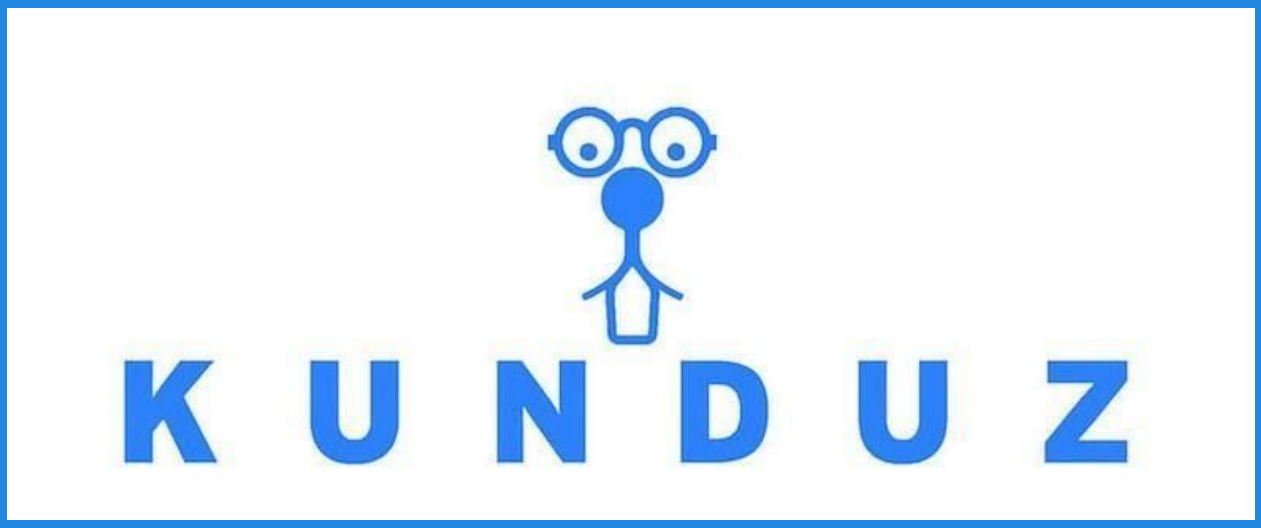

Jan 9 2020 shift 2 Chemistry prepared by KUNDUZ tutors

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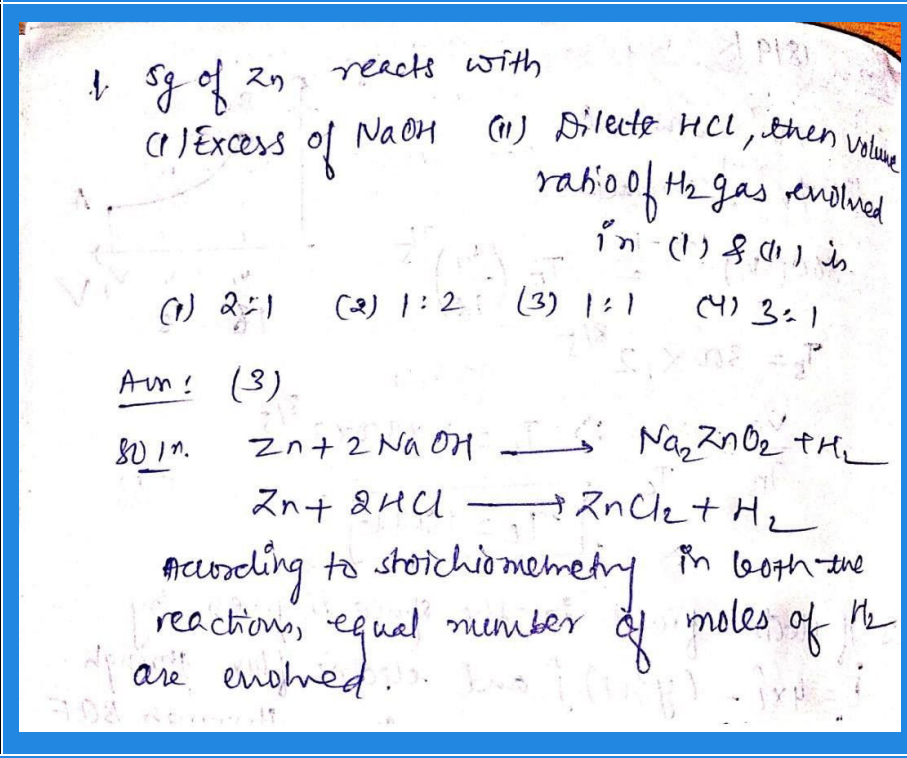
Question no.	Questions and Answers
1	

