FWC

G.C.E. A/L Examination July - 2018

Conducted by Field Work Centre, Thondaimanaru
In Collaboration with
Provincial Department of Education, Northern Province.

Grade – 12 (2019)	Chemistry - II	Time :- 2 Hours

Part- II
Structured essay - A

❖ **Answer all questions on This paper itself.**

01.

a) Consider the following chemical species
$SO_3, Cl_2O_7, Mg_3N_2, KNO_3, Na_2S_2O_3, Z_nO, PCl_5, Cu(NO_3)_2, C_2H_2, SbCl_3$. Should be Which one of the above species (species should be used only one time)

i. Show amphoteric properties ? ……

ii. contains a bond angle of 180°? ……

iii. Which is the most acidic oxide? ……

iv. reacts with water to liberate a gas with basic properties? ……

v. gives a while precipitate when it is dissolved in dil HCl and the solution is diluted with water? ……

vi. has both ionic bonds and covalent bonds? ……

vii. gives yellow coloured solution an addition of con HCl to its aqueous solution?
……

viii. gives a pale yellow precipitate when dil H_2SO_4 is added to its aqueous solution?
……

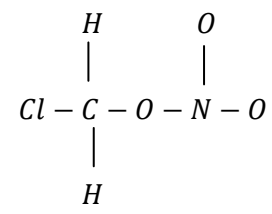
(8x2=16 Marks)

b)

(i) Draw the most acceptable lewis structure for the ion CO_4^{2-}.

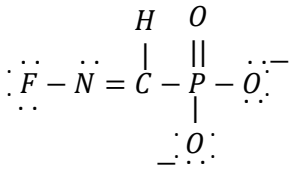
(5 Marks)

(ii) Draw resonance structures for CH_2ClNO_3. The Skeleton is



(12 Marks)

(iii) Based on the hypothetical lewis structure given below



State the following regarding $N, C\ and\ P$ atoms given in the table below

1. Shape around the atom
2. Hybridization of the atom
3. bond angle around the atom

	N	C	P
I. Shape			
II. hybridization			
III. Bond angle			

c) State whether the following statements are true or false (Reasons are not reqired)

i. ICl_2^- and NO_2 are both linear in shape ……

ii. Propene does not exit as geometrical isomers ……

iii. Hot concentrated H_2SO_4 could be used to distinguish between AgCl and AgBr ……..

iv. All spontaneous reactions are ethothermic. ……

02. (a)

i. Write the balanced chemical equation for the reaction given below that occurs in basic medium.

