are present in Threonine.

Ans: 2

Sol:

Threonine have two chiral carbon atom.