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+2 CHEMISTRY ☺ EM Answer Key ⇒ பொ. இரசாயனம் ☺

S.No.	SET (A)	(B)
1.	a) Diethyl ether	b) First order
2.	b) First Order	a) Diethyl ether
3.	b) $C_6H_5-NH-NH-C_6H_5$	a) (ii) and (iii)
4.	d) Pentagonal bipyramidal	d) 1-iii, 2-i, 3-iv, 4-ii
5.	d) CH_3COCH_3	d) Pentagonal bipyramidal
6.	c) C_4-C_2	a) 4.90 BM
7.	c) $W-P\Delta V$	d) Strong reducing agents
8.	a) $-OH$	c) Dynamic
9.	a) (ii) and (iii)	c) C_4-C_2
10.	d) 1-iii, 2-i, 3-iv, 4-ii	c) $ohm^{-1}\ m^{-1}$
11.	d) Strong reducing agents	c) $W-P\Delta V$
12.	a) Ionic	a) $-OH$
13.	c) Dynamic	a) Ionic
14.	a) 4.90 BM	b) $C_6H_5NHNHC_6H_5$
15.	c) $Ohm^{-1}\ m^{-1}$	d) CH_3COCH_3

2 Marks :-

16. Ionisation Energy $\propto$ Nuclear charge

The higher the nuclear charge of protons in the nucleus, the higher is the ionisation energy. Because of the higher nuclear charge, the e^-s bound with more force and hence higher energy will be required for their removal.

17. Oxidation State of Actinides :-

+2, +3, +4, +5, +6.

Common oxidation state : +4

Maximum oxidation State : +6

18. Mechanism of photosynthesis in Plants : A small quantity of radioactive CO_2 containing radioactive oxygen O^{17} is mixed with ordinary CO_2 and the process is carried out. It has been found that oxygen gas evolved along with sugar formation is non radioactive. Therefore O_2 produced comes from H_2O and not from CO_2 is proved. The correct mechanism is as follows:

$$6\,CO_2^* + 6\,H_2O \longrightarrow C_6H_{12}O_6^* + 6\,O_2\uparrow$$

Role : Study of reaction mechanism.

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19. Vitreous State:-

Vitreous state or a glassy state is a condition in which certain substances can exist lying between the solid and liquid state.

20. Glucose $\xrightarrow{Conc.HI}$ $CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$ n-hexane

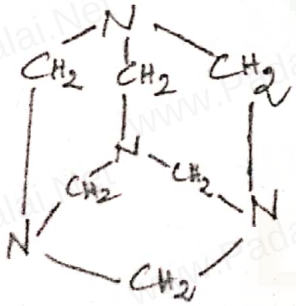
21.

Emulsion	Examples (Emulsifying agents)
O/W	Proteins, gums, natural and synthetic soaps.
W/O	Heavy metal salts of fatty acids, long chain alcohols, lamp black

22. * Glycerose - a mixture of glyceraldehyde and dihydroxy acetone. ($\begin{matrix}CHO\\ CHOH\\ CH_2OH\end{matrix}$ + $\begin{matrix}CH_2OH\\ CO\\ CH_2OH\end{matrix}$)

* Milder oxiding agents like Br_2/H_2O (or) Fenton's reagent $[FeSO_4+H_2O_2]$ (or) Sodium hypobromite oxidises glycerol to glycerose.

23. Urotropine:



Use: Urinary antiseptic

24. — Compulsory:-

(II) is faster. Higher the value of E_a, slower is the rate of the rex.

3 Marks:-

25.
$$EN \text{ of } F = \frac{(IP)_F + (EA)_F}{2 \times 2.8} = \frac{17.4+3.62}{5.6}$$

EN of F = 3.75

26.

Lanthanides	Actinides (Any 3)
1. Binding energy of 4f↑	Binding energy of 5f↓
2. Maximum oxidation state +4	Maximum oxidation state +6
3. 4f e⁻s greater shielding	5f e⁻s poor shielding effect.
4. Most of their ions are colourless	ions are coloured
5. Paramagnetic easily explained	Paramagnetic very difficult to interpret
6. They donot form complexes	They form complexes
7. non radioactive except Pm	All of them are radioactive
8. Their cpds less basic	Their compounds more basic
9. They donot form oxocations	They form oxocations.

27. $_{90}Th^{232} \longrightarrow {}_{82}Pb^{208} + x\,{}_2\alpha^4 + y\,{}_{-1}\beta^0$

$232 = 208 + 4x + 0$

$4x = 24$

$\boxed{x = 6}$

$90 = 82 + 2x + (-y)$

$90 = 82 + 2(6) - y$

$-y = 90 - 94$

$\boxed{y = 4}$

$$_{90}Th^{232} \longrightarrow {}_{82}Pb^{208} + 6\,{}_2He^4 + 4\,{}_{-1}e^0$$

28. Reaction quotient: (Q)

The rex quotient is defined as the ratio of the product of initial concentrations of products to the product of initial concentrations of reactants under non equilibrium condition.

$$aA + bB \rightleftharpoons lL + mM$$

$$Q = \frac{[L]^l [M]^m}{[A]^a [B]^b}$$

$Q > K_c \rightarrow$ Backward reaction

$Q < K_c \rightarrow$ Forward reaction.

