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JEE (Main)

PAPER-1 (B.E./B. TECH.)

2022

COMPUTER BASED TEST (CBT)

Memory Based Questions & Solutions

Date: 27 July, 2022 (SHIFT-2) | TIME : (3.00 a.m. to 6.00 p.m)

Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

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PART : CHEMISTRY

1. In neutral medium $KMnO_4$ oxidise thiosulphate to

(1) $S_2O_8^{2-}$ (2) $S_2O_7^{2-}$ (3) SO_3^{2-} (4) SO_4^{2-}

Ans. (4)

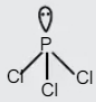
Sol. In neutral medium

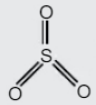
$$8KMnO_4 + 3S_2O_3^{2-} + H_2O \longrightarrow 8MnO_2 + 6SO_4^{2-} + 2OH^-$$

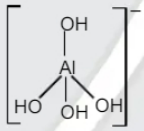
2. How many among the following are non planar

PCl_3, SO_3, $[Al(OH)_4]^-$, BF_3, NO_3^-, H_2O_2

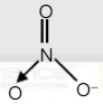
Ans. (3)

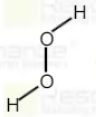
Sol. (i) PCl_3  Pyramidal, non planar

(ii) SO_3  Trigonal, Planar

(iii) $[Al(OH)_4]^-$  Tetrahedral, non planar

(iv) BF_3 Trigonal, planar

(v) NO_3^-  Trigonal, planar

(vi) H_2O_2  Open book, planar

3. The group I element A having highest hydration enthalpy has similar properties of group II element B, then element B is :

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

Ans. (1)

Sol. In group I Li has highest hydration enthalpy which has diagonal relationship with group II element Mg.

4. **Assertion :** Boron is unable to form $[BF_6]^{3-}$

Reason : Boron has small size.

(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. (2)

Sol. Boron do not form $[BF_6]^{3-}$. Since Boron does not have vacant d orbitals it can not expand octet.

5. Correct order of ionisation energy of following element with outermost electronic configuration

(a) $3s^2$ (b) $3s^2\,3p^3$ (3) $3s^23p^1$ (4) $3s^23p^4$

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

Ans. (1)

Sol. Correct order of IE is $s^1 < p^1 < s^2 < p^4 < p^3 < p^5$

6. In how many of the following ores Iron is present.

Haematite, Siderite, Cassiterite, Kaolinite, Sphalerite

Haematite, Siderite, Cassiterite, Kaolinite, Sphalerite

Ans. (2)

Sol.

Ore	Formula
Haematite	Fe_2O_3
Siderite	$FeCO_3$
Cassiterite	SnO_2
Kaolinite	$Al_2(OH)_4Si_2O_5$
Sphalerite	ZnS

7. **Assertion :** Dissolved substance of colloidal solution can be separated by using parchment paper.
Reason : Particles of true solution can not pass through parchment paper while particles of colloidal solution pas through parchment paper.

(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. (3)

Sol. Colloidal solution particles can be separated using parchment paper.
True solution can pass through parchment paper while colloidal particle can not pass.

8. Metal in complex have low oxidation state when ligands are :

(1) Good π accepter. (2) Good σ donor.

(3) Poor σ donor. (4) Poor π donor.

Ans. (1)

Sol. When metal has low oxidation state, it has more electron density in d orbital. So it has more tendency to back donate electrons. Thus compound must have good π acceptor ligand.

9. Ferric solution on reaction with potassium Ferrocyanide give Prussian blue colour due to formation of which complex

(1) $Fe_4[Fe(CN)_6]_3$ (2) $Fe[Fe(CN)_6]$

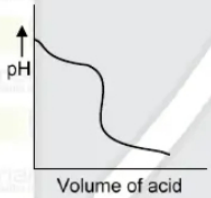
(3) $[Fe(OH)_2(NH_3)_2]$ (4) $[Fe(NH_3)_6][Fe(CN)_6]$

Ans. (1)

Sol. $4\ Fe^{3+} + 3\ [Fe(CN)_6]^{4-} \longrightarrow Fe_4[Fe(CN)_6]_3 \downarrow$ (Prussian Blue)

10. Identify correct titration graph for titration of NH_4OH with HCl.

(1)



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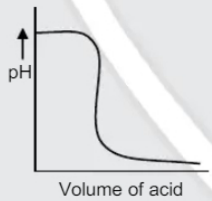

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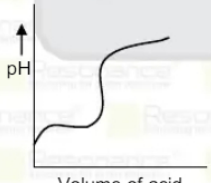

