HIGHER SECONDARY FIRST YEAR EXAMINATION - MAR/APR- 2019

STD - XI **CHEMISTRY TENTATIVE ANSWER KEY** **MAX.MARKS - 70**

PART - I

Answer all the questions

	A- type		**B- type**
1.	c) Covalent nature	1.	a) $K_p < K_c$ (or) c) $K_p = K_c (RT)^{-ve}$
2.	a) $K_p < K_c$ (or) c) $K_p = K_c (RT)^{-ve}$	2.	c) Covalent nature
3.	a) CaC_2	3.	d) CaF_2
4.	b) Stark effect	4.	a) Argon
5.	b) $C_6H_5\overset{+}{N}H_3$	5.	b) Stark effect
6.	d) (1) -(iv), (2) - (i) ,(3) - (ii), (4) - (iii)	6.	d) 30%
7.	c) Boyle's law	7.	b) H_2O
8.	a) 5.6	8.	a) $JK^{-1}\ mol^{-1}$
9.	d) CaF_2	9.	d) (1) -(iv), (2) - (i) ,(3) - (ii), (4) - (iii)
10.	a) Argon	10.	d) $\pi V = nRT$
11.	b) H_2O	11.	c) Boyle's law
12.	c) propene	12.	a) 5.6
13.	a) $JK^{-1}\ mol^{-1}$	13.	c) propene
14.	d) 30%	14.	a) CaC_2
15.	d) $\pi V = nRT$	15.	b) $C_6H_5\overset{+}{N}H_3$

PART - II

Answer any six questions and Questions No.24 is Compulsory **6 x 2 =12**

16. **Pauli Exclusion Principle**

"No two electrons in an atom can have the same set of values of all four quantum numbers."

Explaination : For 2 e^- in helium, 1 e^- has the quantum numbers same as the electron of hydrogen atom, n = 1, *l* = 0, m = 0 and s = +1/2 For other electron, the fourth quantum number is different i.e., n = 1, *l* = 0, m = 0 and s = -1/2

17. **Definition of valency** - the combining power of an element, especially as measured by the number of hydrogen atoms it can displace or combine with.

18. Gases whose behaviour is consistent with these assumptions under all conditions are called ideal gases.and which consequently obeys the gas laws exactly

19. **Third law of thermodynamics** 'states that the entropy of pure crystalline substance at absolute zero is zero. (OR)

$$\lim_{T\to 0} S = 0 \text{ for a perfectly ordered crystalline state}$$

20. **Bond length**

The distance between the nuclei of the two covalently bonded atoms is called bond length.
(I) bond length can be determined by **spectroscopic**, **x-ray diffraction** and **electron-diffraction techniques**

21. **Test for Nitrogen**: If nitrogen is present it gets converted to sodium cyanide which reacts with freshly prepared ferrous sulphate and ferric ion followed by conc. HCl and gives a Prussian blue color or green color or precipitate.

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22. The alkyl group is directly attached to the magnesium metal make it to behave as carbanion. So, any compound with easily replaceable hydrogen reacts with Grignard reagent to give corresponding alkanes.

$$CH_3MgCl + H_2O \rightarrow CH_4 + Mg(OH)Cl$$

23. **Acid rain** :chemically converted into sulphuric acid and nitric acid respectively as a results of pH of rain water drops to the level 5.6, hence it is called acid rain.

(i) $2SO_2 + O_2 + 2H_2O \rightarrow 2H_2SO_4$ (ii) $4NO_2 + O_2 + 2H_2O \rightarrow 4HNO_3$

24. **Kjeldahls method:** is carried much more easily than the Dumas method. It is used largely in the analysis of foods and fertilizers.

PART - III

Answer any six questions and Questions No.33 is Compulsory **6 x 3 =15**

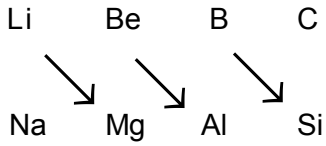
25. H_2SO_4 basicity = 2 eq mol^{-1}

Molar mass of H_2SO_4 = (2x 1) + (1x 32) + (4 x 16) = 98 g mol^{-1}

Gram equivalent of H_2SO_4 = $\frac{98\ g\ mol^{-1}}{2\ eq\ mol^{-1}} = 49\ g\ eq^{-1}$

26. The similarity in properties existing between the diagonally placed elements is called **'diagonal relationship'.**

On moving diagonally across the periodic table, the second and third period elements show certain similarities. Even though the similarity is not same as we see in a group, it is quite pronounced in the following pair of elements.



27. $^{6}_{3}Li + {}^{1}_{0}n \rightarrow {}^{4}_{2}He + {}^{3}_{1}T \ \ (Tritium)$

28. **Le Chatelier-Braun principle.**

"If a system at equilibrium is disturbed, then the system shifts itself in a direction that nullifies the effect of that disturbance."

29. **Isotonic solutions.**

Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. When such solutions are separated by a semipermeable membrane, solvent fl ow between one to the other on either direction is same, i.e. the net solvent fl ow between the two isotonic solutions is zero.