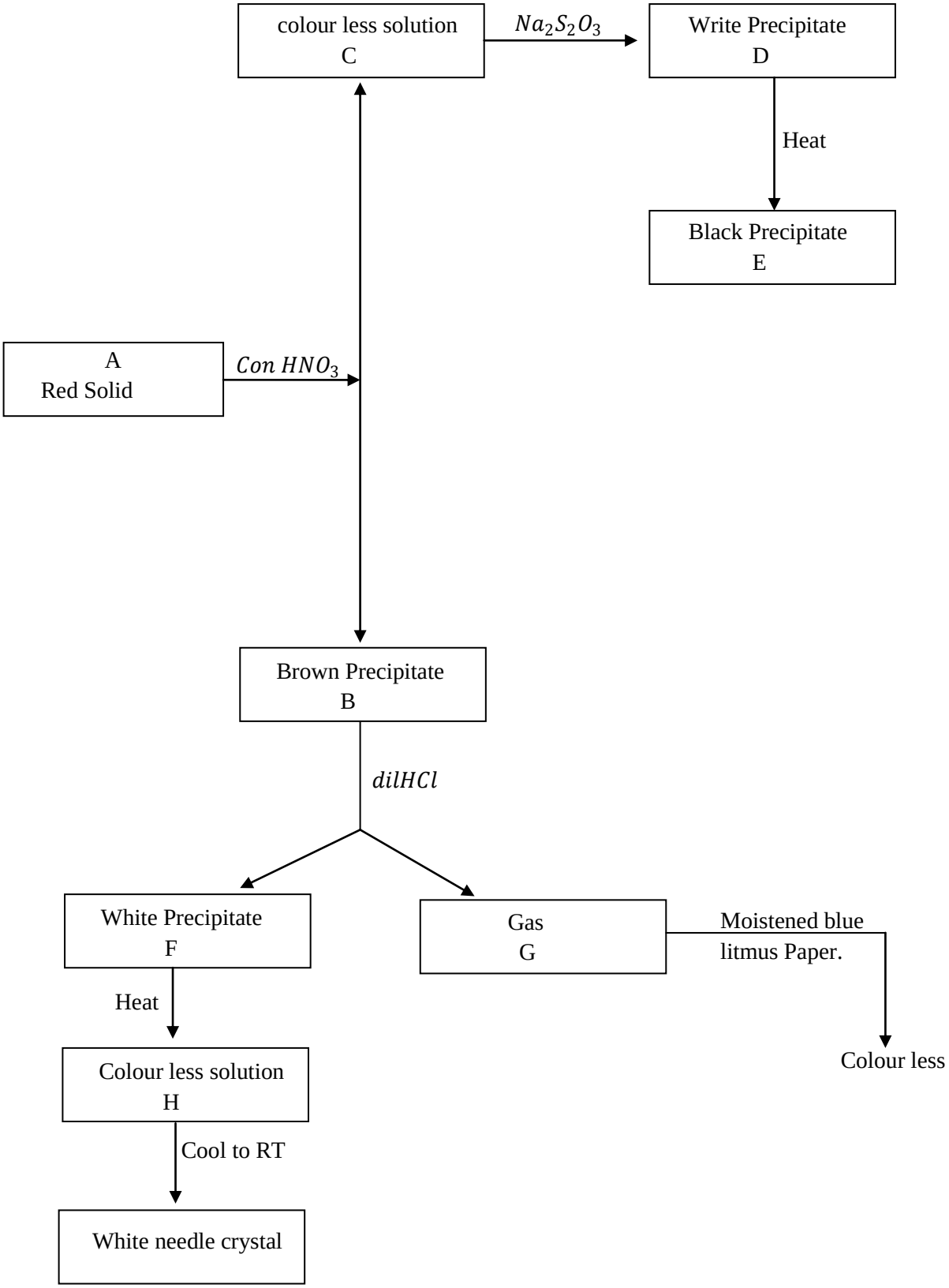
$$CN^- + OCl^- + OH^- \rightarrow CO_3^{2-} + N_2 + Cl^- + H_2O$$

ii. Calculate the mole fraction of the solute in of the following solution A.

A :- 1moldm^{-3} aqueous solution of sucrose which has a density of 1.242gcm^{-3}

$[C - 12, O - 16, H - 1]$

(b) Oxide A is formed bt P block elements. The chemical Reactions of A is given below.



i. Identify the A,B,C,D,E,F,G and H.

A :- ..... B :- .....

C :- ..... D :- .....

E :- ..... F :- .....

G :- ..... H :- .....

ii. Write the balanced equation $A + Con\ HNO_3 \rightarrow$

.....

03. (a). Consider the following enthalpy and entropy data with to the formation of $SO_{3(g)}$ at 25°C

	$\Delta H_f^\theta KJmol^{-1}$	$S^\theta Jmol^{-1}K^{-1}$
$SO_{3(g)}$	−396	257
$SO_{2(g)}$	−297	248
$O_{2(g)}$	0	205

Calculate the following things with regard to the reaction $2SO_{2(g)} + O_{2(g)} \rightarrow 2SO_{3(g)}$

i. Standard enthalpy change ?

.....

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.....

.....

ii. Standard entropy change

.....

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.....

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.....

iii. Standard Gibbs free energy change. [at 25°C]

.....

.....

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.....

.....

iv. State the idea with regard to the spontaneity as the above reaction at 25°C

.....

(b) At T K, $m_1 g$ of gas A exists in a container under pressure of $P_1 Nm^{-2}$ $m_2 g$ of gas B was introduced this container without allowing a change in volume $and\ T$: then pressure become $P_2 Nm^{-2}$ If the molarmass of gas A is M_A and that of B is M_B.

i. write the Ideal gas equation.

……

ii. Express the $\frac{P_1}{P_2}$ ratio in terms $m_1, m_2, M_A\ and\ M_B$.