2

2. Given K_{sp} of $Cr(OH)_3$ is 6×10 then determine $[OH^-]$. Neglect contribution of OH^- ions from H_2O.

(1) $(18 \times 10^{-31})^{1/4}$ M (2) $(18 \times 10^{-31})^{1/2}$ M

(3) $(6 \times 10^{-31})^{1/4}$ M (4) $\left(\frac{6}{27} \times 10^{-31}\right)^{1/4}$ M

Ans: (1)

Sol: $Cr(OH)_3 \longrightarrow Cr^{3+} + 3OH^-$

$\quad\quad\quad

3

3. Select the correct statement among the following.
(A) LiCl doesnot dissolve in pyridine.
(B) Li doesnot react ethyline to form ethynide.
(C) Li and Mg reacts slowly with water.
(D) Among alkali metals Li has highest hydration tendency.

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

Ans: (1).

Sol: Theory based.

4

4. Given an element with ionisation enthalpies $IE_1 = 496 \frac{KJ}{mol}$ and $IE_2 = 4562 \frac{KJ}{mol}$ one mole hydroxide of this element is treated seperately with HCl and H_2SO_4 respectively. Moles of HCl and H_2SO_4 reacted respectively are

(1) 1, 0.5 (2) 0.5, 1 (3) 2, 0.5 (4) 0.5, 2

Ans: (1)

Sol: Acording to the given data of IE_1 This element must belong to group 1 and thus is monovalent & form hydroxide of the type M(OH).

$$MOH + HCl \longrightarrow MCl + H_2O$$
1 mol 1 mol

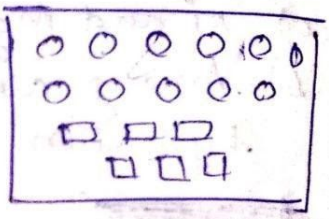
$$2MOH + H_2SO_4 \longrightarrow M_2SO_4 + H_2O$$
1 mol $-\frac{1}{2}$ mol

5

5. Reactant A represented by square is in equilibrium with product B represented by circles. Then value of equilibrium constant is

(1) 1 (2) 2

(3) 3 (4) 4



Ans: (2)

6

6. Given following complexes

(I) $Na_4[Fe(CN)_6]$ (II) $[Cr(H_2O)_6]Cl_2$

(III) $(NEt_4)_2[CoCl_4]$ (IV) $Na_3[Fe(C_2O_4)_3]$

(All 3d)

Correct order of spin only magnetic moment for the above complexes is

(1) (II) > (III) > (IV) > (I) (2) (II) > (IV) > (III) > (I)

(3) (I) > (IV) > (III) > (II) (4) (II) > (I) > (IV) > (III)

Sol: As $\mu_s = \sqrt{n(n+2)}$

Complex (I) = Fe^{2+} = SFL = $t_{2g}^{2,2,2} eg^{0,0}$: $\mu_s = 0$

Complex (II) = Cr^{2+} = WFL = $t_{2g}^{1,1,1} eg^{1,0}$ = $\mu_s = \sqrt{24}$

Complex (III) = Co^{2+} = WFL = $eg^{2,2}$, $t_{2g}^{1,1,1}$ $\mu_s = \sqrt{15}$

Complex (IV) = Fe^{3+} = SFL = $t_{2g}^{2,2,1} eg^{0,0}$ $\mu_s = \sqrt{3}$

7

7. Select the correct option.

(1) Entropy is function of temperature and also entropy change is function of temperature

(2) Entropy is a function of temperature and entropy change is not a function of temperature.

