

OBSERVATIONS: I - titration of

1. Solution in Burette: KMnO<sub>4</sub> solution
2. Solution in Pipette: 10ml M/20 F.A.S. Solutions of min
3. Solution in Conical flask: 10ml M/20 F.A.S. + one test tube of dil. H<sub>2</sub>SO<sub>4</sub>
4. Indicator: KMnO<sub>4</sub> solution
5. End point: Colourless to faint pinkish colour present

OBSERVATION TABLE:

	Burette Readings	Volume of F.A.S. (ml)	Volume of KMnO <sub>4</sub> (ml)	C.B.R.
	Initial Burette Reading (ml)	Final Burette Reading (ml)		
1.	0	10.2	10	10.2
2.	0	10.3	10	10.3
3.	0	10.2	10	10.2

$$\frac{3 \cdot 18}{2} = \frac{221}{2} = \text{Molar Mass}$$

$$M = \frac{Molar Mass \times 2}{221} = \frac{Molar Mass}{110.5}$$

$$M = \frac{Molar Mass}{110.5}$$

## CALCULATIONS :

$M_1$  = Molarity of  $\text{KMnO}_4$  used,  $M_2$  = Molarity of F.A.S.

$V_1$  = Volume of  $\text{KMnO}_4$ ,  $V_2$  = Volume of F.A.S.

minimum dilution to neutralise  $\text{MnO}_4^-$

as in 1st, no. of  $\text{KMnO}_4$  stoichiometric

### A] Molarity of $\text{KMnO}_4$

$$5M_1 V_1 = M_2 V_2$$

$$5M_1 \times 10.2 = 1 \times 10$$

$$M_1 = 1 \times 10 \times \frac{1}{5} = 0.2 \text{ M}$$

$$100.2 \times 10.2 \times 5 = 100.2 \times 2 \times 0.2 = 0.0001$$

$$M_1 = 0.01 \text{ M}$$

$$100.2 \times 2 \times 0.2 = 100.2 \times 2 \times 0.0001 = 0.0002$$

### B] Strength of $\text{KMnO}_4$ solution:

$$\text{Strength} = M_1 \times \text{Molar mass of } \text{KMnO}_4 \text{ used to } \text{PSP:0}$$

$$= 0.01 \times 158$$

$$100.2 \times 0.01 \times 158 = 1.58 \text{ g/l}$$

$$100.2 \times 0.01 \times 158 = 1.58 \text{ g/l}$$

0.25

## II - Zinc borate estimation

### OBSERVATION:

1. Solution in burette: KMnO<sub>4</sub> solution
2. Solution in pipette & 10ml M/40 oxalic acid solution
3. Solution in conical flask: 10ml M/40 oxalic acid + one test tube of H<sub>2</sub>SO<sub>4</sub>
4. Indicator: KMnO<sub>4</sub> solution
5. End point: Colourless to Faint pink

OBSERVATION TABLE

Burette Readings	Initial Burette reading(ml)	Final Burette reading(ml)	Volume of oxalic acid(ml)	Volume of KMnO <sub>4</sub> (ml)	C.B.R.
0	0	9.7	10	9.7	9.7
0	0	9.5	10	9.5	9.5
0	0	9.7	10	9.7	9.7

Observation readings

Molar concentration of KMnO<sub>4</sub> solution, i.e., H<sub>2</sub>SO<sub>4</sub>, KMnO<sub>4</sub> solution, etc., Burettes, Conical flask, Test tube, Weighing balance, etc.

