FWC

வடமாகாணக் கல்வித் திணைக்களத்துடன் இணைந்து
தொண்டைமானாறு வெளிக்கள நிலையம் நடாத்தும்
மூன்றாம் தவணைப் பரீட்சை - 2020
Conducted by Field Work Centre, Thondaimanaru.
In Collaboration with Provincial Department of Education
Northern Province
3rd Term Examination - 2020

இரசாயனவியல் - II B **Chemistry - II B**	**Gr. 12 (2021)**	**02**	**E**	**II**

05) a)

i) From gas laws, obtain ideal gas equation PV = nRT.

ii) At 27^0C and 1 x 10^5Pa pressure a vessel of 2 dm^3 capacity contains gas A. At 27^0C and 2 x 10^5Pa pressure a vessel of capacity 3 dm^3 contains gas B. Both the vessels are connected using a tube of negligible volume.

I. Find partial pressure of $A_{(g)}$

II. Find the mole fraction of $A_{(g)}$

III. Find the total pressure of the system.

IV. Find the density of the gas in the system

[A - 20 $gmol^{-1}$, B – 4 $gmol^{-1}$]

V. State the assumptions that are used.

b) Using the data given below, calculate the enthalpy of the reaction

$$Cl_{2(g)} + CaBr_{2(s)} \rightarrow CaCl_{2(s)} + Br_{2(l)}$$

enthalpy of atomization of $Ca_{(s)}$ = 177 $kJmol^{-1}$

Sum of the 1st and 2nd enthapies of ionization $Ca_{(s)}$ = 1740 $kJmol^{-1}$

Enthalpy of 1st electron gain of $Br_{(g)}$ = -331 $kJmol^{-1}$

Enthalpy of bond dissociation of $Br_{2(g)}$ = 193 $kJmol^{-1}$

Enthalpy of vapourisation of $Br_{2(l)}$ = 31 $kJmol^{-1}$

Enthalpy of formation of $CaCl_{2(s)}$ = $-$ 795 $kJmol^{-1}$

Enthalpy of Lattice dissociation $CaBr_{2(s)}$ = $+2162$ $kJmol^{-1}$

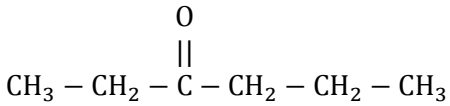
c) LP gas is used at home to boil water. LP gas contains mainly propane $[C_3H_8]$. It is required to raise the temperature of 100 Kg of water from 20^0C to 70^0C, using the heat obtained by the combustion of this gas. Find the volume of propane gas needed at STP, to accomplish the above conditions.

(1 mol of gas at STP = 22.4dm^3) C - 12$gmol^{-1}$ H - 1$gmol^{-1}$

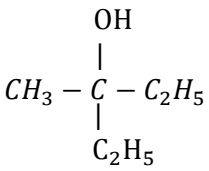
Specific heat capacity of water = 4200 $JKg^{-1}K^{-1}$

Enthalpy of combustion of C_3H_8 = - 2050 $KJmol^{-1}$

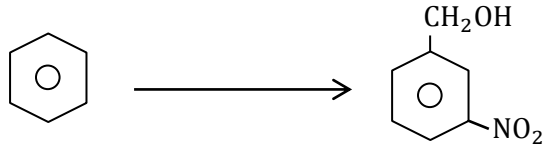
06) a) Using only ethyne as a starting organic substance how would you synthesize



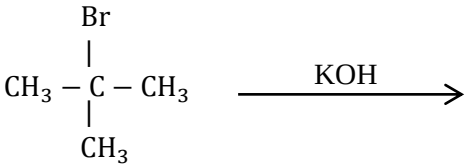
b) Using only ethanol as a starting organic substance how can



c) Complete the following conversion in not more than four (4) steps.