(3) Entropy is not a function of temperature & entropy change is a function of temperature.

(4) Both entropy and entropy change are not function of temperature.

Ans: (1)

Sol: $\Delta S = \int \frac{dq}{T}$

$$S_T = \int_0^T \frac{nC\,dT}{T}$$

8

8. A compound (A: $B_3N_3H_3Cl_3$) reacts with $LiBH_4$ to form inorganic benzene (B).

(A) reacts with C to form $B_3N_3H_3(CH_3)_3$.

(B) and (C) are respectively.

(1) Boron nitride, MeMgBr

(2) Boron nitride, MeBr

(3) Borazine, MeBr

(4) Borazine, MeMgBr.

Ans: (4)

Sol: $B_3N_3Cl_3H_3$ (A) $+ LiBH_4 \rightarrow$ $B_3N_3H_6$ (B) $+ LiCl + BCl_3$

$B_3N_3H_3Cl_3$ (A) $+ 3MeMgBr$ (C) $\rightarrow$ $B_3N_3H_3(CH_3)_3 + 3MgBrCl$

9

9. In a box a mixture of H_2, O_2 & CO along with charcoal is present then variation of pressure with the time will be as follows:

(1) P, t

(2) P, t

(3) P, t

(4) P, t

Ans: (3)

Sol: Theory based

10

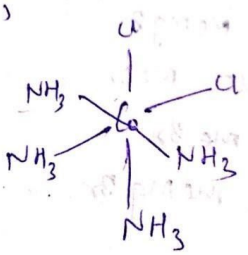
10. Given complex $[Co(NH_3)_4Cl_2]$ In it if Cl–Co–Cl bond angle is 90° then it is:

(1) Cis-isomer (2) trans-isomer

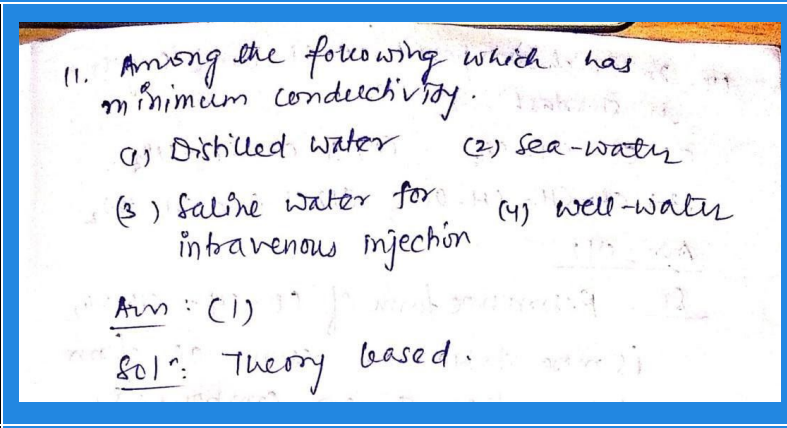
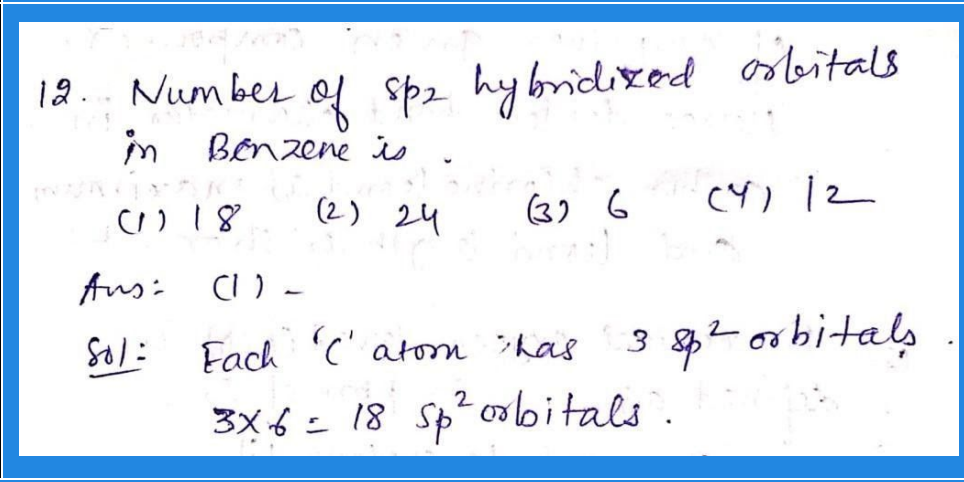
(3) Meridional and trans. (4) Cis and trans both.

