



# COMPUTER BASED TEST (CBT) Memory Based Questions & Solutions

Date: 28 July, 2022 (SHIFT-2) | TIME : (3.00 p.m. to 6.00 p.m)

Duration: 3 Hours | Max. Marks: 300

### SUBJECT: CHEMISTRY

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### PART : CHEMISTRY

 Identify total number of state variables from the following Heat, Volume, Enthalpy, Internal energy

Ans. (3)

Sol. Sate variable ⇒ Volume, Enthalpy, Internal energy, Path function ⇒ Heat Correct order of increasing metallic character of following element is Na. Mg. Be. Si. P.

(1) P < Si < Be < Mg < Na

- (2) P < Si < Na < Be < Mg
- (3) Na < Mg < Be < Si < P
- (4) Be < Mg < Na < Si < P

Ans. (1)

- Sol. On moving top to bottom metallic character increases and on moving left to right metallic character
- 3. 0.2 M, 2 L H<sub>2</sub>SO<sub>4</sub> is mixed with 0.1 M 2 L NaCl, then molarity of Na<sub>2</sub>SO<sub>4</sub> is \_\_\_\_\_ × 10<sup>-3</sup>.

Ans.

Sol. H<sub>2</sub>SO<sub>4</sub> + 2NaCl → Na<sub>2</sub>SO<sub>4</sub>

0.4 0.2 Mole LR is NaCl

0.3 0 0.1

Molarity of Na<sub>2</sub>SO<sub>4</sub> =  $\frac{0.1}{4}$  = 0.025

4. Assertion: Metal ion from their compound easily reduce in molten state than in solid state

Reason: AG become more negative due to increase in entropy.

- (1) Assertion is true, Reason is true and Reason is correct explanation of Assertion
- (2) Assertion is true, Reason is true and Reason is not correct explanation of Assertion.
- (3) Assertion is true and Reason is false
- (4) Assertion is false and Reason is true

Ans. (1)

 $\Delta G = \Delta H - T \Delta S$ Sol.

So on melting entropy is increases and  $\Delta G$  become more negative so metal ion get easily reduced.

When liquid A and liquid B are mixed from an ideal solution in which mole fraction of A in vapour phase is 0.5 while in liquid phase is 0.2. If total vapour pressure is 0.8 atm, then vapour pressure of pure A is

Ans. (2)

 $P_A = P_A^0 \times X_A = (P_{Total})Y_A$ Sol.

 $(P_A^0) 0.2 = 0.8 \times 0.5$ 

 $P_A^o = 2$  atm

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Statement-I: An alloy of Li & Mg is used in aircraft construction.

Statement-II: Magnesium plays important roles in neuromuscular function, interneuronal transmission, cell membrane integrity and blood coagulation.

- (1) Both Statement I and Statement II are correct
- (2) Statement I is correct but Statement II is incorrect
- (3) Statement I is incorrect but Statement II is correct.
- (4) Both Statement I and Statement II are incorrect

Ans.

Statement-I: An alloy of AI & Mg is used in aircraft construction. Sol.

Statement-II: Calcium plays important roles in neuromuscular function, interneuronal transmission, cell membrane integrity and blood coagulation.

2 mole of NO and 1 mole of O2 on reaction gives 0.8 mole of NO2 at equilibrium according to the reaction

$$2NO(g) + O_2(g) \longrightarrow 2NO_2(g)$$

At 600 K, if equilibrium pressure is 1 atm, then find Kc

(Given R = 0.0821 atmxlit) (Report your answer to nearest integer) molxK

Ans.

Sol.  $2NO(g) + O_2(g) \longrightarrow 2NO_2(g)$ 

> 2 mole 1 mole 0 t = 0

1.2 male 0.6 male 0.8

$$K_{P} = \frac{(P_{NO_{2}})^{2}}{(P_{NO})^{2}(P_{O_{2}})} = \frac{\left(\frac{0.8}{2.6} \times 1\right)^{2}}{\left(\frac{1.2}{2.6}\right)^{2} \left(\frac{0.6}{2.6}\right)} = \frac{(0.8)^{2} \times 2.6}{(1.2)^{2} \times 0.6} = \frac{1.664}{0.864} = 1.8824$$

$$K_P = K_C = (RT)^{\Delta_R} \Rightarrow 1.8824 = K_C (0.082 \times 600)^{-1}$$
  
 $K_C = 92.6$ 

Assertion : HCl is not used in permanganate titration.

