



JEE (Main)

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

2021

COMPUTER BASED TEST (CBT) Memory Based Questions & Solutions

Date: 25 July, 2021 (SHIFT-1) | TIME : (9.00 a.m. to 12.00 p.m)

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SUBJECT: CHEMISTRY

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**RESULT: JEE (Advanced),
JEE (Main), NEET**

HIGHEST No. of Classroom Selections
in JEE (Advanced) 2020 from any Institute of Kota

5 AIRs in TOP-50 in JEE (Adv.) 2020 from Classroom



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AIR-2 (GEN-EWS)	Zonal Topper IIT-Kharagpur	2nd Rank in IIT-Kharagpur Zone		
AIR-15	AIR-25	AIR-29	AIR-30	AIR-41
DHANANJAY KEJRIWAL	SAMARTH AGARWAL	SANKALP PARASHAR	AARYAN K. GUPTA	UTKARSH P. SINGH
With us Since Class 9 th	With us Since Class 11 th	With us Since Class 11 th	With us Since Class 9 th	With us Since Class 10 th

Total Selections in JEE (Advanced) 2020	Eligible for JEE (Advanced) Through -JEE (Main) 2020	NEET 2020
4505	14755	2646
Classroom: 3441 Distance: 1064	Classroom: 11047 Distance: 3708	Classroom: 1833 Distance: 813

ADMISSION OPEN for Session 2021-22

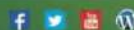
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CLASS 11, 12 & 12+

Target: JEE (Main+Adv.) | JEE (Main) | NEET

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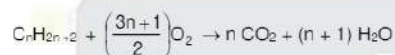
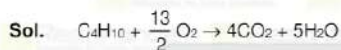
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PART : CHEMISTRY

1. In the combustion of butane 72gm of H₂O is produced. The amount of butane taken initially is [X] × 10⁻¹.

The value of 'X' is

Ans. 464



∴ 1 mole C₄H₁₀ produces 5 mole H₂O.

5 mole (5 × 18) = 90 gm.

90 gm → 58 gm

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2. $A+B \rightleftharpoons 2C$.

Initially 1 mole each of A, B and C are taken in 1 litre vessel. Equilibrium constant is 100. The concentration of C at equilibrium in [X] × 10⁻¹. The value of 'X' is

Ans. (25)

Sol. $A + B \rightleftharpoons 2C$ $K_C = 100$

$$t = 0 \quad 1 \quad 1 \quad 1$$

$$t = t_{eq} \quad 1-x \quad 1-x \quad 1+2x$$

$$K_c = \frac{(1+2x)^2}{(1-x)^2}$$

$$100 = \frac{(1+2x)^2}{(1-x)^2} \text{ of } [C]$$

$$10 \quad (1+2x)$$

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$$x = \frac{3}{4}$$

$$\text{concentration of } [C] = 1 + 2 \left(\frac{3}{4} \right) = 2.5 \times 10^{-1}$$

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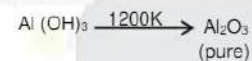
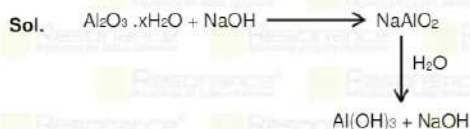
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3. In the leaching of Bauxite, which Oxide is leached out using NaOH.

- (1) Fe₂O₃ (2) Al₂O₃ (3) TiO₂ (4) SiO₂

Ans. (2)



4. Among the given oxides

- (i) CrO₃ (ii) V₂O₅ (iii) Fe₂O₃ (iv) MnO₂

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- (1) (i) < (ii) < (iii) < (iv) (2) (ii) < (iii) < (i) < (iv) (3) (ii) < (iv) < (i) < (iii) (4) (iii) < (iv) < (ii) < (i)

Ans. (4)

Sol.

	Compound	Oxidation state of metal
(i)	CrO ₃	+6
(ii)	V ₂ O ₅	+5
(iii)	Fe ₂ O ₃	+3
(iv)	MnO ₂	+4

5. Find the concentration of Fe²⁺ (10 ml) required to reduce 15 ml of 0.1M K₂Cr₂O₇ Solution is:

Ans. 0.9



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$$n_1V_1 = n_2V_2$$

$$15 \times 0.1 \times 6 = 10 \times M \times 1$$

$$M = 0.9 \text{ Molar}$$

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6. Arrange the following ions in the increasing order of size, Na^+ , K^+ , Mg^{+2} , Al^{+3} .

