JEE (Main) 2020

COMPUTER BASED TEST (CBT)
Memory Based Questions & Solutions

Date: 02 September, 2020 (SHIFT-2)  |  TIME : (03.00 p.m. to 06.00 p.m)

Duration: 3 Hours  |  Max. Marks: 300

SUBJECT : CHEMISTRY
**PART : CHEMISTRY**

Single Choice Type (एकल विकल्प प्रकार)

This section contains 20 Single choice questions. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which Only One is correct.

इस भाग में 20 एकल विकल्प प्रश्न हैं। प्रत्येक प्रश्न के 4 विकल्प (1), (2), (3) तथा (4) हैं, जिनमें से एक केवल सही है।

1. If given compound having molecular formula \( \text{C}_7\text{H}_8\text{O} \) react with \( \text{HI} \) and produce two compounds A and B. A will give yellow ppt with \( \text{AgNO}_3 \) and B show positive iodoform test after tautomerisation. Identify the structure of given compound.

   ![Chemical Structures](image)

   **Ans.** (1)

   **Sol.**

2. The structure shown above when react with \( \text{HNO}_3 \) in \( \text{H}_2\text{SO}_4 \) give product is

   ![Chemical Structures](image)

   **Product is** (1)
3. (I) \[ \text{Br} + \text{aq. NaOH} \rightarrow \text{OH} + \text{NaBr} \]

Rate = \[ k \frac{[\text{Br}]}{[\text{OH}]} \]

(II) \[ \text{Br} + \text{C}_2\text{H}_5\text{OH} + \text{OH}^- \rightarrow \text{Br}^- + \text{C}_2\text{H}_5\text{OH} \]

Rate = \[ \frac{[\text{Br}]}{[\text{OH}^-]} \]

Correct statement regarding these two reaction I and II.
(1) Rate of I reaction remain unchanged if concentration of OH⁻ increases.
(2) Rate of II reaction remain unchanged if concentration of OH⁻ increases.
(3) Rate of both reactions become double if concentration of OH⁻ become double.
(4) Rate of both reactions donot depend upon concentration of OH⁻.

Ans. (1)

Sol. First reaction is S_N_1 in which rate does not depend on conc. of nucleophile. Second reaction is E_2 reaction in which rate depends on conc. of base.

4. Find out order of acidic strength in following compound.

\[
\begin{align*}
\text{(a)HO} & \quad \text{NO}_2 \\
\text{(b)COOH} & \quad \text{C} = \text{CH(d)} \\
\end{align*}
\]

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

Ans. (2)

5. Product is:

\[
\begin{align*}
\text{Product is:} & \\
\text{(1) Br} & \\
\text{(2) Br} & \\
\text{(3) F} & \\
\text{(4) F} & \\
\end{align*}
\]

Ans. (3)

Sol.

6. Sucrose \[ \overset{\text{Hydrolysis}}{\longrightarrow} \text{A} + \text{B} \]

Which colour is obtained after above reaction?

(1) Red  
(2) Violet  
(3) Blue  
(4) Black

Ans. (1)
Sol.
Selliwanoff reagent $\rightarrow$ [Roscino reagent + Conc. HCl]
Use of Selliwanoff reagent is to distinguish aldoses and ketoses. Ketoses show red colour with Selliwanoff Reagent.

7. Two acyclic compounds A & B having same molecular formula C₅H₁₀O. A and B react with CH₃MgBr and give respectively C and D. C and D have following information.

<table>
<thead>
<tr>
<th>Iodoform Test</th>
<th>Lucas Test</th>
<th>Identify structure of C and D are respectively.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-$ve</td>
<td>$-$ve</td>
<td>(1) and (4)</td>
</tr>
<tr>
<td>$+$ve</td>
<td>$+$ve</td>
<td>(2) and (3)</td>
</tr>
</tbody>
</table>

Ans. (2)

Sol.