30. Isostructural indicates that both molecules will be having same chemical structure.

O = C = O & H-C ≡ C-H

Molecular geomentry	-	Linear (180^o)
Dipole moment($\vec{\mu}$)	-	Zero
hybridization of carbon in CO_2 and C_2H_2	-	sp

31. **Williamson's synthesis**

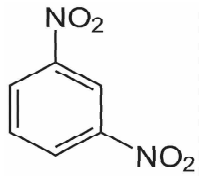
Haloalkane, when boiled with sodium alkoxide gives corresponding ethers.

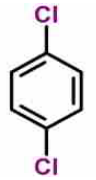
$CH_3CH_2Br + Na\ OCH_2CH_3 \rightarrow CH_3CH_2\text{- O - }CH_2CH_3 + NaBr$

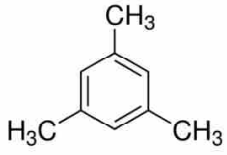
Bromo ethane Sodium ethoxide diethyl ether

32. i) in white wash due to its disinfectant nature.

ii) Calcium hydroxide reacts with the carbon dioxide in air to form thin layer of calcium carbonate on the walls. It gives a shiny finish to the walls

33. a) 

b) 

c) 

- IV PART

Answer all the questions **5 x5 =25**

34. a) i) in hydrogen peroxide (H_2O_2) is - 1.

$2 (+ 1) + 2x = 0 \Rightarrow 2x = - 2 \Rightarrow x = - 1$

ii) **de Broglie eqn**

(i) Planck's quantum hypothesis: $E = h\nu$ ..... (1) (wave nature)

(ii) Einsteins mass-energy relationship $E = mc^2$ ..... (2) (particle character)

combine eqn 1&2 $h\nu = mc^2$

$hc/\lambda = mc^2 \Rightarrow h/\lambda = mc \Rightarrow \lambda = h/mc$ (c = v) $\Rightarrow \lambda = h/mv$

h- Planck's constant , m - mass of electron , c = velocity of light

(OR)

b) i) **State**: In triads, the atomic weight of the middle element nearly equal to the arithmetic mean of the atomic weights of the remaining two elements.

In 1817, J. W. Dobereiner classified some elements such as chlorine, bromine and iodine with similar chemical properties into the group of three elements called as triads.

S. No.	Elements in the Triad	Atomic weight of middle element	Average atomic weight of the remaining elements
1	Li, Na, K	23	$\frac{7+39}{2} = 23$

ii) $Na_2O_2 + H_2SO_4 \rightarrow Na_2SO_4 + H_2O_2$

35.

a) i) A) BeO and MgO are almost insoluble in water. On the other hand, oxides of other elements form hydroxides. BeO is amphoteric;

B) BeO oxide is covalent due to the small size of Be^{2+}ion,while other oxides are ionic in nature.

ii) The rate of diffusion or effusion is inversely proportional to the square root of molar mass. This statement is called **Graham's law of diffusion/effusion.**

$$\text{rate of diffusion } \alpha \frac{1}{\sqrt{M}}$$

(OR)

b) i) $\Delta S_{fusion} = \frac{\Delta H}{Tm(K)} = \frac{6008 \text{ J.mol}^{-1}}{(0+273)} = 22.007 \text{ J mol}^{-1} \text{ K}^{-1}.$

ii) $CaCO_3 (s) \rightleftharpoons^{\Delta} CaO (s) + CO_2 (g)$

36. a) i) Henry's law is applicable at moderate temperature and pressure only.

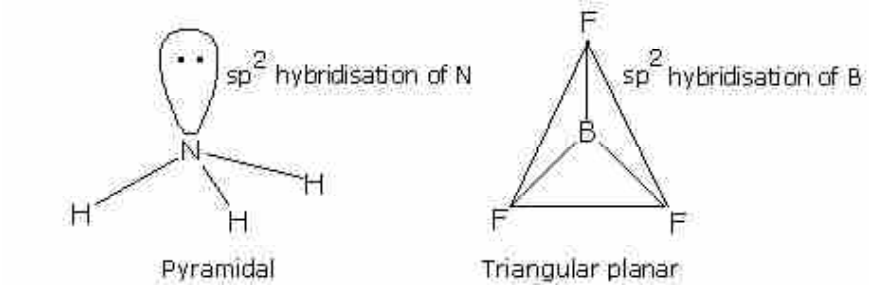
Only the less soluble gases obeys Henry's law

The gases reacting with the solvent do not obey Henry's law. For example, ammonia or HCl reacts with water and hence does not obey this law.

$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$ and $HCl + H_2O \rightleftharpoons H_3O^+ + Cl^-$

The gases obeying Henry's law should not associate or dissociate while dissolving in the solvent.