……

……

……

……

……

iii. Mole fraction of $B_{(g)}$ is X_1. Express the X_1 in terms $P_1\ and\ P_2$

……

iv. If $P_1 = 5 \times 10^4 Pa$ $P_2 = 9 \times 10^4 Pa$ and $m_2 = 2m_1$ calculate the $\frac{M_A}{M_B}$

……

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……

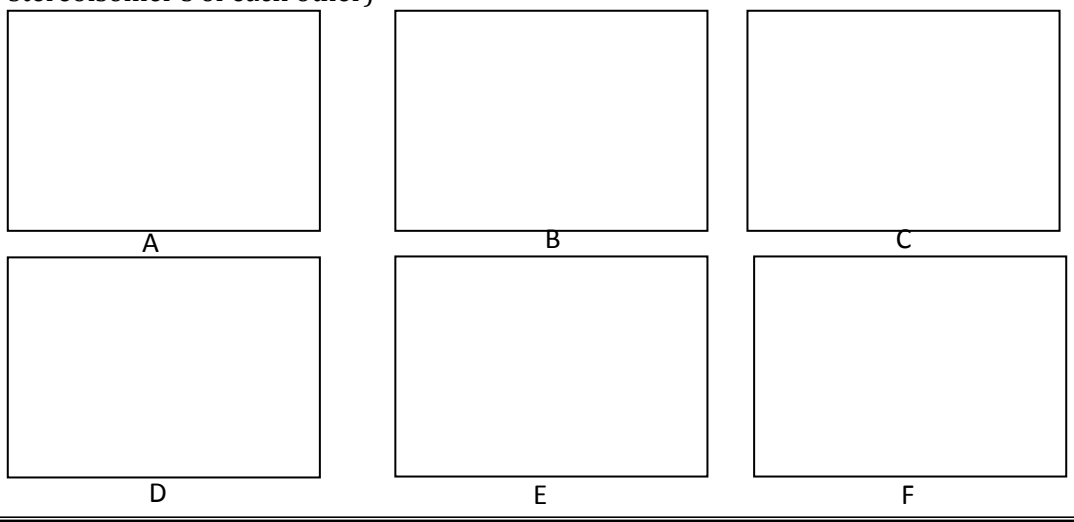
……

v. State the assumption that you used in above parts.

……

04. (a). A, B, C, D, E and F are six isomeric alkenes with seven carbon atoms. hydrogenation of them gives the same product G. G is an Optically active compound.

i. Draw the possible structures for A,B,C,D,E and F (A,B,C,D,E and F should be next be stereoisomer's of each other)

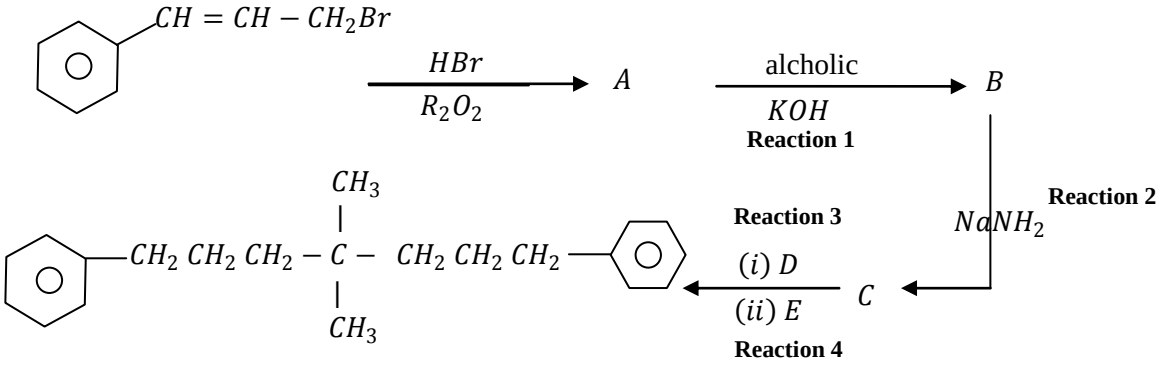


ii. Of the above isomers, which shows geometrical isomers? (not necessary to draw struactures)

……

……

(b). Consider the following reaction sequence,



i) Draw the structures of A,B and C in the given boxes.

A B C

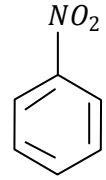
ii) What are the reagents D and E.
(D Aliphatic compound)

D :- E :-

iii) classify each of the reaction in the above sequence as nucleophilic addition (A_N) Electrophilic addition (A_E) nucleophilic substitution (S_N), Electophilic substitution (S_E), elimination (E) and acid - base (AB) by writing (A_N) (A_E) (S_N), (S_E), (E) (AB) in the appropriate cages.

Reaction	1	2	3	4
Reaction type				

(c). Write the mechanism for given reaction.



$$\xrightarrow[an\ hydrous\ \ AlCl_3]{CH_3Cl} X$$

write X.