Block 9 mins:

[A] Block 9 mins: KMnO<sub>4</sub> solution to notice the color change to pink

Wooler weight = 0.45g. (COOC<sub>2</sub>H<sub>5</sub>)<sub>2</sub> to excess KMnO<sub>4</sub>

basic solution to  $\text{pH} = \text{basic solution } \text{M}_1 = 0.05\text{M}$

**CALCULATIONS:** basic solution to  $\text{pH} = \text{basic solution } \text{M}_1 = 0.05\text{M}$ ,  $\text{M}_2 = \text{Molarity of } \text{KMnO}_4$   
 $\text{M}_1 = \text{Molarity of oxalic acid}$        $\text{M}_2 = \text{Molarity of } \text{KMnO}_4$   
 $V_1 = \text{Volume of oxalic acid}$        $V_2 = \text{Volume of } \text{KMnO}_4$

A] Molarity of  $\text{KMnO}_4$

$$\therefore 5\text{M}_1V_1 = 2\text{M}_2V_2$$

$$5 \times 0.05 \times 9.7 \text{ ml} = 2 \times \frac{1}{10} \times 1.9$$

240

$$\therefore \text{M}_2 = \frac{9.7 \times 5}{2 \times 1.9} = 0.0103 \text{ M}$$

$$\therefore \text{M}_2 = 0.01 \text{ M}$$

B] Strength of  $\text{KMnO}_4$

Strength of  $\text{KMnO}_4$  solution =  $\text{Molar mass of } \text{KMnO}_4$

~~strength of solution =  $158 \text{ g/mol}$~~

11 p.m.

## Experiment 17

OBSERVATION:

- 1) Initial temperature of acid and base =  $t_1^\circ\text{C} = 33^\circ\text{C}$
- 2) Final temperature after neutralisation =  $t_2^\circ\text{C} = 39^\circ\text{C}$
- 3) Change in temperature  $\Delta t = (t_2 - t_1)^\circ\text{C} = (39 - 33)^\circ\text{C} = 6^\circ\text{C}$
- 4) Mass of the mixture solution after neutralisation = 200g
- 5) Calorimeter constant of calorimeter =  $W/T^\circ\text{C}$

• ~~Initial mass of acid + initial mass of base = 200g~~

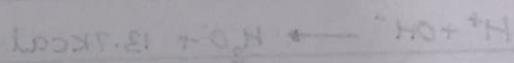
• ~~Final mass of acid + final mass of base = 200g~~

• ~~Initial temperature of acid + initial temperature of base =  $33^\circ\text{C} + 33^\circ\text{C} = 66^\circ\text{C}$~~

• ~~Final temperature of acid + final temperature of base =  $39^\circ\text{C} + 39^\circ\text{C} = 78^\circ\text{C}$~~

• ~~Change in temperature =  $(78 - 66)^\circ\text{C} = 12^\circ\text{C}$~~

• ~~Calorimeter constant =  $W/T^\circ\text{C}$~~



To find out the heat of reaction of  $\text{HCl}$  and  $\text{NaOH}$  we can use the above equation.

## Methodology

• ~~Take two beakers, one containing  $\text{HCl}$  solution and other containing  $\text{NaOH}$  solution.~~

• ~~Measure the initial temperature of both the solutions.~~

• ~~Now add the  $\text{NaOH}$  solution to  $\text{HCl}$  solution.~~

• ~~Measure the final temperature of the mixture.~~

## Observations

- a) ~~Reaction of  $\text{HCl}$  and  $\text{NaOH}$  is exothermic.~~
- b) ~~Heat of reaction of  $\text{HCl}$  and  $\text{NaOH}$  is  $57.2 \text{ kJ/mol}$ .~~

## CALCULATIONS:

### Determination of calorimeter constant:

$$t_1 \text{ (temp of cold water)} = 25^\circ\text{C}$$

$$t_2 \text{ (temp of hot water)} = 55^\circ\text{C}, t_3 \text{ (temp of mixture)} = 40^\circ\text{C}$$

$$W = 4.184 \times \left( 100 \times \frac{(t_2 - t_1)}{(t_3 - t_1)} - 100 \right)$$

$$= 4.184 \times \left( 100 \times \frac{(55 - 25)}{(40 - 25)} - 100 \right) = \underline{\underline{0.1^\circ\text{C}}}$$

### Enthalpy of neutralisation:

Enthalpy change during neutralisation of 100ml of 1M HCl:

$$\Delta H = (200 + W) \times (t_{\text{mix}} - t_{\text{mean}}) \times 4.184 \text{ J}$$