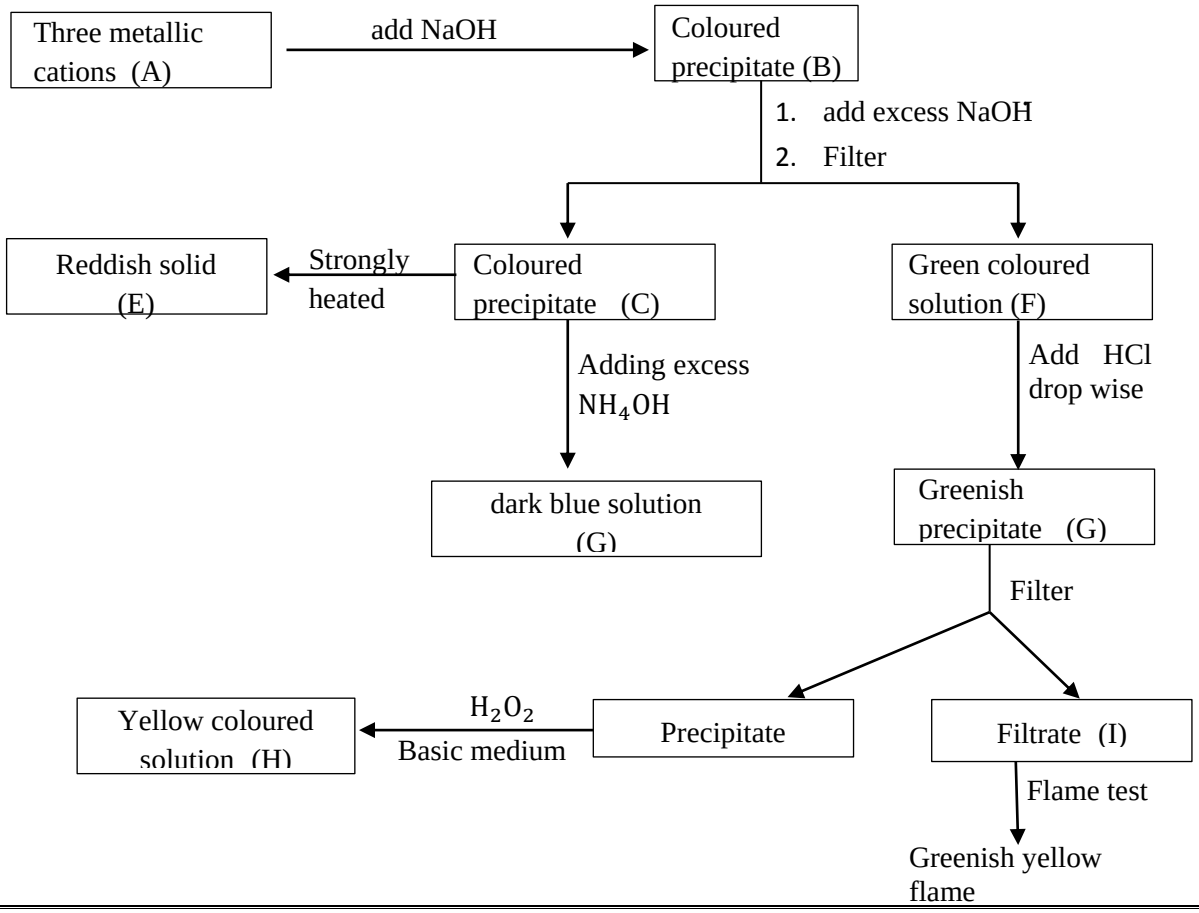
d) The following reaction gives two different products with the same reactant but in different conditions.



(1) State the conditions and products separately?

(2) If one of the type of reactions you have stated can be done in two steps, write the mechanism of the reaction

07) Three cations are present in solution A. The following flow chart given below describes the experiments done to identify them.



a.

I. Identify the three cations.

II. Identify the components responsible for the colour of C, D, E, F, G, H and write their formula.

III. Write the equation for the reaction that takes place when acid is added to H.

IV. What is the observation when H is added to the cation in I.

V. State the IUPAC name of D.

b. A, B, C are complex compounds. The compexes in these compounds are either positively charged or neutral and also their geometrical shape is octahedral. If they possess anions that are not bonded, They are similar and simple anions. The central cations in all A, B and C are with the same oxidation state. The combination. of atoms bonded in A, B and C are $CrH_9N_3Br_3$, $CrH_{12}N_4Br_2$ and $CrH_{15}N_5Br$. But they are not given in the same order.

The following data are provided to identify A, B and C.

- When $AgNO_3$ is added to aqueous solution of A. precipitate was not formed.
- When excess of $AgNO_3$ was added to $100\,cm^3$ of aqueous solution of B of concentration $0.2\,moldm^{-3}$, pale yellow precipitate with dry weight of 7.52g was obtained which was insoluble in dilute NH_3 and soluble in concentrated NH_3.

  (molar mass of pale yellow precipitate = $188\,gmol^{-1}$)

1) Identify the ligands in A, B and C.
2) Deduce the structures of A, B and C and draw them.

c. By dissolving a certain mass of pure FeC_2O_4 in dilute H_2SO_4 solution T is prepared. This solution is heated to 70^0C. Under these conditions $50\,cm^3$ of $0.025\,moldm^{-3}$ $KMnO_4$ was required to completely react with FeC_2O_4. Find the mass of pure FeC_2O_4.

[Fe – 56 $gmol^{-1}$ C - 12 $gmol^{-1}$ O - 16 $gmol^{-1}$]

Note :- Consider FeC_2O_4 to exist as Fe^{2+} and $C_2O_4^{2-}$ in solution T at $70^{\circ}C$