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Part- II

Essay Question - B

❖ **Answer two questions only**

01. a.

i) 21 g of powdered solid $MgCO_3$ was added into $4moldm^{-3}, 25cm^3$ volume of HCl solution in a vessel with negligible heat heat capacity
$MgCO_{3(s)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + Co_{2(g)} + H_2O_{(l)} \quad \Delta H = -40KJmol^{-1}$
$[MgCO_3 M.W = 84]$
Calculate the heat released?

ii) Specific heat capacity and density of HCl acid solution are $4200JKg^{-1}K^{-1}$ and $1.19g\ cm^{-3}$ respectively. Calculate the temperature rise of the above solution?

iii) When 2g of solid Graphite and 2g of hydrogen gas are combusted the the released heat are 65.5 KJ and 286KJ respectively.

iv) If the enthalpy change of $Mg_{(s)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + H_{2(g)}$ is $-470KJmol^{-1}$. Calculate the formation enthalpy of $MgCO_{3(s)}$.

v) If the enthalpy change of $Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)} is -270kJmol^{-1}$
Calculate the enthalpy changes of the given below reaction
$Mg_{(s)} + ZnCl_{2(aq)} \rightarrow MgCl_{2(aq)} + Zn_{(s)}$

b. A,B and C are 3d elements of the periodic table. A doesn't has unpaired electron in ground stage. B has higher unpaired electrons in ground stage. C has higher melting point.

i) Write the chemicals symbols of A,B and C.

ii) Write the oxyanion and its colours formed by. A,B and C

iii) Write oxide its acidic, basic and amphoteric nature formed by B

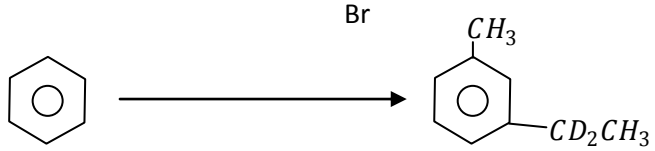
iv) Give a compound in which when on thermal decompose gives amphoteric Oxides OF B

v) Give the complex compound from by stable cation of A with NH_3

vi) Write the Oxycation and its colours of C.

c. Show how you would carry out the following conversions.

i. $CH_3CH_2CH_2Br \longrightarrow CH_3\underset{\underset{Br}{|}}{C}HCH_3$

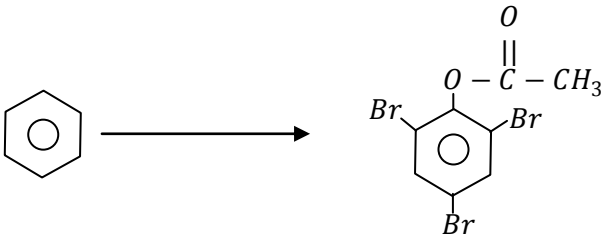
ii. 

iii. $CH_3C \equiv CH \rightarrow CH_3\underset{\underset{D}{|}}{C}H - \underset{\underset{D}{|}}{C}H - \underset{\underset{CH_3}{|}}{C}H - CH_3$

($CH_3C \equiv CH$ is only gives organic compound)

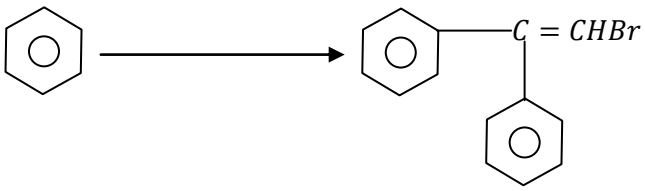
02.

(a) Show how you would carry out the following conversation



(b).