Ans: (1)

Sol:



Cis form

11	
12	

11. Among the following which has minimum conductivity.

(1) Distilled water (2) Sea-water

(3) Saline water for intravenous injection (4) well-water

Ans: (1)

Sol^n: Theory based.

12. Number of sp_2 hybridized orbitals in Benzene is.

(1) 18 (2) 24 (3) 6 (4) 12

Ans: (1)

Sol: Each 'C' atom has 3 sp^2 orbitals.

$3 \times 6 = 18$ sp^2 orbitals.

13

13. Which of the following reaction will not for racemic mixture.

(1) $CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{HCN}$ (2) $(CH_3)_2-CH-CH=CH_2 \xrightarrow{HCl}$

(3)  $\xrightarrow{HCl}$ (4) $CH_3-CH_2-CH=CH_2 \xrightarrow{HBr}$

Ans: (2)

Sol: $(CH_3)_2CH-CH=CH_2 \xrightarrow{HCl} (CH_3)_2CH-\overset{+}{C}H-CH_3$

hydrideshift

Not chiral $\left\{ CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{Cl}{|}}{C}}-CH_2-CH_3 \right.$

14

14. In which compound C-Cl bond length is shortest.

(1) $Cl-CH=CH_2$ (2) $Cl-CH=CH-CH_3$

(3) $Cl-CH=CH-OCH_3$ (4) $Cl-CH=CH-NO_2$

Ans: (4)

Sol: Resonance form of $Cl-CH=CH-NO_2$ is more stable than resonance form of any other given compounds. Hence double bond character in carbon-chlorine bond is maximum and bond length is shortest.

15

Q. Biochemical oxygen demand (BOD) is defined as ... in ppm of O_2.

(1) Required to sustain life.

(2) The amount of oxygen required by bacteria to break down the organic matter present in a certain volume of a sample of water.

(3) The amount of oxygen required by anaerobic bacteria to break down the inorganic matter present in a certain volume of a sample of water

(4) Required photochemical reaction to degrade waste.

Ans : (2)

Sol :- The amount of oxygen required by bacteria to break down the organic matter present in a certain volume of a sample of water, is called BOD.

16

16. Monomers of which of the given polymers is chiral.
(1) Buna-S (2) Neoprene
(3) Nylon-6,6 (4) PHBV

Ans: (4)

Sol: Polymers.

PHBV → $\left(-O-CH(CH_3)-CH_2-C(=O)-O-CH(C_2H_5)-CH_2-C(=O)-\right)$

$CH_3-\underset{OH}{CH}-CH_2-COOH$ & $CH_3-CH_2-\underset{OH}{CH}-CH_2-COOH$

chiral chiral

Both monomers are chiral.

17

17.

Compound	Lab test: Molisch's test	Benedict test	Biuret test
A	✓	X	X
B	✓	✓	X
C	X	X	✓

A B C

(1) Lactose Glucose Albumin
(2) Lactose Glucose Alanine
(3) Lactose Fructose Alanine
(4) Glucose Sucrose Albumin

Ans: (1)
Sol: Theory based.

18

18. Order of basic character is :

(I)  (II)  (III)  (IV) 

~~Ans~~:

(1) I > II > III > IV (2) IV > III > I > II

(3) II > I > III > IV (4) IV > I > II > III

Ans :- 2)

Sol : Basic strength depends upon availability of lone pairs.