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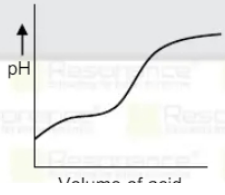


Ans. (1)

11. For a real gas value of compressibility factor is 2 at 25°C and 99 atm pressure, then value of vanderwaal constant b is.....$\times 10^{-2}$ (Lit/mole) [R = 0.083 L atm mole^{-1}K^{-1}] [Assuming pressure to be very high]

Ans. (25)

Sol. Vander waal equation for 1 mole

$$\left(P + \frac{a}{V_m^2}\right)(V_m - b) = RT$$

V_m = volume of 1 mole of gas

At high pressure (moderate temp.)

V_m will be low

so b can't be neglected in comparision to V_m

but $\frac{a}{V_m^2}$ can be neglected as compared to much higher values of P.

Then vander Waals' equation will be

$P(V_m - b) = RT$

$PV_m - Pb = RT$

$$\frac{PV_m}{RT} = \frac{Pb}{RT} + 1$$

$$Z = \frac{Pb}{RT} + 1$$

$$2 = 1 + \frac{99 \times b}{0.083 \times 298}$$

$$b = \frac{0.083 \times 298}{99} = 0.25 = 25 \times 10^{-2} \text{ Lit/mole}$$

12. Arrange following according to decreasing order of energy

(a) $n = 3, l = 0, m = 0, s = -\frac{1}{2}$

(b) $n = 3, l = 1, m = -1, s = +\frac{1}{2}$

(c) $n = 3, l = 2, m = +2, s = +\frac{1}{2}$

(d) $n = 4, l = 0, m = 0, s = +\frac{1}{2}$

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

Ans. (1)

Sol. Energy depends on (n + l) so correct order $\Rightarrow$ 3d > 4s > 3p > 3s

13. In 100 gram water a solute is added & vapour pressure of solution is half of the pure solvent. The vapour pressure of pure water is 23.76 mm of Hg then find the number of mole of solute added.
[Report your answer to nearest integer]

Ans. (6)

Sol. RLVP $\Rightarrow \frac{P^o - P_S}{P_S} = \frac{n_{solute}}{n_{solvent}}$

$$\Rightarrow \frac{\left(P^o - \frac{P^o}{2}\right)}{\left(\frac{P^o}{2}\right)} = \left[\frac{n_{solute}}{100}\right]18$$

$$n_{solute} = \left(\frac{100}{18}\right) = 5.55$$

14. 100 ml, 0.1 M H_2SO_4 is mixed in 50 ml, 0.1 M NaOH solution, the normality of resulting solution is……..$\times 10^{-1}$ N

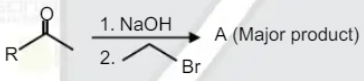
Ans. (1)

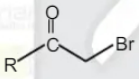
Sol.

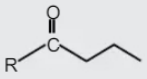
	H_2SO_4	+ 2NaOH	$\longrightarrow Na_2SO_4 + 2H_2O$
milimole	10	5	
milimole	7.5	0	

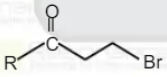
Molarity of $H_2SO_4 = \frac{7.5}{150}$

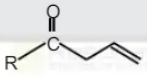
Normality of solution = $\left[\frac{7.5}{150}\right]2 = 1 \times 10^{-1}$ N

15. 

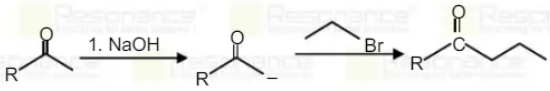
(1) 

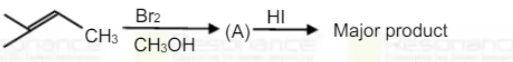
(2) 

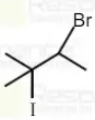
(3) 

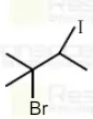
(4) 

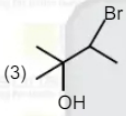
Ans. (2)

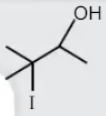
Sol. 

16. 

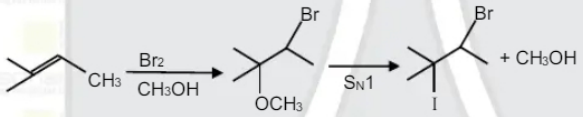
(1) 

(2) 

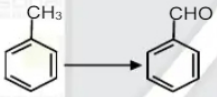
(3) 

(4) 

Ans. (1)

Sol. 

