



JEE (MAIN) 2024

MEMORY BASED QUESTIONS & SOLUTIONS

SHIFT-1

DATE & DAY: 31st January 2024 & Wednesday

PAPER-1

Duration: 3 Hrs.

Time: 09:00 - 12:00 IST

SUBJECT: CHEMISTRY

ADMISSIONS OPEN FOR CLASS 12+

ACADEMIC SESSION 2024-25



TARGET: JEE (ADV.) 2024

For Class XII Passed Student

VISHESH COURSE

MODE: OFFLINE/ONLINE



CLASS STARTS
08th APRIL, 2024



TARGET: JEE (MAIN) 2024

For Class XII Passed Student

ABHYAAS COURSE

MODE: OFFLINE/ONLINE



CLASS STARTS
08th APRIL, 2024

SCHOLARSHIP ON THE BASIS OF JEE (MAIN) 2024 %ILE/AIR

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COURSE COMMENCEMENT: 5th FEBRUARY 2024

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COURSE Concept

Percentile Booster Course (PBC) is for those students who want to boost their percentile in JEE-Main 2024 through a systematic complete course revision & practice plan.

In this course, daily chapter wise tests, Full Syllabus Test, JEE Preparatory Test will be conducted and each test will be followed by proper offline/online discussion class.

COURSE FEE

Offline: ₹4999 | Online: ₹2499

COURSE FEATURES

- Complete Course Coverage
- Chapter wise Test
- Regular Practice through Daily Online Practice Test
- Joint Preparatory Test
- Full Syllabus Test
- Back up support of recorded lectures
- Approx 2500 practice Que.
- Regular Test discussion classes for concept clearance

JEE (Main) 2024 April Attempt में

अधिकतम %ile प्राप्त करने के लिए आज ही Join करें।

SCAN TO
APPLY



*T & C Apply

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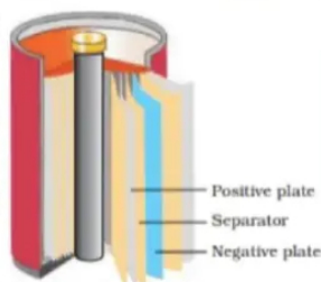


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PART : CHEMISTRY

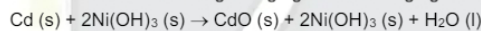
1. Which of the following metals used in battery industry?
(I) Fe (II) Mn (III) Ni (IV) Cd (V) Cr
(1) (I) and (II) (2) (II) and (IV) (3) (I) and (IV) (4) (III) and (IV)

Ans. (4)
Sol.

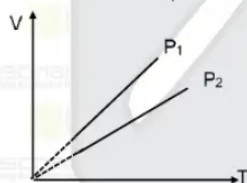


A rechargeable nickel-cadmium cell in a jelly roll arrangement and separated by a layer soaked in moist sodium or potassium hydroxide.

Another important secondary cell is the nickel-cadmium cell which has longer life than the lead storage cell but more expensive to manufacture. We shall not go into details of working of the cell and the electrode reactions during charging and discharging. The overall reaction during discharge is:



2. Select the correct option for isobaric process :



- (1) $P_1 = P_2$ (2) $P_1 > P_2$ (3) $P_2 > P_1$ (4) $P_2 \geq P_1$

Ans. (3)

Sol. $PV_{(\text{fixed})} = nRT$

$$P \propto T$$

\therefore order of pressure : $P_2 > P_1$

3. Among the following solution showing positive deviation :

- (1) Acetone + CHCl_3 (2) Acetone + CS_2
 (3) HNO_3 + H_2O (4) HCOOH + H_2O

Ans. (2)

Sol. Remaining shows negative deviation.

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4. **Statement-I** : Noble gases have very high boiling point.

Statement-II : Noble gases molecules have strong dispersion forces.