Reason: Permanganate ion oxidise HCl to Cl2.

- (1) Assertion is true, Reason is true and Reason is correct explanation of Assertion
- (2) Assertion is true, Reason is true and Reason is not correct explanation of Assertion.
- (3) Assertion is true and Reason is false
- (4) Assertion is false and Reason is true

Ans. (1)

Sol.  $MnO_4^- + Cl^- \longrightarrow Mn^{2+} Cl_2(g)$ 

KMnO<sub>4</sub> oxidise HCl to Cl<sub>2</sub> that's why for acidic medium HCl is not used in permanganate titration.

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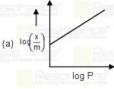
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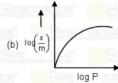
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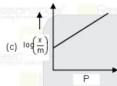
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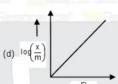
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9. How many of the following are not according to Fraundlisch adsorption isotherm.









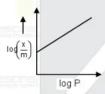
Ans. (3)

Sol. Fraundlich adsorption isotherm.

$$\frac{x}{m} = k(P)^n$$

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

graph between  $log(\frac{x}{m}) Vs log(P)$ 



10. For a 1st order reaction following graph is obtained.



Using this graph find activation energy in calories. (Given R = 2 Cal) (Report your answer to nearest integer)

(8) Ans.

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K = Ae<sup>Ea/RT</sup> Sol.

$$Ink = InA - \left(\frac{Ea}{R}\right)\frac{1}{T}$$

Slope of graph = 
$$-\left(\frac{E_a}{R}\right) = \left(\frac{0-20}{5-0}\right)$$

$$E_a = 4 \times 2 = 8$$
 cal

	List-l		List-II
	Complex		Hybridisation
(i)	[Ni(CO) <sub>4</sub> ]	(a)	dsp <sup>2</sup>
(ii)	[Ni(CN)4]2-	(b)	sp <sup>3</sup>
(iii)	[CoF <sub>6</sub> ] <sup>3</sup> -	(c)	d <sup>2</sup> sp <sup>3</sup>
(iv)	[Co(CN) <sub>6</sub> ] <sup>3</sup> -	(d)	sp <sup>3</sup> d <sup>2</sup>

	(i)	(ii)	(iii)	(iv)
(1)	b	а	d	С
(2)	а	b	С	d
(3)	а	b	d	С
(4)	b	а	C	d
143				

Ans. (1)

Sol.

	List-l		List-II
	Complex		Hybridisation
(i)	[Ni(CO)4]	(a)	sp <sup>3</sup>
(ii)	[Ni(CN) <sub>4</sub> ] <sup>2-</sup>	(b)	dsp <sup>2</sup>
(iii)	[CoF <sub>6</sub> ]3-	(c)	sp <sup>3</sup> d <sup>2</sup>
(iv)	[Co(CN)6]3-	(d)	d <sup>2</sup> sp <sup>3</sup>

14 gram of Nitrogen present in closed container at 300 K. Find how much energy is given to system so that rms velocity of nitrogen molecule become double.

