JEE (Main) 2019

COMPUTER BASED TEST (CBT)
Memory Based Questions & Solutions

Date: 09 April, 2019 (SHIFT-2) | TIME: 02.30 P.M. to 5.30 P.M.
Duration: 3 Hours | Max. Marks: 360
SUBJECT: CHEMISTRY

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Announces

VIVEK
1. Which of the following is Hinsberg reagent?

(1) C₆H₅SO₂CH₃  (2) C₆H₅SO₂Cl  (3) SnCl₂  (4) CoCl₂

**Ans. (2) SnCl₂**

**Sol.** Hinsberg reagent is benzene sulphonyl chloride (C₆H₅SO₂Cl) which is a strong base and reacts with alkyl halides (C₆H₅SO₂Cl) to form primary amine by Hinsberg reaction.

2. Which of the following is potential energy diagram for Sn1 reaction?

**Ans. (2)**

**Sol.** Sn1 is a two step reaction in which first step is rate determining step. Hence the peak of first step is higher than second step.
3. Reactivity order of S_N1 reaction for the following compounds is

\[ \begin{align*}
& (a) \quad \begin{array}{c}
\text{H} \quad \text{Cl} \\
\text{OCH}_3
\end{array} \\
& (b) \quad \begin{array}{c}
\text{CH}_3 \\
\text{Cl}
\end{array} \\
& (c) \quad \begin{array}{c}
\text{Cl}
\end{array} \\
& (d) \quad \begin{array}{c}
\text{CH}_2=\text{Cl}
\end{array}
\end{align*} \]

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

Ans. (4)

Sol. The S_N1 reactivity is proportional to stability of carbocations formed in the rate determining step. S_N1 अभिक्रिया की क्रियात्मकता पर पित्ता यौगिक यदि में क्रम स्थिति क्रमांक के आधार से सम्बंधित होता है |

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4. The atmosphere between the heights 10 to 50 kilometer above the sea level is:

(1) Troposphere  
(2) Stratosphere  
(3) Mesosphere  
(4) Ionosphere

Ans. (2)

Sol. Stratosphere lies between 10 to 50 km from sea level. स्ट्रॅटोफ़र्सी पृथ्वी की सतह से 10 कि.मीटर से 50 कि.मीटर तक स्थित है।

5. Noradrenaline is one of the example of:

(1) Anti-depressant  
(2) Anti-Histamine  
(3) Neurotransmitter  
(4) Antacid

Ans. (3)

Sol. Noradrenaline is one of the example of Neurotransmitter. नोर एड्रेनैलिन एनोर्मेडिन का एक उदाहरण है।

6. The product of following reaction

\[ \begin{align*}
& \text{HO} \\
& \text{Br} \\
& \text{CCl}_3
\end{align*} \]

(1) HO  
(2) HO  
(3) Br  
(4) Br

Ans. (2)

Sol. HO \\
\text{Br} \\
\text{CCl}_3
7. The product of following reaction is:

\[ \text{Product} \]

Ans. (1)

Sol. It is acid catalysed intermolecular esterification reaction.

8. Monomer of \([\text{NH}_3-\text{C}=\text{NH}_2]\) is:

(1) Methanamine
(2) N Methyl urea
(3) Formaldehyde
(4) Ammonia

Ans. (3)

Sol. It is urea formaldehyde polymer and its monomers are urea and formaldehyde.

9. Which can give both carbylamine test and ceric ammonium nitrate test?

(1) Asn-Gln
(2) Lys-Gln
(3) Asp-Lys
(4) Lys-Ser

Ans. (4)

Sol. In Lys-ser amine and alcoholic groups are present respectively hence it will show positive test with carbyl amine and ceric ammonium nitrate.

Lys-ser में, अमीन तथा एल्कोहॉलिक समूह उपस्थित है, अतः यह कार्बिल एमीन तथा चर्चित अम्लिक नाइट्रेट के साथ धांधामक परीक्षण देना चाहिए।
10. \[ \text{Product is chloroform.} \]

(1) \[ \text{Cl} \]

(2) \[ \text{OH} \]

(3) \[ \text{HO} \]

(4) \[ \text{CH}_2-\text{NH}_2 \]

Ans. (2)

Sol.