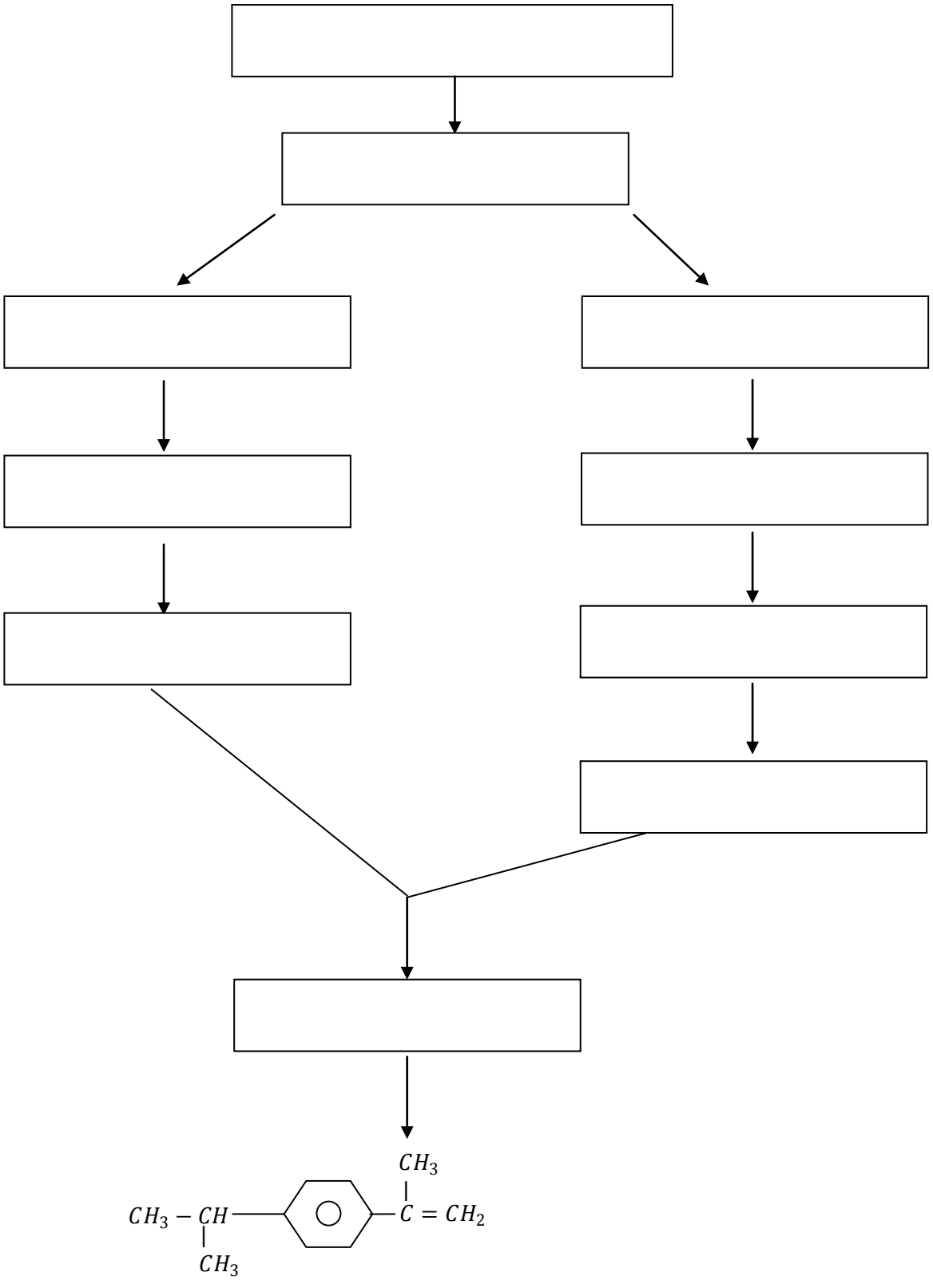
$PBr_3, dil\ H_2\ SO_4,\ Mg,$ dry ether , $CH_3\ COCl, Br_2, CCl_4,$ an hydrous $AlCl_3,\ C_2H_5OH, KOH$



(c). Using only the chemicals given in the list show how you would carry out the following conversation