17. 5 gram of toluene is converted to benzaldehyde. the efficiency of this process is 92%. The wt of benzaldehyde produced in $x \times 10^{-2}$ gram. x is



Ans. (530)

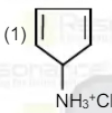
Sol. Mole of toluene = $\frac{5}{92}$ mole

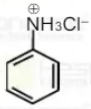
Mole of benzaldehyde = $\frac{5}{92} \times \frac{92}{100}$

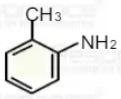
Weight of benzaldehyde = $\frac{5}{92} \times \frac{92}{100} \times 106 = 530 \times 10^{-2}$ gram.

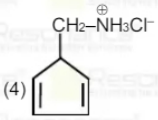
x = 530

18. An organic compound (A) if dissolved in water turn blue litmus red. The molecular mass of the compound is 131 ± 2. If compound is reacted with nitrous acid followed by phenol in alkaline medium gives orange coloured solution. Compound "A" is

(1) 

(2) 

(3) 

(4) 

Ans. (2)

Sol. Anilinium chloride is acidic in solution and turns blue litmus red. With Nitrous acid, it forms benzendiazonium chloride. Which react with phenol in alkaline medium gives orange coloured solution.

19. Which causes more lathers.

(1) Sodium rosinate (2) Sodium stearate

(3) Sodium carbonate (4) Trisodium phosphate

Ans. (1)

Sol. Sodium rosinate produced more lather.

20. **Statement-I :** Fly ash and slag released by still industry are used to in cement industry.

Statement-II : Plastic waste are lead free.

(1) Statement-I is correct only.

(2) Statement-II is correct only.

(3) Both statement-I & II are correct.

(4) Statement-I is incorrect and Statement-II is correct.

Ans. (3)

Sol. Plastic waste are called green fuel.

21. Match the following

Column-I	**Column-II**
(A) Neoprene	(i) Tetra fluoroethene
(B) Teflon	(ii) Acrylonitrile
(C) Acrilan	(iii) Isoprene
(D) Natural rubber	(iv) Chloroprene

(1) (A)-(iv), (B)-(i), (C)-(ii), (D)-(iii) (2) (A)-(iv), (B)-(ii), (C)-(iii), (D)-(i)

(3) (A)-(i), (B)-(i), (C)-(iii), (D)-(iv) (4) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)

Ans. (1)

22. Match the following

Column-I (substance)	**Column-II Method (Purification)**
(A) Acetone + $CHCl_3$	(i) Sublimation
(B) Napthalene + NaCl	(ii) Distillation
(C) Water + Aniline	(iii) Crystallisation
(D) Napthalene + Benzoic acid	(iv) Steam distillation

(1) (A)-(iii), (B)-(i), (C)-(ii), (D)-(iv) (2) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

(3) (A)-(ii), (B)-(i), (C)-(iv), (D)-(i) (4) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)

Ans. (4)

23. Match the following

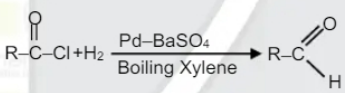
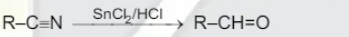
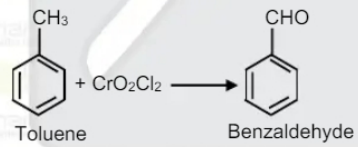
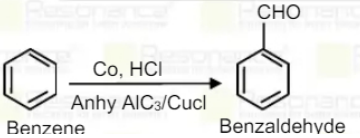
Column-I (Reactant)	**Column-II (Product)**
(A) Glucose + HI	(i) Saccharic acid
(B) Glucose + HNO_3	(ii) n-Hexane
(C) Glucose + Bromine water	(iii) Gluconic acid
(D) Glucose + Acetic Anhydride	(iv) Glucose pentaacetate

(1) (A)-(ii), (B)-(i), (C)-(iii), (D)-(iv) (2) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)

(3) (A)-(iii), (B)-(i), (C)-(ii), (D)-(iv) (4) (A)-(iv), (B)-(iii), (C)-(i), (D)-(ii)

Ans. (1)

24. Match the following

Column-I	**Column-II**
(A) 	(i) Etard reaction
(B) 	(ii) Gattermann-Koch reaction
(C) 	(iii) Rosenmund reaction
(D) 	(iv) Stephens reaction

(1) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i) (2) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)
(3) (A)-(iii), (B)-(iv), (C)-(i), (D)-(ii) (4) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)

Ans. (3)

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