8. For the reaction

$$2A + B \rightarrow C$$

Following experimental data are collected:

<table>
<thead>
<tr>
<th>Exp. No.</th>
<th>A Mole Lit</th>
<th>B Mole Lit</th>
<th>Rate [mole/Lit sec]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>$6 \times 10^{-3}$</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td>0.1</td>
<td>$1.2 \times 10^{-2}$</td>
</tr>
<tr>
<td>3</td>
<td>0.1</td>
<td>0.2</td>
<td>$2.4 \times 10^{-2}$</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td>0.2</td>
<td>$7.2 \times 10^{-2}$</td>
</tr>
<tr>
<td>5</td>
<td>0.3</td>
<td>Y</td>
<td>$2.88 \times 10^{-3}$</td>
</tr>
</tbody>
</table>

Find X and Y

(1) 0.2, 0.3
(2) 0.3, 0.4
(3) 0.4, 0.3
(4) 0.3, 0.2
9. No of subshells having n = 4 & m = –2 are:
   (1) 2
   (2) 4
   (3) 6
   (4) 16
   Ans. (1)
   Sol. For n = 4 possible values of \( l = 0, 1, 2, 3 \) only \( l = 2 \) & \( l = 3 \) can have \( m = –2 \).
   So possible subshells are 2.

10. Which statement is correct when adsorption of gas take place on metal surface?
   (a) \( \Delta H \) becomes less negative with progress of reaction.
   (b) With progress of reaction the strength of residual forces increases.
   (c) \( \text{NH}_3 \) is adsorbed more than \( \text{N}_2 \).
   (d) Equilibrium concentration of adsorbate increases with increase in temperature.
   Ans. (1)
   Sol. (a) When gas is adsorbed on metal surface.
        \( \Delta H \) become less negative with progress of reaction.
        (c) Gas with greater value of critical temperature (\( T_c \)) absorb more. As \( T_c(\text{NH}_3) > T_c(\text{N}_2) \)
        So \( \text{NH}_3 \) absorb more than \( \text{N}_2 \).

11. Three element of 3\(^{\text{rd}}\) period \( x, y, z \) such that the oxide of \( x \) is acidic, \( y \) is amphoteric and \( z \) is basic, the order of atomic no. of these elements is:
   (1) \( x > y > z \)
   (2) \( y > x > z \)
   (3) \( z > x > y \)
   (4) \( x > z > y \)
   Ans. (1)
   Sol. On moving left to right in a period,
        Acidic character of oxides is increase.
        3\(^{\text{rd}}\) period element oxides.
        \[
        \begin{array}{cccc}
        \text{Na}_2\text{O} & \text{MgO} & \text{Al}_2\text{O}_3 & \text{SiO}_2 \\
        \text{Basic} & \text{Amphoteric} & \text{Acid} & \\
        \text{P}_2\text{O}_5 & \text{Cl}_2\text{O}_7 \\
        \end{array}
        \]
        (i) Acidic character ↑
        (ii) Atomic No ↑
        So \( z \) have minimum Atomic No
        & \( x \) have maximum Atomic No
        So correct order in \( x > y > z \)

12. Elements A and B do not form solid bicarbonate but reacts with \( \text{N}_2 \) to give nitrides. Which of the following can be A and B?
   (1) Li, Mg
   (2) Rb, Na
   (3) Ca, Cs
   (4) Ca, Na
   Ans. (1)
   Sol. Li and Mg do not form solid bicarbonate. But react with \( \text{N}_2 \) to give nitrides.
   \[
   \begin{align*}
   6\text{Li} + \text{N}_2 & \rightarrow 2\text{LiN} \\
   3\text{Mg} + \text{N}_2 & \rightarrow \text{Mg}_3\text{N}_2
   \end{align*}
   \]

13. The structure of SF\(_4\) is octahedral. What is the structure of SF\(_4\) [including the lone pairs if any]?
   (1) trigonal bipyramidal
   (2) pyramidal
   (3) square planar
   (4) trigonal planar
   Ans. (1)
   Sol. SF\(_4\) → Steric No = 5 so hybridisation is sp\(^3\)d.
14. Cast iron is used for the production of:
   (1) wrought iron, steel
   (2) wrought iron, pig iron, steel
   (3) pig iron, wrought iron
   (4) pig iron, steel
   Ans. (1)
   Sol. Cast iron is made from pig iron which is used for production of wrought iron & steel.

