iii. In the estimation of sulphur by Carius method 0.468g of organic compound produced 0.668g $BaSO_4$.

Find the percentage of S in the given compound.

OR

Draw the structural formula for the following compounds :

a. But - 2- ynal b. Ethyl butanoate

ii. Identify A, B, C :

a. $C_2H_5COOH + NaOH \xrightarrow[CaO]{\Delta} A \xrightarrow[Cu]{[O]} B$

$A \xrightarrow{\text{sunlight}, Cl_2} C$

iii. For the compound NH_2CSNH_2, while performing Lassaigne's test for N, what colour will you obtain? Give the formula of the resulting compound.

Quarterly Examination - 2018-19

CHEMISTRY

Class : XI

Time : 3 Hrs. 15 mints **Full Marks : 70**

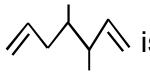
(Question 1 is of 20 marks having four sub-parts, all of which are compulsory. Question No. 2 to 8 carry 2 marks each having to internal choices. Question No. 9 to 15 carry 3 marks each having two internal choices. Question No. 16 to 18 carry 5 marks each all of which is internal choices)

Part I

Q1. a. Fill in the blanks : (4x1=4)

i. Balmer lines occur when the execited electrons jump from higher energy level to ____ level and for Paschen series electrons jump from higher level to ____ energy level.

ii. 10.6g of Na_2CO_3 (Na = 23, C = 12, 0 = 16) contains ____ molecules of Na_2CO_3 and ____ atoms of Na.

iii. IUPAC name of the compound  is ____

iv. For testing halogens, the filtrate is boiled with concentrated HNO_3 in order to destroy ____ and ____ ions.

b. Complete the following sentences by selecting the correct alternatives from the choices given : (4)

i. In Lassaigne's test for nitrogen, the blue colour is due to the formation of :

a. Potassium ferricyanide b. Ferric ferrocyanide

c. Sodium ferrocyanide

ii. Which of the carbonates given below is unstable in air and is kept in CO_2 atmosphere to avoid decomposition :

a. $BeCO_3$ b. $MgCO_3$ c. $BaCO_3$

iii. Which of the following set of quantum numbers is not possible?

a. n = 1, l = 0, m = 0, s = +½

b. n = 4, l = 0, m = 0, S = ½

c. n = 2 l = 0 m = –1, S = +½

iv. If the concentration of glucose in blood is 0.9 gL^{-1}. What will be the molarity of glucose in blood?

a. 5 (M) b. 0.05 (M) c. 0.005 (M)

c. Match the following :

i.	Kolbe's electrolytic reaction	a)	Calcium hydride
ii.	Saturated hydrocarbon	b)	Cs
iii.	Hydrolith	c)	Substitution reaction
iv.	Used in photoelectric cell	d)	$2CH_3COONa$ ----> C_2H_6 + 2 NaOH + H_2 + $2H_2O$
		e)	hydrogen peroxide

d. Answer the following questions : (4x2=8)

i. Arrange the following in the order of property indicated :

a. $BeSO_4$, $BaSO_4$, $CaSO_4$, $SrSO_4$ (increasing solubility)

b. CsCl, NaCl, LiCl, KCl (increasing covalent character)

ii. A proton is accelerated to a velocity of $3x10^7$ ms^+. If the velocity can be measured with a precision of ± 0.5%, calculate the uncertainty in the position of proton. ($h = 6.6 \times 10^{-34}$)JS, mass of proton = $1.66x10^{-27}$ kg)

iv. Equivalent weight of certain bivalent metal is 20. What is the molecular mass of its chloride? (Cl = 35.5)

Q17. i. Write balanced equations for the following named reactions :

a. Clemmensen reduction b. Wurtz reaction

c. Corey-house reaction

ii. 0.354 g of organic compound on analysis by Kjeldahl's method gave ammonia which was absorbed in 70 ml M/10 H_2SO_4. The excess of the acid required 40 ml of M/5 NaOH for complete neutralisation. Calculate the percentage of nitrogen in the compound.

OR

i. Carry out the following conversions :

a. Methane to ethane

b. Ethanol to chloroethane

c) Methane to methanol

ii. 0.28 g of an organic compound containing P gave 0.45g of $Mg_2P_2O_7$ in carius estimation. Calculate the percentage of phosphorus in the compound. (Mg = 24, P = 31, 0 = 16)

Q18. i. Draw the structural formula for the following compounds :

a. 3 Amino hex - 4 enal b. Propane nitrile

ii. Identify A, B, C

a. $C_2H_5Br + Mg \xrightarrow{Ether} A \xrightarrow{H_2O} B + C$

Q6. In carious determination of halogens, 0.15 g of an organic compound gave 0.12 g of AgBr. Find the percentage of bromine in the compound.

Q7. Show that beryllium oxide is amphoteric in nature. (Give equations)

OR

Write reactions when (i) lithium nitrate is heated and

(ii) any other alkalimetal nitrate is heated.

Q8. Give two reactions where hydrogen behaves as

i. reducing agent ii. oxidising agent

Q9. In the laboratory preparation of hydrogen, explain why

i. Concentrated H_2SO_4 is not used

ii. Nitric acid is not used

iii. Pure zinc is not used.