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

Ans. (4)

5. Among the following white precipitate is :

- (1) PbI_2 (2) $(\text{NH}_4)_2\text{S}$ (3) $(\text{NH}_4)_3\text{AsO}_4 \cdot 12\text{MoO}_3$ (4) PbSO_4

Ans. (4)

Sol. (1) $\text{PbI}_2 \rightarrow$ yellow ppt

(2) $(\text{NH}_4)_2\text{S} \rightarrow$ soluble

(3) $(\text{NH}_4)_3\text{AsO}_4 \cdot 12\text{MoO}_3 \rightarrow$ yellow ppt

6. What is the correct order of electron gain enthalpy of following?

- (1) $\text{S} > \text{Ar} > \text{F} > \text{Br}$ (2) $\text{F} > \text{Br} > \text{S} > \text{Ar}$ (3) $\text{Ar} > \text{S} > \text{Br} > \text{F}$ (4) $\text{Ar} > \text{F} > \text{Br} > \text{S}$

Ans. (3)

Sol. We have to take with sign, if magnitude wise electron gain enthalpy is not asked

Element **Electron gain enthalpy (KJ/mol)**

F - 333

S - 200

Br - 325

Ar + 96

7. $\text{Fe}_{(\text{aq})}^{3+} + \text{SCN}_{(\text{aq})}^- \rightleftharpoons \text{Fe(SCN)}_{(\text{aq})}^{2+}$

Value of K_c is :

- (1) $\frac{[\text{Fe(SCN)}^{2+}]}{[\text{Fe}^{3+}][\text{SCN}^-]}$ (2) $\frac{[\text{Fe}^{3+}][\text{SCN}^-]}{[\text{Fe(SCN)}^{2+}]}$ (3) $\frac{[\text{Fe}^{3+}][\text{SCN}^-]}{[\text{Fe(SCN)}^{2+}]}$ (4) $\frac{[\text{SCN}^-]}{[\text{Fe}^{3+}][\text{Fe(SCN)}^{2+}]}$

Ans. (1)

Sol. $K_c = \frac{[\text{Fe(SCN)}^{2+}]}{[\text{Fe}^{3+}][\text{SCN}^-]}$

8. Two combining atomic orbitals :

- (A) Must have same energy
 (B) Must have same symmetry about the molecular axis
 (C) Must overlap to less extent

(D) Must have unsymmetry about the molecular axis.

(1) C & D (2) A & B (3) B & C (4) A & D

Ans. (2)





Sol. (A) The combining atomic orbitals must have the same or nearly the same energy.
(B) The combining atomic orbitals must have the same symmetry about the molecular axis.
(C) The combining atomic orbitals must overlap to the maximum extent.

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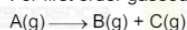
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9. For first order gaseous reaction



Initial pressure is P_i and total pressure after time t is P_t . Then the rate constant of reaction is _____.

(1) $\frac{2.303}{t} \log \frac{P_i}{(2P_i - P_t)}$ (2) $\frac{2.303}{t} \log \frac{P_i}{(P_i - P_t)}$

(3) $\frac{2.303}{t} \log \frac{2P_i}{(P_i - P_t)}$ (4) None of these

Ans. (1)

Sol. $A(g) \longrightarrow B(g) + C(g)$

$$t = 0 \quad P_i \quad 0 \quad 0$$

$$t = t \quad P_i - x \quad x \quad x$$

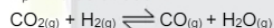
$$t = \infty \quad 0 \quad P_i \quad P_i$$

$$K = \frac{2.303}{t} \log \frac{P_\infty - P_t}{P_\infty - P_i} = 2.303 \log \frac{2P_i - P_t}{2P_i - P_i}$$

$$K = \frac{2.303}{t} \log \frac{P_i}{2P_i - P_t}$$

10. Calculate the Gibbs free energy (ΔG°) in KJ for the reaction given below if

$K_p = 70.95$ at 300 K



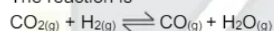
$\log 70.95 = 1.8509$

(1) -10.632 KJ (2) -12.653 KJ (3) -15.982 KJ (4) None of these

Ans. (1)

Sol. Given $K_p = 70.95$ at 300K

The reaction is



We know the relation

$$\Delta G^\circ = -2.303 RT \log K_p$$

$$\Delta G^\circ = -2.303 \times 8.314 \times 300 \log (70.95)$$

$$= -10632.4 \text{ J}$$

$$= -10.632 \text{ KJ}$$

11. Electrolytic conductance does not depend on

(1) Nature of electrolyte (2) Nature of electrode
(3) Nature of solvent added (4) Concentration of electrolyte

Ans. (2)

Sol. As per NCERT.