∴ Greater the resonance ⇒ Smaller the basicity of loan pair

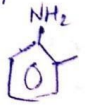
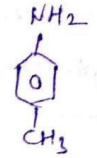
NaNO2 β-Naphthol coloured

19

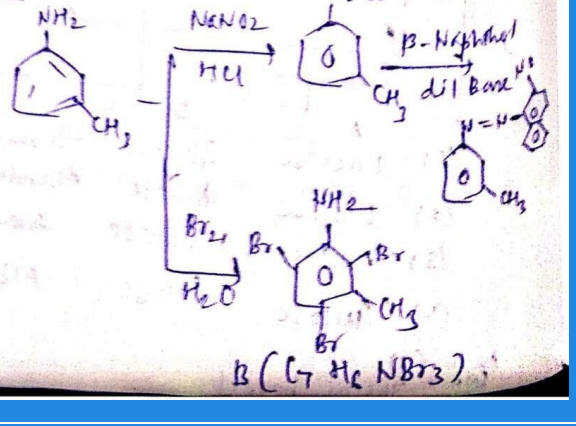
19. Compound A — NaNO2 / HCl → β-Naphthol / dil Base → coloured comp

Br2 / H2O → B ($C_7H_6NBr_3$)

Compound A will be.

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

Ans : (2)

Sol : 

B ($C_7H_6NBr_3$)

20

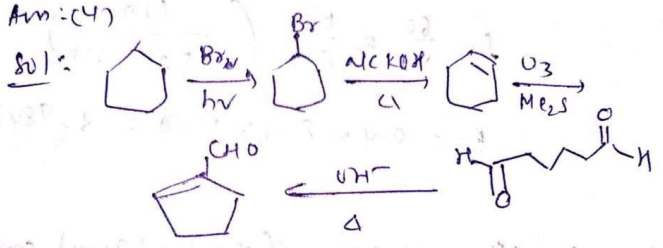
20. Complex X $\xrightarrow[(2)\ \text{alc. KOH}]{(1)\ Br_2, h\nu}$ $\xrightarrow[(4)\ Me_2S]{(3)\ O_3}$ $\xrightarrow[(5)\ \text{dil NaOH},\ \Delta]{}$ CH=O

Compound X will be.

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

Ans: (4)

Sol:

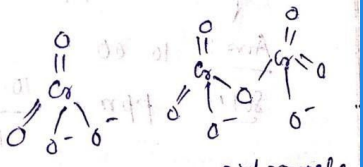


21

21. Total number of Cr-O bond in chromate ion and dichromate ion is

Ans: ~~12~~ 12.00

Sol^n: Chromate ion



Dichromate

Total number of Cr-O bond is 12.

22

22 Lacto bacillus has generation time 60 min. at 300K and 40 min at 400K. Determine activation energy in $\frac{KJ}{mol}$.

$R = 8.3\ J\,K^{-1}mol^{-1}$, $\ln\left(\frac{2}{3}\right) = 0.4$

Ans: 03.98

Sol^n: $\ln \frac{K_2}{K_1} = \frac{Ea}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$

$\ln \frac{60}{40} = \frac{Ea}{8.3}\left(\frac{100}{400 \times 300}\right)$.

$Ea = 0.4 \times 8.3 \times 12000 = 3.984\ KJ/mol$

23

23. One Litre sea water ($d = 1.03\ g/ml$) contains 10.3 mg of O_2 gas. Determine concentration of O_2 in ppm.

Ans: 10.00

Sol^n: $ppm = \frac{10.3 \times 10^{-3}}{1030} \times 10^6 = 10$

24

24. 0.1 mol of an ideal gas has volume 1 dm^3 in a locked box with frictionless piston. The gas is in ~~form of~~ thermal equilibrium with excess of 0.5m aqueous ethylene glycol at its freezing point. If piston is released all of a sudden at 1atm then decide the final volume of gas in dm^3. ($R = 0.08\ atm\ L\ mol^{-1} K^{-1}$, $K_f = 2.0\ K\ mol^{-1}$)

Ans: 2.176 dm^3; 2.18

Sol^n: $K_f = 2.0$

$m = 0.5\ m$.