(Assume nitrogen act as ideal gas) [R = 8.3 J/mol × K]

- (1) 9337.55 J
- (2) 3112.5 J
- (3) 12450 J
- (4) 6225 J

Ans. (1)

$$U_{ms} = \sqrt{\frac{3K!}{M}}$$

$$(O_{rms})_1$$
  $V_{11}$   
 $\Rightarrow$   $T_2 = 4T_1$   
 $T_2 = 1200 \text{ K}$ 

$$\Delta U = \left(\frac{F}{2}\right) nR\Delta T$$

$$= \frac{5}{2} \times \frac{1}{2} \times 8.3 \times 900$$
$$= 9337.5 \text{ J}$$

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- An element crystalize in FCC unit cell with edge length 4 × 10<sup>-8</sup> cm and have density 9.03 gram/cm<sup>3</sup>, then molar mass of element is: (Given: NA = 6.02 × 1023) (Report your answer to nearest integer)
- (87)Ans.
- $Z \times M$  $d = \frac{1}{N_A \times Volume}$ Sol
  - $4 \times M$ 9.03 = $6.02 \times 10^{23} \times (4 \times 10^{-8})^3$
  - $M = \frac{9.03 \times 6.02 \times 10^{23}}{4.000 \times 10^{23}} \times 64 \times 10^{-24}$ = 86.97 gram
- Which of the following are not isoelectronic species 14.
  - (1) Sm2+, Er4+
- (2) Yb2+, Lu3+

65Tb4+: [54Xe]4f7

- (3) Tm4+, Tb2+
- (4) Eu2+, Tb4+

- Ans. (1,4)
- 68Er4+: [54Xe]4f10 Sol. 62Sm2+: [54Xe]4f8 70Yb2+: [54Xe]4f14 71Lu3+: [54Xe]4f14 69Tm4+: [54Xe]4f11 65Tb2+: [54Xe]4f9
- 15. What products are formed in the reaction of white phosphorous with thionlychloride :
  - (1) PCl<sub>3</sub>, SO<sub>2</sub>, S<sub>2</sub>Cl<sub>2</sub>

63Eu<sup>2+</sup>: [54Xe]4f<sup>7</sup>

(2) PCI<sub>5</sub>, SO<sub>2</sub>, S<sub>2</sub>CI<sub>2</sub>

(3) PCl<sub>3</sub>, SO<sub>2</sub>

(4) PCl<sub>3</sub>, SO<sub>2</sub>, Cl<sub>2</sub>

- Ans. (1)
- $P_4(white) + 8SOCl_2 \longrightarrow 4PCl_3 + 4SO_2 + 2S_2Cl_2$ Sol.
- 16. When concentrate HNO3 react with I2 product obtained are :
  - (1) HIO<sub>3</sub>, NO<sub>2</sub>, H<sub>2</sub>O

(2) HIO<sub>4</sub>, NO<sub>2</sub>, H<sub>2</sub>O

(3) HIO3, NO2, H2O

(4) HIO<sub>4</sub>, N<sub>2</sub>O, H<sub>2</sub>O

- Ans. (1)
- Sol.
- Assertion: Zero overlap is a type of out of phase overlap.

Reason: It is due to different orientation direction of approach

- (1) Assertion is true, Reason is true and Reason is correct explanation of Assertion
- (2) Assertion is true, Reason is true and Reason is not correct explanation of Assertion.
- (3) Assertion is true and Reason is false
- (4) Assertion is false and Reason is true
- Ans. (1)

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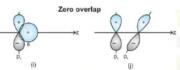
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Sol.



Zero overlap (out of phase due to different orientation direction of approach)

in removal of temporary hard using clark's method. Froduct obtained are (1) CaCO<sub>3</sub>, Mg(OH)<sub>2</sub> (2) CaCO<sub>3</sub>, MgCO<sub>3</sub> (3) Ca(OH)2, MgCO3 (4) Ca(OH)2, Mg(OH)2 Ans. (1) Sol. Clark's method Ca  $(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3 + 2H_2O$  $Mg (HCO_3)_2 + 2Ca(OH)_2 \rightarrow 2CaCO_3 + Mg(OH)_2 + 2H_2O$ H<sub>2</sub>O<sub>2</sub> can be oxidise by powerful oxidising agent HIO<sub>4</sub> and O<sub>2</sub> is obtained. 19. Find oxidation state of iodine in the product. Ans. -1 +7 +5  $H_2O_2 + H_1O_4 \longrightarrow H_1O_3 + O_2 + H_2O$ Sol. 20. Nitrogen is not react with oxygen in atmosphere due to : (1) Nitrogen is unreactive in atmospheric condition (2) Nitrogen oxide are unstable (3) The reaction highly endothermic (4) The reaction is highly exothermic Ans. Ans. (1)