The conductance of electricity by ions present in the solutions is called electrolytic or ionic conductance.

The conductivity of electrolytic (ionic) solutions depends on:

(i) the nature of the electrolyte added

(ii) size of the ions produced and their solvation

(iii) the nature of the solvent and its viscosity

(iv) concentration of the electrolyte





(v) temperature (it increases with the increase of temperature).

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PAGE # 3

12. **Statement-I** : CFT can explain the strength of anionic ligands.

Statement-II : VBT does not explain the colour exhibited by coordination compounds.

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

Ans. (1)

Sol. Theory based.

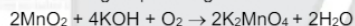
13. **Assertion**: K_2MnO_4 changes into $KMnO_4$ in neutral or acidic solution

Reason: K_2MnO_4 undergoes disproportionation in neutral or acidic medium.

- (1) Both A and R are true and R is the correct explanation of A.
 (2) Both A and R are true but R is NOT the correct explanation of A.
 (3) A is true but R is false.
 (4) A is false but R is true.

Ans. (1)

Sol. Potassium permanganate is prepared by fusion of MnO_2 with an alkali metal hydroxide and an oxidising agent like KNO_3 . This produces the dark green K_2MnO_4 which disproportionates in a neutral or acidic solution to give permanganate.

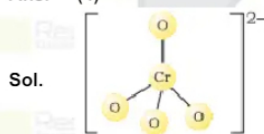


14. **Statement-I** : The structure of CrO_4^{2-} ion is square planar

Statement-II : Chromate ion changes to dichromate ion in acidic medium.

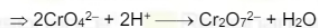
- (1) Both statements are correct.
 (2) Both statements are incorrect.
 (3) Statement I is correct and statement II is incorrect.
 (4) Statement I is incorrect and statement II is correct.

Ans. (4)



Chromate ion

Tetrahedral



15. (I) Shape of $[Ni(CN)_4]^{2-}$ is square planar

(II) VBT cannot explain ligand field strength

(III) For cis- $[Pt(en)_2Cl_2]^{2+}$ isomerism is not exhibited

(IV) $[NiCl_4]^{2-}$ is square planar

select correct statements

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

Ans. (1)

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PAGE # 4

Sol. (I) dsp^2 , sq. planar

(II) True

(III) It is optically active (d- & l-forms)

(IV) sp^3 , tetrahedral

16. Match the column:

	Column-I		Column-II
(A)	Glucose + red P/HI	(1)	No reaction

(B)	Glucose + HNO ₃	(2)	Gluconic acid
(C)	Glucose + NaHCO ₃	(3)	Saccharic acid
(D)	Glucose + Br ₂ /H ₂ O	(4)	n-Hexane

(1) A - 1, B - 2, C - 3, D - 4

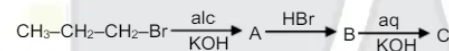
(2) A - 3, B - 1, C - 4, D - 2

(3) A - 2, B - 3, C - 4, D - 1

(4) A - 4, B - 3, C - 1, D - 2

Ans. (4)

17. Find out the final product (C)



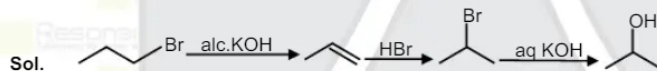
(1) Propane

(2) Propan-1-ol

(3) Propan-2-ol

(4) Propene

Ans. (3)



18. Adsorption method is used in

(1) Chromatography

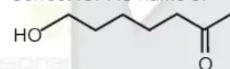
(2) Extraction

(3) Distillation

(4) Sublimation

Ans. (1)

19. Correct IUPAC name of



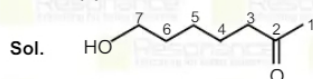
(1) 7-Hydroxyheptan-2-one

(2) 6-Hydroxyheptan-2-one

(3) 2-Oxoheptan-7-ol

(4) Hydrogen-6-oxoheptane

Ans. (1)



7-Hydroxyheptan-2-one

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20. Statement-I : pK_a of phenol = 10 and pK_a of ethyl alcohol = 15.6

Statement-II : Ethyl alcohol is more acidic than phenol.

(1) Both Statement-I & Statement-II are correct.

(2) Both Statement-I & Statement-II are incorrect.

(3) Statement-I is correct whereas Statement-II is incorrect.