$\Delta T_f = K_f\, m$

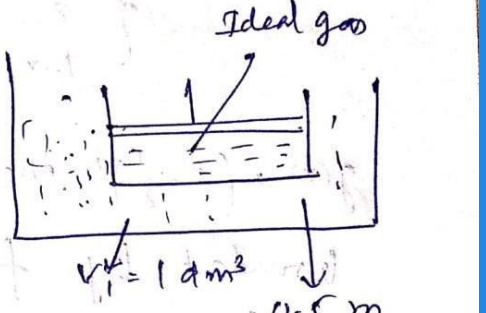
$= 1$.

$T_{initial} = 272\ K$

$n = 0.1\ mol$

$V = 0.1\ dm^3$

$P_{gas} = \frac{nRT}{V} = 2.176\ atm$

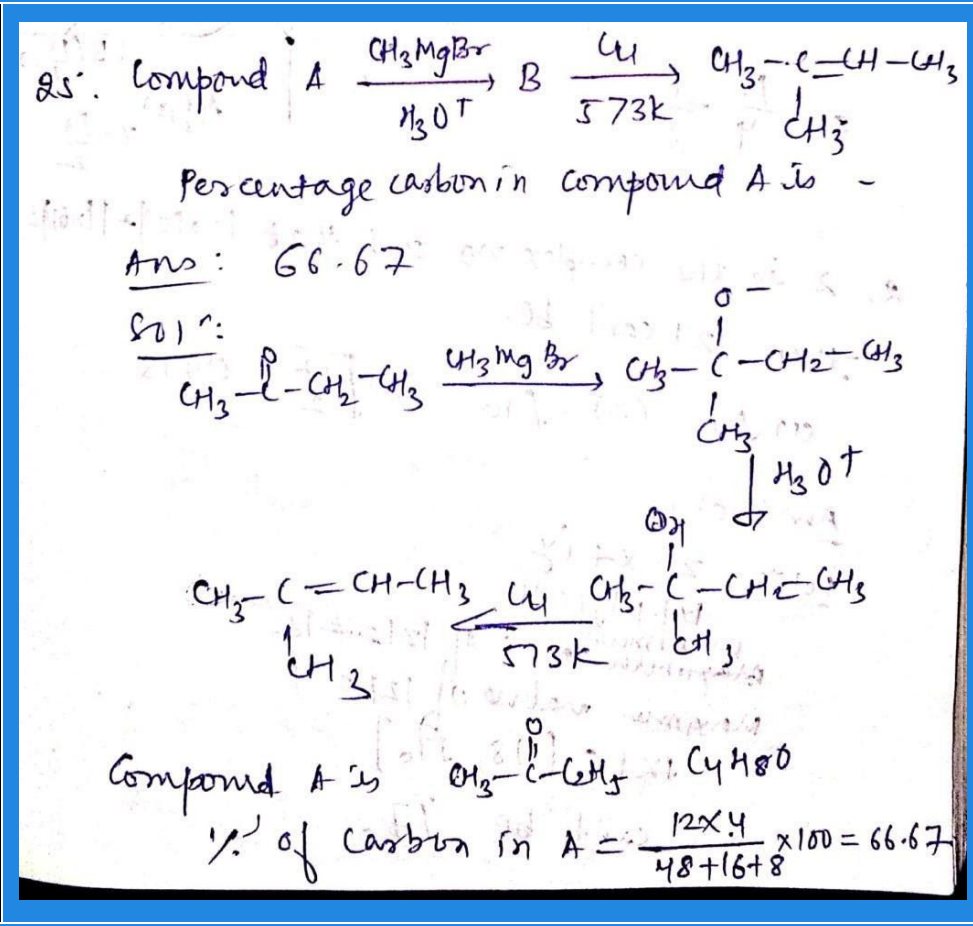


After releasing piston,

$P_1 V_1 = P_2 V_2$

$V_2 = 2.176\ dm^3$

25



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