15. Which of the following cannot show isomerism?
   (1) [Ni(NH₃)₆Cl₂]
   (2) [Ni(en)₂]
   (3) [Pt(NH₃)₄Cl₂]
   (4) [Ni(NH₃)₄(H₂O)₂]
   Ans. (1)
   Sol. 
   $$\text{Ni}^{2+} \rightarrow 3d^84s^2 \rightarrow \text{sp}^3 \text{hybridization}.$$ 
   So [Ni(NH₃)₄Cl₂] do not show isomerism.
   (2) [Ni(en)₂], show optical isomerism.
   (3) [Pt(NH₃)₄Cl₂], show geometrical isomerism.
   (4) [Ni(NH₃)₄(H₂O)₂], show geometrical isomerism.

16. Structure of XeF₂⁺ and XeO₂F₂ respectively are:
   (1) Pentagonal planar, trigonal bipyramidal
   (2) Pentagonal planar, trigonal bipyramidal
   (3) Trigonal bipyramidal, pentagonal planar
   (4) Trigonal bipyramidal, trigonal bipyramidal
   Ans. (1)
   Sol. (i) XeF₂⁺
   St. No. = (5 + 2) = 7
   So hybridisation is = sp³d³
   and structure is pentagonal planar.
   (ii) XeO₂F₂
   St. No. = 6
   So hybridisation is = sp³d³
   and structure is trigonal bipyramidal.

---

**Resonance Eduventures Ltd.**

Reg. Office & Corp. Office: CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005
Ph. No.: +91-744-2777777, 2777700 | FAX No.: +91-022-39167222
To Know more: sms RESO@156677 | Website: www.resonance.ac.in | E-mail: contact@resonance.ac.in | DIN: U8030328/2007/CG/2046029
Toll Free: 1800 258 5555 | 7340019331 | info@resonance.ac.in | www.resonance.ac.in

---

17. Match the following, proportionally with distance according to their interaction energy.

<table>
<thead>
<tr>
<th>Species Interaction</th>
<th>Interaction Energy Proportionally</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Ion – Ion</td>
<td>(a) $\frac{1}{r}$</td>
</tr>
<tr>
<td>(ii) Dipole – dipole</td>
<td>(b) $\frac{1}{r^2}$</td>
</tr>
<tr>
<td>(iii) London dispersion</td>
<td>(c) $\frac{1}{r^3}$</td>
</tr>
<tr>
<td>(d)</td>
<td></td>
</tr>
</tbody>
</table>

Which of the following is correct match?

(1) (i) – (b); (ii) – (c); (iii) – (d) 
(2) (i) – (b); (ii) – (b); (iii) – (c) 
(3) (i) – (b); (ii) – (c); (iii) – (d) 
(4) (i) – (c); (ii) – (b); (iii) – (a) 

Ans. (1)

Sol. (i) Ion-ion interaction energy is inversely proportional to the distance between ions $\frac{1}{r}$.

(ii) dipole-dipole interaction energy is inversely proportional to the third power of $r$ $\frac{1}{r^3}$.

(iii) The interaction energy of London force is inversely proportional to sixth power of distance between two interaction particles $\frac{1}{r^6}$.

18. The absorption spectra of three samples A, B, C is given:

Absorption
19. If a mango shrinks when kept in concentrated salt solution, then which of the following process take place?

An. 3

Sol. When mango kept in concentrated salt solution then solvent (water) flow from mango to concentrate solution that’s why mango shrinks this is called “Osmosis”

20. Heat of combustion of ethanol to give CO₂ and water at constant pressure and 27°C is -327 kcal. How much heat is evolved in (cal) in combustion at constant volume at 27°C?

An. 326400

Sol. C₂H₅OH(l) + O₂(g) → 2CO₂(g) + 3H₂O(l); ΔHc = -327 Kcal

ΔHc = ΔUc + ΔnRT

= -327 x 10⁵ = ΔUc + 1 x 2 x 300
= -326400 cal

So heat evolved as constant volume is 326400 cal

21. For cell reaction

2Cu⁺ → Cu + Cu²⁺

Find ln k = __________ x 10⁻¹

Where k is equilibrium constant.