11. 0.1 M HCl is added to an unknown strength of NaOH solution. Identify the correct diagram:

(1) \[ \text{pH} \text{ vs. Volume added} \]

(2) \[ \text{Volume added} \text{ vs. pH} \]

(3) \[ \text{pH} \text{ vs. Volume added} \]

(4) \[ \text{Volume added} \text{ vs. pH} \]

0.1 M HCl को जड़ता समय के NaOH विलयन में मिलाकर जाता है। सही सिखावा छलते--

(1) \[ \text{परिवर्तन} \text{ गम्य आवश्यक} \]

(2) \[ \text{मिलाकर गम्य आवश्यक} \]

(3) \[ \text{परिवर्तन} \text{ गम्य आवश्यक} \]

(4) \[ \text{मिलाकर गम्य आवश्यक} \]

Ans. (2)

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14. Calculate depression in freezing point of 0.03 m solution of K₂SO₄ (assumed completely ionised) in a solvent with Kᵥ = 4 K kg mol⁻¹.

\[ Kᵥ = 4 \text{ K kg mol}^{-1} \]

Kₚ for 1 mol of K₂SO₄ is 1 mol K₂SO₄. The freezing point depression (ΔT) is calculated using the formula:

\[ ΔT = Kᵥ \times m \]

Where:
- ΔT is the freezing point depression
- Kᵥ is the molal freezing point depression constant (4 K kg mol⁻¹)
- m is the molality of the solution (0.03 m)

\[ ΔT = 4 \times 0.03 = 0.12 \text{ K} \]

15. Which of the following is amorphous form of silica?

(1) Quartz
(2) Kieselguhr
(3) Tridymite
(4) Cristobalite

Amorphous form: (2) Kieselguhr

16. \( \frac{20}{W} \text{ gm of } KI \) will have molality \( \frac{W}{m} \) (Given GMM = 166 gm)

\[ \frac{20}{W} \text{ of } KI \] will have \( \frac{W}{m} \) molar R.S.

\( \frac{20}{166} = 0.12 \) GMM = 166 gm

17. At a constant temperature Ne, Ar, Kr and Xe deviate from ideal behavior according to equation:

\[ P = \frac{RT}{V_m - b} \]

Where b is van der Waals' constant. The Z vs P graph would be steepest for which of the following:

- Ne
- Ar
- Kr
- Xe

From the graph, we can see that Xe has the highest deviation from ideality.

\[ \frac{RT}{m - b} \]

At constant T, slope of Z vs P graph = b

Xe has the maximum radii & hence maximum b & hence its graph will be steepest.
18. Which of the following statement is incorrect about the given energy profile diagram?

(1) C is thermodynamically most stable
(2) D is kinetically most stable
(3) Activation energy for making A + B from C is the maximum
(4) Enthalpy to form C is 5kJ less than that to form D.

19. Molecules from 10mL of 1mM surfactant solution are adsorbed on 0.24 cm² area forming unimolecular layer. Assuming surfactant molecules to be cube in shape, determine the edge length of the cube. 1mM surfactant concentration is 10mL hence, 0.24 cm² is adsorbed on 1mL of surfactant solution. This is an estimation of the area covered by one surfactant molecule. 

Total area covered by one particle = Number of particles 

\[ \text{Total area covered by one particle} = \frac{0.24 \times 10^{-3} \times 10^{19}}{10^{-10} \times 2\pi} \]

a = 2 x 10⁻⁵ cm = 2 pm

20. Which of the following statements is incorrect for 1s orbital of hydrogen atom?

(1) It is possible to find an electron at a distance 2a₀ (a₀ = Bohr radius)
(2) The magnitude of potential energy is twice of kinetic energy for a given orbit
(3) The total energy of an electron is maximum in its first orbit.
(4) The probability density of finding an electron is maximum at the nucleus

21. Which of the following is diamagnetic?

(1) O₂
(2) CO
(3) B₂
(4) NO

According to MOT, O₂, B₂ & NO are paramagnetic, only CO is diamagnetic.
22. Maximum oxidation state is shown by which pair of elements:

(1) Np, Pu
(2) Cl, Bk
(3) Np, Pr
(4) Ac, Th

Ans (1)