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29. Characteristics of dyes:

(i) It should have a suitable colour.

(ii) It should be fast to light

(iii) It should be able to fix itself (or) be capable of being fixed to the fabric.

(iv) It should be resistant to the action of H_2O, dilute acids and alkalies (all detergents and washing soaps are alkaline in nature).

30. Standard emf of a cell :-

When the emf of a cell is determined under standard conditions, it is called the Standard emf. It is defined as the emf of a cell with 1M Solutions of reactants and Products in solution measured at 25°c. It is represented by the symbol E°.

31. Racemic Mixture :-

When equal amounts of d-isomer and l-isomer are mixed, recemic mixture is obtained. Ex: Meso Tartaric acid

32. fructose

No of Chiral Carbon atoms } 3

No of optical isomers } $2^n = 2^3 = 8$

compulsory ✓

33. $\log \frac{K_1}{K_2} = \frac{E_a}{2.303R}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$

$\log \frac{K_1}{K_2} = \frac{100000\ J/mol}{2.303 \times 8.314}\left[\frac{1}{308} - \frac{1}{298}\right]$

$\log \frac{K_1}{K_2} = -0.5745$

$\frac{K_1}{K_2} = \text{antilog}(-0.5745)$

$\frac{K_1}{K_2} = 0.2664$; $K_2 = \frac{K_1}{0.2664} = 3.75 K_1$ times

$\therefore K_2$, the rate constant at 35°c will be 3.75 times the rate Constant at 25°c.

5 Marks :-

34. a) (i) (A) CO_2 : $4+2\times6 = \frac{16}{8} = SP$

(B) NO_2^- = $5+2\times6+1 = \frac{18}{8} = 2+\frac{2}{2} = 3 = sp^2$

(c) ClO_2^- = $7+2\times6+1 = \frac{20}{8} = 2+\frac{4}{2} = 4 = sp^3$

(D) XeF_2 = $8+2\times7 = \frac{22}{8} = 2+\frac{6}{2} = 5 = sp^3d$

(ii) Heisenberg's uncertainty Principle:-

It is impossible to measure simultaneously both the position velocity of a microscopic particle with absolute accuracy (or) certainty.

$$\Delta x \cdot \Delta P \geq \frac{h}{4\pi}$$

(OR)

b) (i) Inert Pair effect :-

In p-block, as we move down the group in the Periodic table, the 2 e⁻s in the ns orbital becomes inert and they are less available for bonding.

(ii) Uses of silicones :- (any 3)

* Silicones act as excellent insulators for electric motors.
* Straight chain polymers of Silicones are called silicone fluids. They are used in

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Water Proofing textiles, as lubricants and as Polish.
* silicone rubber retain their elasticity and resist Chemical attack
* Cross linked polymer of silicones are used as non stick coating for pans and in Paints and Varnish.
* silicone Oils are used for high temperature oil bath, high Vacuum pump. etc.

35. a) (i) $[Ti^{3+}(H_2O)_6]^{3+}$

$Ti^{3+} - 3d^1 \rightarrow$ d-d transition possible by the absorption of energy from the visible light and Produce Purple Colour.

$[Sc^{3+}(H_2O)_6]^{3+}$ $Sc^{3+} \rightarrow 3d^0$

d-d transition not possible and it is colourless.

(ii) Chrome plating :-

Cathode : the articles to be plated
Anode : Plate of lead
Electrolyte : Chromic acid + H_2SO_4 (H_2CrO_4)

During electrolysis, chromium deposits on the article (cathode). Generally the articles are 1st plated with nicked and then Subjected to Chrome plating.

b) Werner's theory :-

1. Every metal atom has 2 types of Valency.

Primary (or) ionisable Valency
Secondary (or) non ionisable Valency

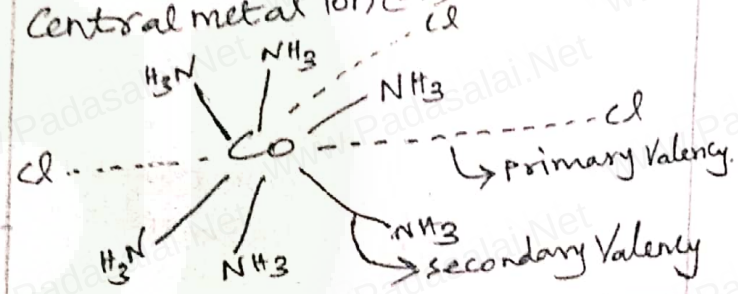
(ii) Primary Valency corresponds to the oxidation state of the metal ion. (always satisfied by -ve ions).