(1) $\text{Al}^{+3} < \text{Mg}^{+2} < \text{Na}^+ < \text{K}^+$ (2) $\text{K}^+ < \text{Na}^+ < \text{Al}^{+3} < \text{Mg}^{+2}$

(3) $\text{Al}^{+3} < \text{Mg}^{+2} < \text{K}^+ < \text{Na}^+$ (4) $\text{Mg}^{+2} < \text{Al}^{+3} < \text{K}^+ < \text{Na}^+$

Ans. (1)

Sol. $\text{K}^+ > \text{Na}^+$ {moving down the group size increases}

$\text{Na}^+ > \text{Mg}^{+2} > \text{Al}^{+3}$ {Iseolectronic species}

Z 11 12 13

E 10 10 10

7. Henry's law constant for CO_2 in water in $0.835 \times 2 \times 10^3$ bar. How many millimoles of CO_2 would dissolve

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Ans. 25

Sol. $P_{\text{CO}_2} = K_H X_{\text{CO}_2}$

$$X_{\text{CO}_2} = \frac{P_{\text{CO}_2}}{K_H} = \frac{0.835}{0.835 \times 2 \times 10^3}$$

$$X_{\text{CO}_2} = 0.5 \times 10^{-3}$$

$$\text{Number of moles of water} = \frac{900}{18} = 50$$

$$\frac{n_{\text{CO}_2}}{n_{\text{CO}_2} + n_{\text{H}_2\text{O}}} = 0.5 \times 10^{-3}$$

(n_{CO_2} in denominator is neglected as it is $\ll 50$)

$$n_{\text{CO}_2} = 0.5 \times 10^{-3} \times 50 = 25 \times 10^{-3} \text{ moles} \\ = 25 \text{ millimoles}$$

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Ans. (2)

Sol. The main reasons are :

(i) six large chloride ions cannot be accommodated around Si^{+4} due to limitation of its size.

(ii) interaction between lone pair of chloride ion and Si^{+4} is not very strong.

The species like, SiF_6^{2-} , $[\text{GeCl}_6]^{2-}$, $[\text{Sn}(\text{OH})_6]^{2-}$ exist where the hybridisation of the central atom is sp^3d^2 .

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9. Which of the following complex is active in magnetic field.

- (1) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ (2) $[\text{Co}(\text{CN})_6]^{3-}$ (3) $[\text{Ni}(\text{Co})_4]$ (4) $[\text{Ni}(\text{CN})_4]^{2-}$

Ans. (1)

Sol. $\text{Fe}^{3+}; 3d^5$

It will contain 5 unpaired electrons.

Thus it is paramagnetic and attracted in external magnetic field.

10. Empirical formula of a given octahedral complex is $\text{CrCl}_3 \cdot 3\text{NH}_3 \cdot 3\text{H}_2\text{O}$. It precipitates 3 moles of AgCl . What is the secondary valency of central atom.

Ans. (4)

Sol. $[\text{Cr}(\text{NH}_3)_3(\text{H}_2\text{O})_3]\text{Cl}_3 + 3\text{AgNO}_3 \rightarrow 3\text{AgCl} \downarrow$
White ppt.

11. For a process $\Delta H_{\text{fusion}} = 2.4 \text{ K.Cal mol}^{-1}$ and $\Delta H_{\text{vaporisation}} = 98.6 \text{ K.Cal mol}^{-1}$. Then $\Delta H_{\text{sublimation}}$ (in Kcal mol^{-1}) :

Ans. 101 K.Cal mol^{-1}

Sol. $\Delta H_{\text{sublimation}} = \Delta H_{\text{vap}} + \Delta H_{\text{fusion}}$
 $= 98.6 + 2.4$
 $= 101 \text{ K.Cal mol}^{-1}$

12. Which of the following statement is correct :

- (1) H-H bond strength is equal to D-D bond strength.
(2) H-H bond strength is half of D-D bond strength.
(3) H-H bond strength is double the D-D bond.
(4) H-H bond strength is less than D-D bond strength

Sol. H-H bond dissociation energy 435 KJ/mol

D-D bond dissociation energy 450 KJ/mol

13. Which of the following about micelle formation is correct for sodium stearate $[\text{C}_{17}\text{H}_{35}\text{COO}^- \text{Na}^+]$

- (1) Micelles formed are spherical with hydrocarbon part towards the centre of sphere
(2) Micelles formed are spherical with hydrocarbon part lying outside
(3) Micelles formed are Non spherical with hydrocarbon part towards the centre of sphere
(4) Micelles formed are Non-spherical with hydrocarbon part lying outside

Ans. (1)