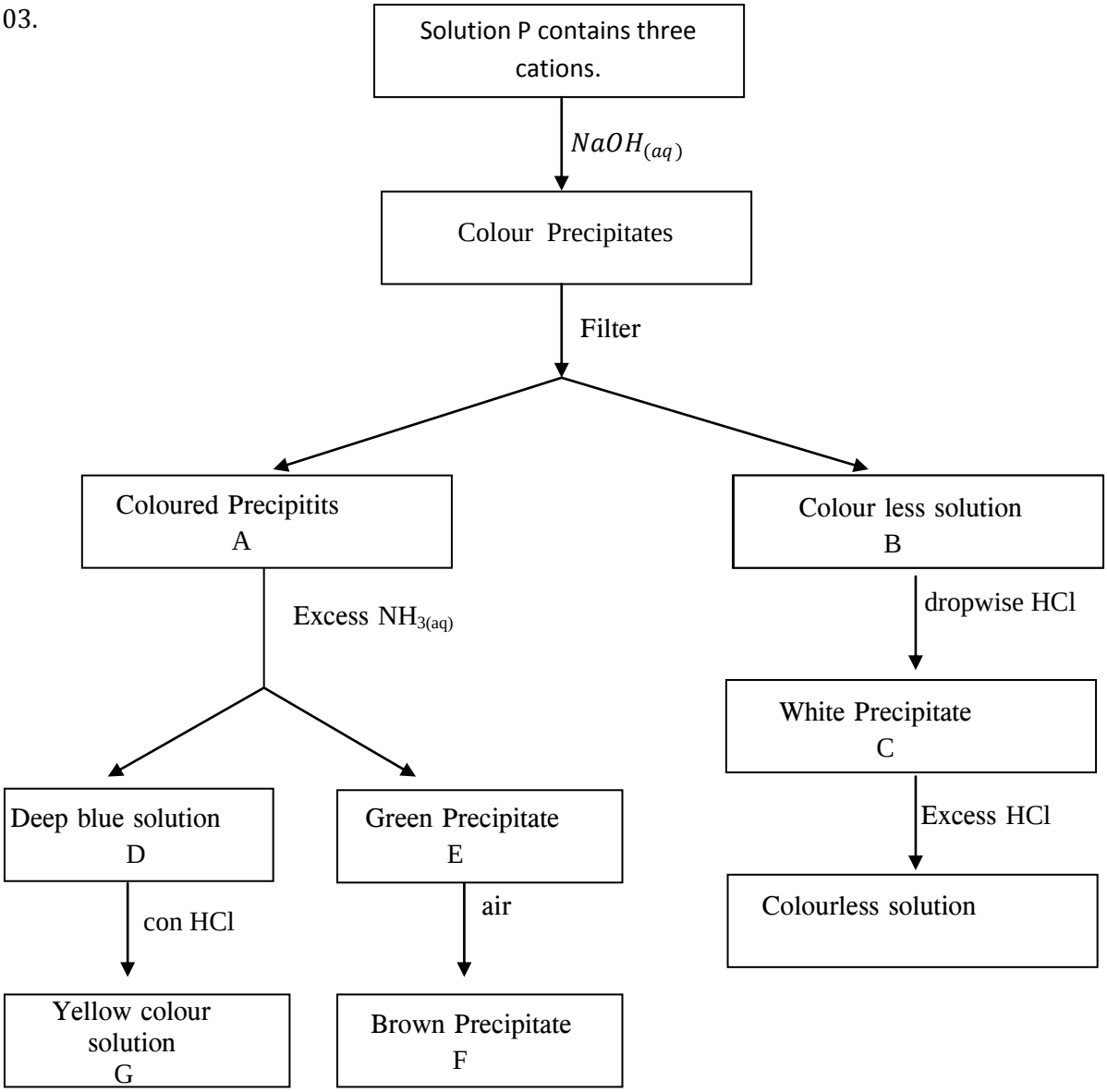
Chemical list

$CH_3CH_2CH_2Br, Water, benzene, Br_2, an.hy.FeBr_3, Mg, dry\ ether, C_2H_5OH, KOH, dilH_2So_4, HgSO_4, Con\ H_2SO_4, HBr, BrCH_2CH_2CH_2Br$



$$CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}} - \text{C}_6\text{H}_4 - \overset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} = CH_2$$

03.



- ❖ Cation of D doesn't give precipitate with H_2S in acidic medium
- ❖ metal of the compound C shows allotrope

I. What are the coloured precipitate in A

II. Identify and write the compound of B,C,D,E,F and G.

(b) Aqueous solution of X contains three anions to the above solution

i. A white precipitate was obtained when adding dil$HNO_3/BaCl_2$

ii. A colour gas was obtained when adding dillHCl

iii. A dark brown colour solution was obtained when adding $CuSO_{4(aq)}$

What are the three anions in the solution X?

(c) Two portions of equal volume of solutions were prepared by dissolving 0.12 kg sample containing Urea, $Na_3PO_4$and $CaCl_2$ in water. When adding excess silver acetate and $dilHNO_3$ to the first portion only 28.7g AgCl precipitate was obtained. when adding excess $Ba(OH)_2$ to other potion $60.1g\ Ba_3(PO_4)_2$ precipitate was obtained. Sample Contains 2.2g impurity. Find the mass of NH_3 Obtained When adding excess NaOH to a 0.12kg of the Sample.

$[Na-23,\ Cl-35.5,\ Ag-108,\ Ba-137,\ P-31,\ O-16,\ N-14]$.