Given

(i) Cu⁺ + e → Cu \[ \text{E}^{\circ} = 0.52 \text{ V} \]
(ii) Cu²⁺ + e → Cu⁺ \[ \text{E}^{\circ} = 0.16 \text{ V} \]

\( \frac{RT}{F} = 0.025 \)

An. 144

Sol. \( E_{\text{red}} = E_{\text{Cu}⁺/\text{Cu}} - E_{\text{Cu²⁺/Cu⁺}} \)

= 0.52 - 0.16

= 0.36 V

\[ \frac{RT}{nF} \ln K_{eq} \]

0.36 = 0.025 x \ln k

In k = 14.4 x 10⁻¹

An. 144

22. In a saturated acyclic compound the mass ratio of C : H is 4 : 1 and C : O is 3 : 4. Find the no. of moles of CO₂ required to react with 2 moles compound to give CO₂ and water.

An. 0.00

Sol. Mass ratio of C : H = 4 : 1 → 12 : 3

C & O : 3 : 4 = 12 : 16

mass mole mole ratio

C 12 1 1
H 3 3 3
O 16 1 1

Empirical formula → CH₂O

as compound is saturated a cyclic so molecular formula is C₂H₃O₂

\[ \frac{C₂H₃O₂}{2} \rightarrow \text{2CO}_2(g) + 3\text{H}_2\text{O}(g) \]
23. A metal having work function $= 4.41 \times 10^{-19}$ J is subjected to a light having wavelength 300 nm, then maximum kinetic energy of the emitted. Photoelectron is $\ldots \ldots \ldots \ldots \times 10^{-21}$ J.

\[ \text{Ans.} \quad 222.00 \]

\[ E kE \]

\[ E = E_0 + (kE)_{\text{max}} \]

\[ \frac{hC}{\lambda} = 4.41 \times 10^{-19} + kE \]

\[ \frac{6.63 \times 10^{-34} \times 3 \times 108}{300 \times 10^{-9}} = 4.41 \times 10^{-19} + kE \]

\[ So, (kE)_{\text{max}} = 6.63 \times 10^{-19} - 4.41 \times 10^{-19} \]

\[ = 2.22 \times 10^{-19} \]

\[ = 222 \times 10^{-21} J \]

24. Let the oxidation state of the transition element of compound K₂Cr₂O₇, KMnO₄ and K₂FeO₂. be X, Y and Z respectively, calculate X + Y + Z.

\[ \text{Ans.} \quad 19.00 \]

\[ \text{Sol.} \]

<table>
<thead>
<tr>
<th>Compound</th>
<th>Oxidation state of transition element.</th>
</tr>
</thead>
<tbody>
<tr>
<td>K₂Cr₂O₇</td>
<td>X = +6</td>
</tr>
<tr>
<td>KMnO₄</td>
<td>Y = +7</td>
</tr>
<tr>
<td>K₂FeO₂</td>
<td>Z = +6</td>
</tr>
</tbody>
</table>

so \( X + Y + Z = 19 \)
Announcing Rank Booster Part-2
An Exhaustive Online Preparation Course of 3 Weeks for JEE (Advanced) 2020

Course Features
- New specially designed 18 Advanced Worksheets
- Online Live Discussion class (6 per week) each of 1.5 hours for Advanced worksheets
- Exclusive Unit wise Work Sheets covering tough & important concepts
- Revision DPPs for more practice on daily basis
- Medium of Teaching and Content would be only English
- Gyan Sutra booklet: Specially designed package for quick revision of P, C & M

Course Brief
The Rank Booster Part 2 course is recommended for students aiming a top rank in JEE (Advanced) 2020. The course structure is tailored to better the chances through rigorous practice of 18 Advanced Worksheets and their exhaustive conceptual discussion. Also, unit wise worksheets for self-practice to strengthen tough and important concepts.

Boosting Aspirations to Reality

Course Starts
07 Sept.
Course Duration
3 Weeks
Course Mode
Online
Course Fee
₹5000/-

Limited Seats

Resonance
Educating for a better tomorrow

Register on
www.resonance.ac.in
Toll Free: 1800 258 5555
7023003307, 7728990101 | 7340010333

© Resonance Edventures Limited | Toll-Free 1800-258-5555 | 07142 277777, 2777700 | contact@resonance.ac.in | CIN - U80509RX2007PLC024029