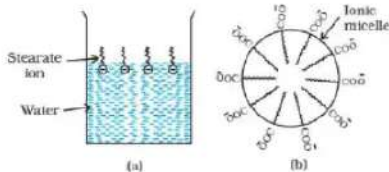
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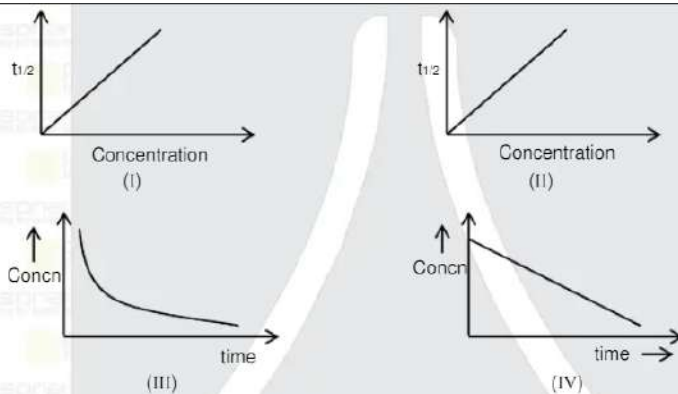
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Sol.





- (1) I, III – First order ; II, IV – Zero order
 (2) I, IV – zero order ; II, III – First order

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Ans. (2)

Sol. $A_t = (A_0) - Kt$: Zero Order

$$t_{1/2} = \frac{A_0}{2K}$$

$A = A_0 e^{-Kt}$; First order

$$t_{1/2} = \frac{\ln 2}{K}$$

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15. Which of the following protein is soluble in water?

- (1) Albumin (2) Fibrin (3) myosin (4) Collagen

Ans. (1)

Sol. It is globular protein (water soluble)

16. Which of the following is not used for drying agent?

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Ans. (1)

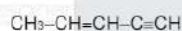
17. CH_3MgBr react which of the following to give methane gas?

- (1) H_2S (2) H_2O (3) NH_3 (4) All of these

Ans. (4)

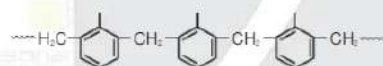
Sol. Grignard reagent act as strong base.

18. Number of σ bonds

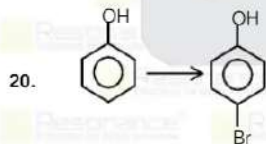


Ans. (10)

19. Given structure is



Sol. Novolac is linear polymer.



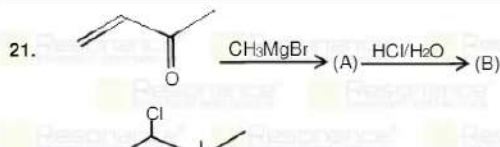
- (i) $\text{Br}_2/\text{H}_2\text{O}$ (ii) $\text{Br}_2/\text{FeBr}_3$ (iii) Br_2/CS_2 (iv) $\text{Br}_2/\text{CHCl}_3$

- (1) (i) & (ii) (2) (ii) & (iii) (3) (iii) & (iv) (4) (i) & (iv)

Ans. (3)

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Ans. (2)

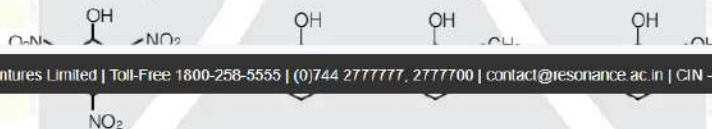
22. **Assertion:** Primary aromatic amine can't be prepared by Gabriel-phthalimide method.

Reason: Aryl halide cannot undergo nucleophilic substitution reaction.

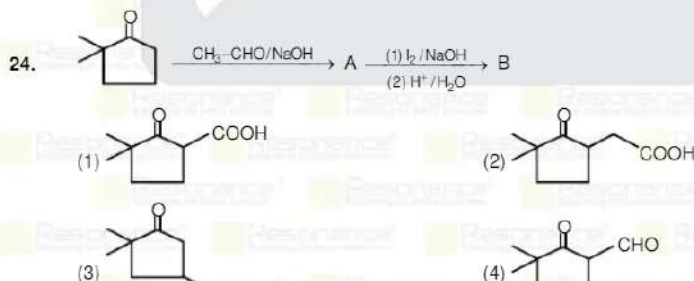
- (1) Assertion-1 is True, Reason-2 is True; Reason-2 is a correct explanation for Assertion-1.
 (2) Assertion-1 is True, Reason-2 is True; Reason-2 is NOT a correct explanation for Assertion-1.
 (3) Assertion-1 is True, Reason-2 is False.
 (4) Assertion-1 is False, Reason-2 is True.

Ans. (1)

23. Which of the following react with NaHCO_3 and evolved CO_2 gas.



Ans. (1)



- (1)  (2) 
 (3)  (4) 

Ans. (1)

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