Q10. Write balanced equations :

i. Lithium reacts with ethanol

ii. Calcium nitride is hydrolysed

iii. Beryllium oxide is heated with carbon and chlorine

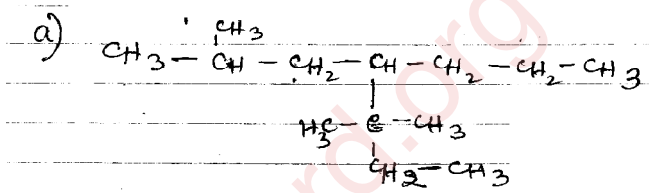
Q11. i. Write the bond line structure of the following compounds :

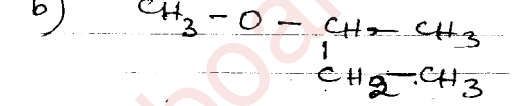
a. 3, 4-dimethyl hept-2, 4 diene

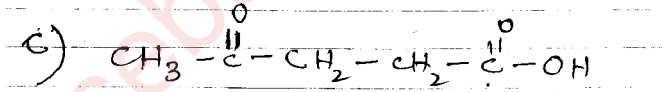
b. Cyclopentanol

ii. Which alkane has higher boiling point : n - hexane or isopentane and why?

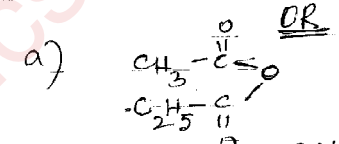
Q12. Write the IUPAC names of the following compounds :

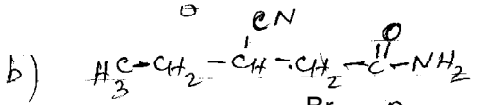
a) 

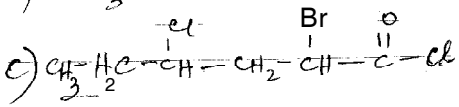
b) 

c) 

OR

a) 

b) 

c) 

Q13. i. Write the electronic configuration of Cr^{2+} and Mn^{+4} (Cr = 24, Mn = 25) and give the number of unpaired electrons.

ii. Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 A. Calculate the threshold frequency and work function (w_o) of the metal

OR

i. a. Arrange the following orbitals in order of increasing energy

5s, 3p, 3d, 4p, 6s

b. For a particular atom, the maximum value of magnetic quantum number(m) obtained is +4. What are the possible values of n, l and m?

ii. Calculate the wave number and energy associated with the second line in the Paschen series for hydrogen ($R_H = 10.97 \times 10^6\ m^{-1}$)

Q14. i. What is the molarity of a solution obtained by mixing 750 ml of 0.5 M HCl with 250 ml of 2(M) HCl?

ii. 2g of metal carbonate is neutralised completely by 100 ml of 0.1 (N) HCl. What is the equivalent weight of metal carbonate?

Q15. i. a. Write set of quantum numbers for an electron in 4f orbital.

b. How many orbitals are there in its f subshell? Write the number of electrons in that subshell.

ii. How many nodal planes are there in 4S orbital? What is the shape of d orbital?

Q16. i. State the law of reciprocal proportion.

ii. An antifreeze solution is prepared from 222.6 g ethylene glycol ($C_2H_6O_2$) and 200g of water. Calculate the molality of the solution. If the density of the solution is 1.072 gml^{-1} then calculate the molarity.

iii. Which expression represents de Broglie relationship?

a. $\frac{h}{mv} = p$ b. $\lambda = \frac{h}{mv}$ c. $\lambda = \frac{h}{mp}$

OR

i. Why a molar solution is more concentrated than a molal solution? [density of water at room temperature is 0.99 gL^{-1}]

ii. Quantum numbers a) n = 3 l = 2 and b) n = 5 l = 3 represents which orbitals?

iii. How many moles of $Ca_3(PQ_4)_2$ will contain 0.45 moles of oxygen atoms? (Ca = 40, P = 31, 0 = 16)

iii. An aqueous solution of 6.3 g of oxalic acid dihydrate ($C_2O_4H_2.2H_2O$) is made upto 250 ml. What is the volume of 0.1 (N) NaOH required to completely neutralize 10 ml of this solution?

iv. Give reasons :

a. Two electrons occupy the same orbital together despite both having negative charge.

b. Electronic configuration of copper is $Ar]_{18}\ 3d^{10}4S^1$ but not $Ar]_{18}\ 3d^9\ 4S^2$

Part II

Q2. A metal forms two oxides. The higher oxide contains 80% metal. 0.72 g of lower oxide gave 0.8g of higher oxide when oxidised. Show that the data illustrates the law of multiple proportion.

OR

10 ml of hydrogen combine with 5 ml of oxygen to yield water. When 200 ml of hydrogen at NTP are passed over heated CuO, the later loses 0.144 g of its mass [CuO + H2 ----> Cu + H2O] show these results agree with the law of constant composition.

Q3. 1.0 g of Mg is burnt in a closed vessel which contains 0.5g of O_2. Which is the limiting reactant? What is the amount of MgO formed in the reaction?
$2\ Mg + O_2$ ---> 2 MgO [Mg = 24., O = 16)

Q4. Give the set of all four quantum numbers of

i. Valence electron of potassium (K = 19)

ii. 23rd electron of iron (Fe = 26)

Q5. The kinetic energy of a subatomic particle of mass 9.0×10^{-31} kg is 3×10^{-25} J. Calculate the wavelength associated with its motion

[h = 6.66×10^{-34} Kg $m^2 s^{-1}$]