Sol. Np & Pu : + 3, + 4, + 5, + 6, + 7
Cl & Bk : + 3 & + 4, respectively
Np & Pr : + 3
Ac & Th : + 3 & + 4 respectively
Np & Pu : + 3, + 4, + 5, + 6, + 7
Cl & Bk : + 3, + 4
Np & Pr : + 3
Ac & Th : + 3

23. Which of the following is not a carbonate ore?

(1) Calamine
(2) Siderite
(3) Bauxite
(4) Malachite

Ans (3)

Sol. Calamine : ZnCO₃
Siderite : FeCO₃
Bauxite : Al₂O₃·(OH)₃·xH₂O (0 < x < 1)
Malachite : CuCO₃·Cu(OH)₂

24. Which of the following statements is/are correct?

I. B₂O₃ is an acidic oxide
II. Ga₂O₃ and Al₂O₃ are amphoteric oxides.
III. InS₂O₃ and TeO₂ are basic oxides.

(1) I, II, III
(2) I, II
(3) II, III
(4) I, III

Ans (1)

Sol. B₂O₃ is an acidic oxide
Al₂O₃ and Ga₂O₃ are amphoteric oxides.
InS₂O₃ and TeO₂ are basic oxides.
B₂O₃ अपील ऑक्साइड है
Al₂O₃ आपील ऑक्साइड है
InS₂O₃ और TeO₂ धारिय ऑक्साइड है

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25. The coordination number of the complex formed by this ligand with 3d transition metal and inner transition metal is respectively

(1) 6 and 6  
(2) 8 and 6  
(3) 6 and 8  
(4) 8 and 8

3d तंत्रण भाग तथा अंतरौरणांक भागु युक्त रिजेंद्र द्वारा रिविजित संबंध की समान्य संख्या क्रमशः है:

(1) 6 तथा 6  
(2) 8 तथा 6  
(3) 6 तथा 8  
(4) 8 तथा 8

Ans. (3)
Sol. Common CN of transition elements = 6
Common CN of inner transition elements = 8 to 12
अंतरौरणांक तत्वों की समान्य CN = 8 से 12

26. With reference to Valence Bond Theory in co-ordination compounds which of the following statements is/are, correct?

I. VBT does not explain the colour exhibited by co-ordination compounds.  
II. VBT explains and gives quantitative interpretation of magnetic data.  
III. VBT does not distinguish between weak field ligand and strong field ligand.  
IV. VBT explains the electronic spectrum of complexes.

I. VBT does not explain the colour exhibited by co-ordination compounds.  
II. VBT explains and gives quantitative interpretation of magnetic data.  
III. VBT does not distinguish between weak field ligand and strong field ligand.  
IV. VBT explains the electronic spectrum of complexes.

Ans. (4)
Sol. VBT does not explain the colour exhibited by co-ordination compounds.  
VBT does not explains and gives quantitative interpretation of magnetic data.  
VBT does not distinguish between weak field ligand and strong field ligand.  
VBT explains the electronic spectrum of complexes.

27. Assertion: Iron is extracted from Haematite ore
Reason: Haematite is carbonate ore

(1) Assertion and Reason both are correct and Reason is correct explanation to Assertion
(2) Assertion and Reason both are correct but Reason is not correct explanation to Assertion
(3) Assertion is incorrect but Reason is correct
(4) Assertion is incorrect but Reason is correct

Ans. (4)
Sol. Haematite ओक्सिडेंट: Fe₂O₃

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28. Why does HF has the maximum boiling point amongst all hydrogen halides?

(1) Due to hydrogen bonding  
(2) Due to Vander Waals's forces  
(3) Due to minimum molecular mass  
(4) None of these

क्यों सभी हाइड्रोजन हाइड्राइड में HF अधिकतम क्षमता रखता है?

(1) हाइड्रोजन बैंड के कारण  
(2) वांडर वॉल्स से झरने के कारण  
(3) मिनिमम अवक्षम प्रकार के कारण  
(4) कोई से नहीं?

Ans. (1)
Sol. Due to Hydrogen bonding HF has high boiling point amongst Hydrogen halides. 
हाइड्रोजन बैंड के कारण HF सभी हाइड्रोजन हाइड्राइड में उच्च क्षमता रखता है।
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