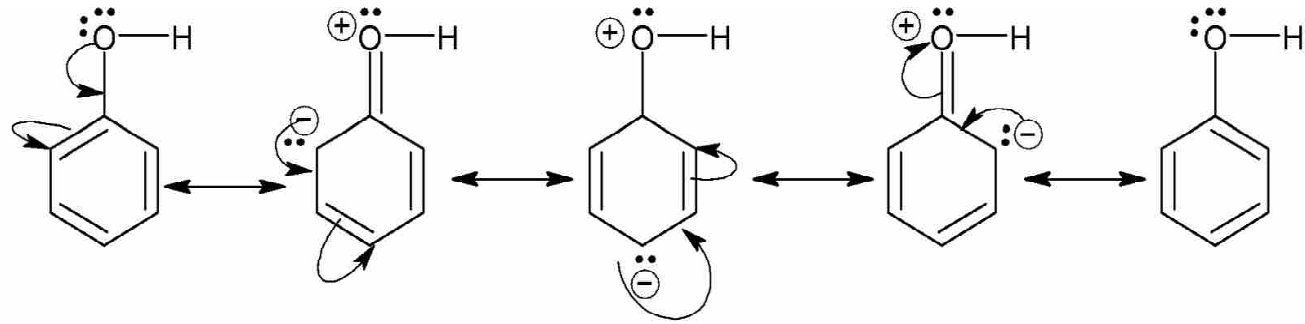
ii)



(OR)

b) i) **but-2-ene** a) cis - isomer b) trans - isomer

ii) Positive resonance effect occurs, when the electrons move away from substituent attached to the conjugated system. It occurs, if the electron releasing substituents are attached to the conjugated system. In such cases, the attached group has a tendency to release electrons through resonance. These electron releasing groups are usually denoted as +R or +M groups. **Examples : -OH, -SH, -OR,-SR, $-NH_2$, -O-etc...**



37. a) i) (A) 2 - methyl butane (B) 2,2- dimethyl propane

ii) **Nucleophiles** are reagents that has high affinity for electro positive centers.

All Lewis bases act as nucleophiles.

eg) Neutral Nucleophile : NH_3 , H_2O, R-OH , R- O - R'...etc..

Negatively charged nucleophiles : OH^- , Cl^- , CN^-.. etc..

Electrophilies are reagents that are attracted towards negative charge (or) electron rich center

All Lewis acids act as electrophiles.

eg) Neutral electrophiles : $AlCl_3$, BF_3, CO_2, :CCl_2 etc..

Positive electrophiles : H^+, R+, H_3O^+, NO_2^+ etc..

(OR)

b) i) (A) $3\ H\text{-}C\equiv C\text{-}H \xrightarrow[873\ K]{\text{Red Hot Iron tube}}$ 

(B) $C_6H_5OH + Zn \rightarrow C_6H_6 + ZnO$

(C) $C_6H_6 + CH_3Cl \xrightarrow{\text{anhydrous } AlCl_3} C_6H_5CH_3 + HCl$

ii) Coal tar is a viscous liquid obtained by the pyrolysis of coal. During fractional distillation, coal tar is heated and distills away its volatile compounds namely benzene, toluene, xylene in the temperature range of 350 to 443 K.

NAME OF THE FRACTION	TEMPERATURE RANGE	NAME OF THE COMPENENTS
Middle oil	443 - 503 K	Phenol, Naphthalene
Heavy oil	503 - 543 K	Naphthalene, Cresol
Green oil	543 - 633 K	Anthracene
Pitch Alone	633 K	Residue

38. a) i) Empirical formula = C_6H_6O

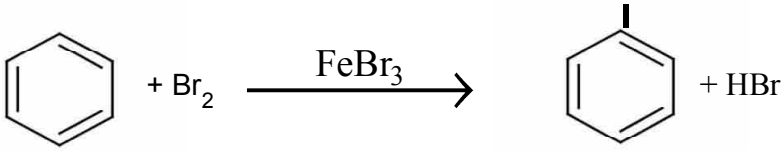
$$n = \frac{\text{Molar mass}}{\text{Calculated empirical formula mass}}$$

$$n = \frac{2 \times VD}{94} = \frac{2 \times 47}{94} = 1$$

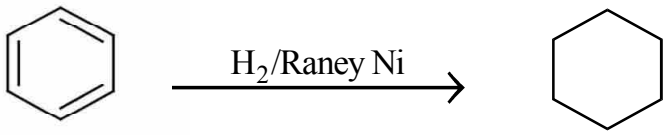
$$\text{Molecular formula} = (C_6H_6O)\times 1 = C_6H_6O$$

ii)

Compound - A gives B



Compound - A gives C



Compound A - Benzene

Compound B - Bromobenzene

Compound C - Cyclohexane

b) i) $C_{(s)} + O_{2(g)} \rightarrow CO_{2\,(g)}$

$$\Delta S^0_r = \Sigma S^0_{products} - \Sigma S^0_{reactans}$$

$$\Delta S^0_r = \left\{S^0_{CO_2}\right\} - \left\{S^0_C + S^0_{O_2}\right\}$$

$$\Delta S^0_r = 213.6 - [5.740 + 205]$$

$$\Delta S^0_r = 213.6 - [210.740]$$

$$\Delta S^0_r = 2.860\ JK^{-1}$$

ii) $R\text{-}C \equiv N \xrightarrow{H_2O/H^+} R\text{-}CONH_2 \xrightarrow{H_2O/H^+} R\text{-}COOH$

A- amide **B - Carboxylic acid**

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