(iii) secondary Valency corresponds to the coordination number of the metal atom (or) ion. (satisfied by either -ve ions or neutral molecules.

(iv) The molecules (or) ions that satisfy secondary Valencies are called ligands.

(v) secondary Valency → definite directions in space
Primary Valency → non-directional in nature

(vii) The ligands have unshared Pair of e⁻s. These unshared Pair of e⁻s are denoted to Central metal ion (or) atom.



36. a) (i) Molecular Crystals :-

The lattice points in molecular crystals consist of molecules which do not carry any charge. The forces binding the molecules together are 2 types. (i) Dipole-dipole interaction, Vanderwaal's force. Dipole-dipole → Ice
Vanderwaal's force → molecular solids.

(ii) Characteristics of ionic Compounds :-

* The heats of vapourisation is high
* The vapour pressure at ordinary temperature are very low
* The mp & bp are very high.

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* Ionic crystals are hard and brittle.
* Ionic crystals are insulators in solid state.
* Ionic crystals are soluble in H_2O and also in other polar solvents.
* Ionic solids are good conductors when dissolved in H_2O.

b) Derivation of K_p & K_c :-

$aA + bB + cC + \cdots \rightleftharpoons lL + mM + nN + \cdots$

$$K_c = \frac{[L]^l [M]^m [N]^n \cdots}{[A]^a [B]^b [C]^c \cdots}$$

$$K_p = \frac{P_L^l P_M^m P_N^n \cdots}{P_A^a P_B^b P_C^c \cdots}$$

$C_i = \frac{P_i}{RT}$, $P_i = \frac{n_i}{V} RT$ $\therefore C_i = \frac{n_i}{V}$

$$K_c = \frac{(P_L/RT)^l (P_M/RT)^m (P_N/RT)^n \cdots}{(P_A/RT)^a (P_B/RT)^b (P_C/RT)^c \cdots}$$

$$K_c = \frac{P_L^l P_M^m P_N^n \cdots}{P_A^a P_B^b P_C^c \cdots} \left(\frac{1}{RT}\right)^{(l+m+n\cdots)-(a+b+c\cdots)}$$

$$K_c = \frac{K_p}{(RT)^{\Delta ng}} ; \quad K_p = K_c (RT)^{\Delta ng}$$

$\Delta ng = 0$; $K_p = K_c$
$\Delta ng = +ve$, $K_p > K_c$
$\Delta ng = -ve$; $K_p < K_c$.

37. a) (i)

	dispersed phase	dispersion medium
Paint	Solid	Liquid
Froaths of air	Gas	Liquid

(ii) Catalytic poison:-
The activity of Catalyst can be destroyed by the Substance is called Catalytic Poison.

$$SO_2 + O_2 \xrightleftharpoons[As_2O_3]{Pt} 2SO_3$$

$$N_2 + 3H_2 \xrightleftharpoons[H_2S]{Fe} 2NH_3$$

b) (i) Buffer solution:-
A buffer solution is one which maintance its pH fairly constant even upon the addition of small amounts of acids (or) bases.
Acidic buffer : $CH_3COOH + CH_3COONa$.
Basic buffer : $NH_4OH + NH_4Cl$

(ii) K_a of Propionic acid $= 1.34 \times 10^{-5}$

$pK_a = -\log K_a = -\log 1.34 \times 10^{-5}$

$pK_a = 4.87$

$pH = pK_a + \log \frac{[salt]}{[acid]}$

$pH = 4.87 + \log \frac{0.5}{0.5}$

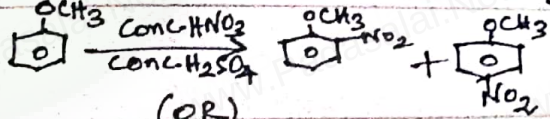
$pH = 4.87$

38. (i) Lucas Test:

$(CH_3)_3COH \xrightarrow[ZnCl_2]{Conc.HCl} (CH_3)_3C-Cl$ (Turbidity-immediately)

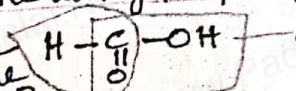
$(CH_3)_2CHOH \xrightarrow[ZnCl_2]{Conc.HCl} (CH_3)_2CHCl$ (Turbidity-5-10 mints)

$CH_3CH_2OH \xrightarrow[ZnCl_2]{Conc.HCl} CH_3CH_2Cl$ (No turbidity)

(ii) 

(OR)

b) (i) Reducing Property of HCOOH:



reduce Tollen's reagent & Fehling's solution.

$HCOOH + Ag_2O \longrightarrow H_2O + CO_2 + 2Ag\downarrow$

$HCOO^- + 2Cu^{2+} + 5OH^- \longrightarrow CO_3^{2-} + Cu_2O + 3H_2O$

(ii) Carbylamine rex :-

$C_6H_5NH_2 + CHCl_3 + 3KOH \xrightarrow{\Delta} C_6H_5NC + 3KCl + 3H_2O$

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