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22. Conc. HI A Zn B

A and B are:

OH

(1) OH

(2) OH

Sol. OH

L2/NaHCO3 A, Major product is

(1) OH

(2) OH

(2) OH

(3) OH

(4) OH

(5) OH

(6) OH

(7) OH

(8) OH

(9) OH

(10) OH

(11) OH

(11) OH

(12) OH

(13) OH

(14) OH

(15) OH

(16) OH

(17) OH

(18) OH

(19) OH

(20) OH

(21) OH

(21) OH

(22) OH

(23) OH

(33) OH

(44) OH

(45) OH

(46) OH

(56) OH

(67) OH

(77) OH

(78) OH

(78) OH

(79) OH

(70) OH



Ans. (3)

- Statement-I: Aniline on nitration give ortho, meta, para derivative of aniline.
   Statement-II: Nitration of aniline is carried out in highly acidic solution.
  - (1) Statement-I is correct only.
  - (2) Statement-II is correct only
  - (3) Statement-I is correct and Statement-II is incorrect.
  - (4) Statement-I is incorrect and Statement-II is correct.

Ans. (3)

- 25. Statement I: Thin layer chromatography involves separation of substances based on adsorption. Statement II: Silica gel coated on glass plate in thin layer chromatography is used as an adsorbent.
  - (1) Statement-I is correct only.
  - (2) Statement-II is correct only.
  - (3) Statement-I and Statement-II both are correct.
  - (4) Statement-I is incorrect and Statement-II is correct.

Ans. (3)

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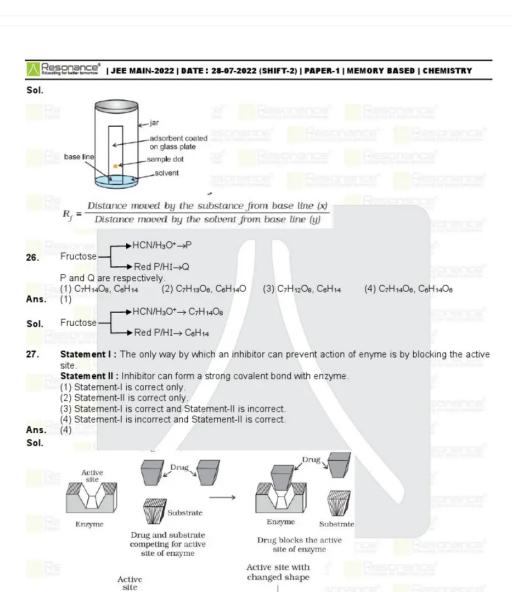
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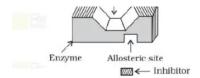
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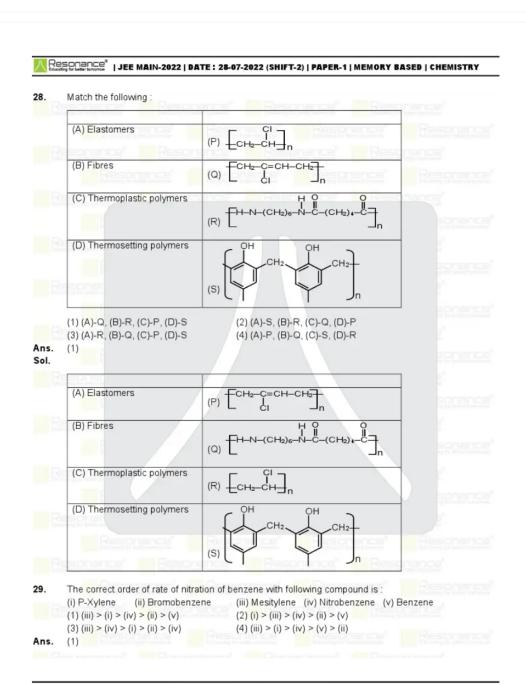
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