(4) Both Statement-I and Statement-II are incorrect.

Ans. (3)

Sol. (3) Statement-I is correct whereas Statement-II is incorrect.

21. The sextet carbon species eligible as electrophile is

(1) Carbocation

(2) Carbanion

(3) Pentavalent carbon

(4) Free radical carbon

Ans. (1)

Sol. Carbocation is every charge electrophile with six electron in valence shell.

22. Statement-I : Alcohol act as both nucleophile and electrophile.

Statement-II : Alcohol reacts with active metals like Na, K to product H₂ gas.

(1) Both Statement-I & Statement-II are correct.

(2) Both Statement-I & Statement-II are incorrect.

(3) Statement-I is incorrect whereas Statement-II is correct.

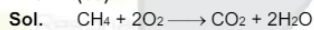
(4) Both Statement-I and Statement-II are incorrect.

Ans. (3)

Sol. (3) Statement-I is incorrect whereas Statement-II is correct.

23. In the reaction of combustion of CH₄, it gives 22g of CO₂. Find the moles of CH₄ in terms of x × 10⁻² mol.

Ans. (50)



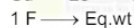
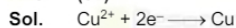
$$\text{mol} = \frac{22\text{g}}{44} = \frac{1}{2} \text{ mol}$$

$$\frac{n_{\text{CH}_4}}{1} = \frac{n_{\text{CO}_2}}{1} \text{ no of moles of CH}_4 = \frac{1}{2}$$

$$n_{\text{CH}_4} = \frac{1}{2} \Rightarrow \frac{1}{2} \times 100 \times 10^{-2}$$
$$50 \times 10^{-2}$$

24. If one faraday of electricity is used in the discharging of Cu^{2+} . Then find the mass in (g) of Cu deposited (Nearest integer) (Cu = 63.5)

Ans. (32)



$n\text{-factor} = 2$

$$E_w = \frac{M}{2}$$

$$E_w = \frac{63.5}{2} \approx 32\text{g}$$

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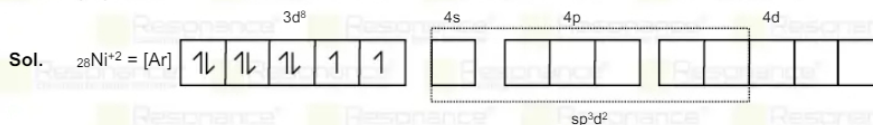
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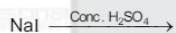
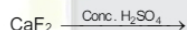
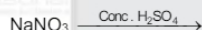
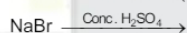
25. For $[\text{Ni}(\text{NH}_3)_6]^{+2}$ spin only magnetic moment is $x \times 10^{-1}$ BM. Value of x is _____. (Nearest integer)

Ans. (28)

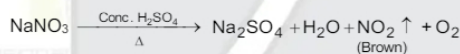
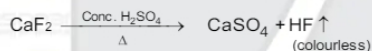
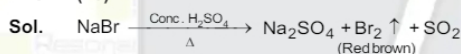


$$n = 2, \sqrt{2(2+2)} = \sqrt{8} \text{ BM} = 2.8 \text{ BM} = 28 \times 10^{-1} \text{ BM}$$

26. What is molar mass (in g/mol) of salt, which will not produce coloured gas in the following



Ans. (78)

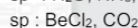
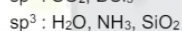
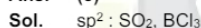


$\text{CaF}_2 = 78 \text{ g/mol}$

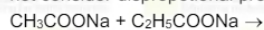
27. How many of the following have sp^3 hybridisation ?



Ans. (3)



28. The total number of different alkanes formed when the following mixture is subjected to electrolysis (does not consider disproportionation product).



Ans. (3)



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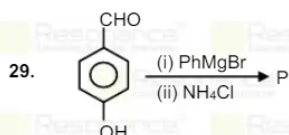
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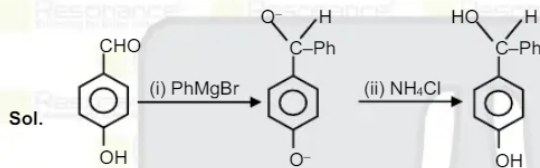
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Find the number of OH group in (P)

Ans. (2)



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