Enthalpy change during neutralisation of 1000 ml of 1M HCl:

$$\Delta H = (200 + W) \times (t_{\text{mix}} - t_{\text{mean}}) \times 4.184 \times \frac{1000}{100} \text{ J}$$

$$\Delta H = 200 \times (39^\circ\text{C} - 33^\circ\text{C}) \times 4.184 \times 10 = \underline{\underline{50200 \text{ J}}}$$

$$\Delta H = 50.2 \text{ kJ}$$

∴ Heat is produced during neutralisation reaction, ∴ the enthalpy of neutralisation is negative.

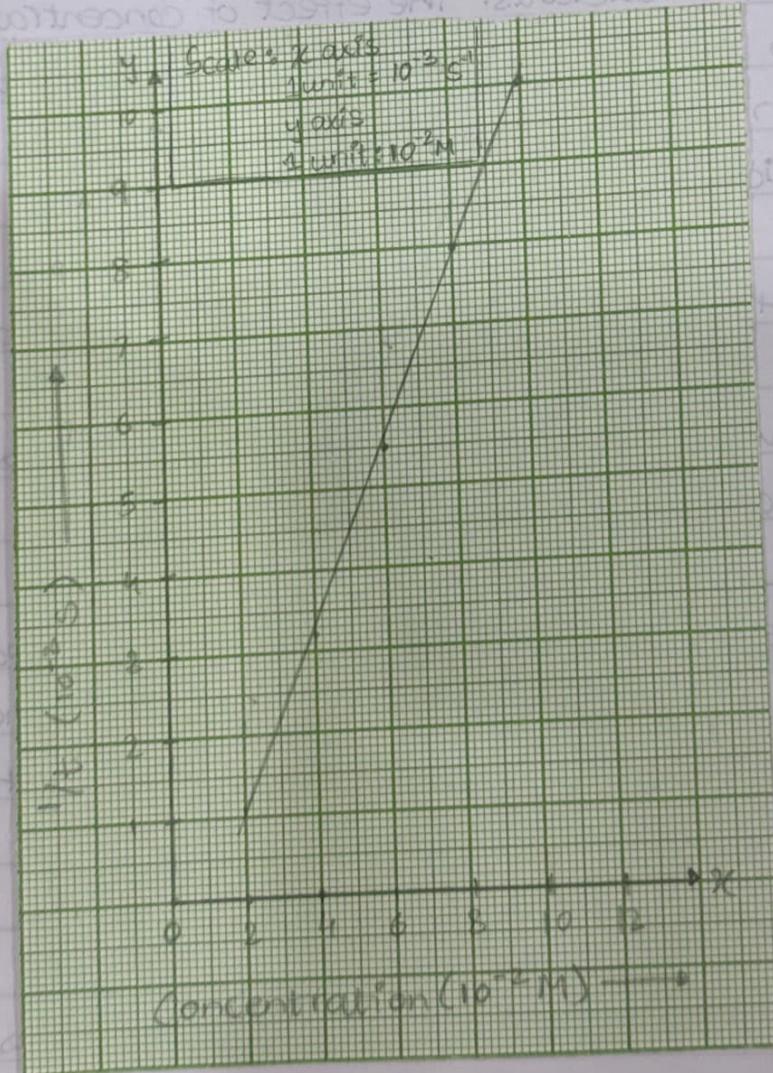
Enthalpy of neutralisation = 50.2 kJ

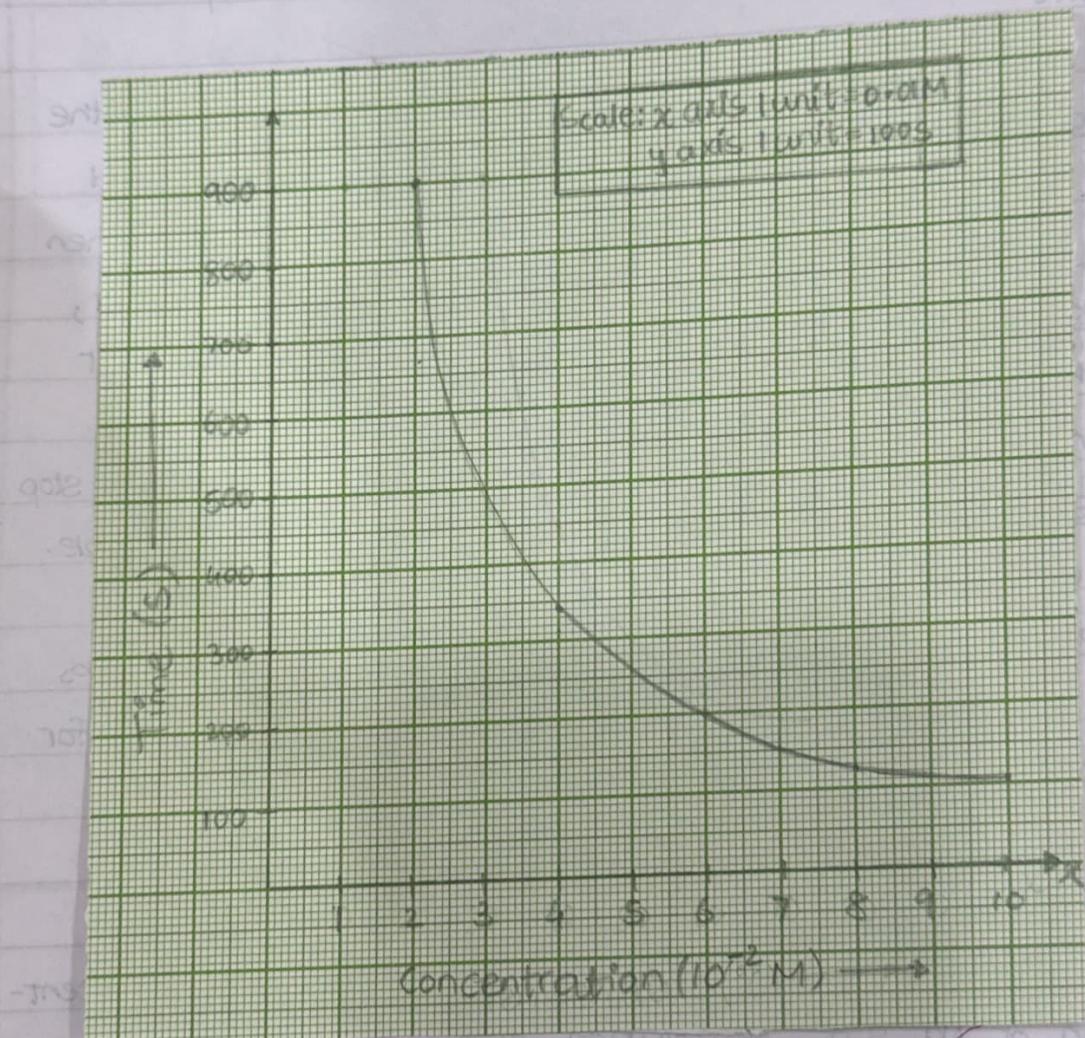
## I - Potassium Iodide

## OBSERVATIONS:

Flask No.	Vol. of $\text{Na}_2\text{S}_2\text{O}_3$ sol. (ml)	Vol. of water (ml)	Total Vol. of soln. (ml)	Concentration of $\text{Na}_2\text{S}_2\text{O}_3$ sol.	Vol. of 1M HCl (ml)	Time taken for cross to become invisible (s)	$\frac{1}{t}$ (s <sup>-1</sup> )
1.	10	40	50	0.02M	10	900	0.0011
2.	20	30	50	0.04M	10	312.5	0.0032
3.	30	20	50	0.06M	10	222.2	0.0055
4.	40	10	50	0.08M	10	125.0	0.0080
5.	50	0	50	0.1M	10	100.0	0.0095

Graph showing the effect of concentration on the rate of reaction.





## II - Enzymatic Reactions

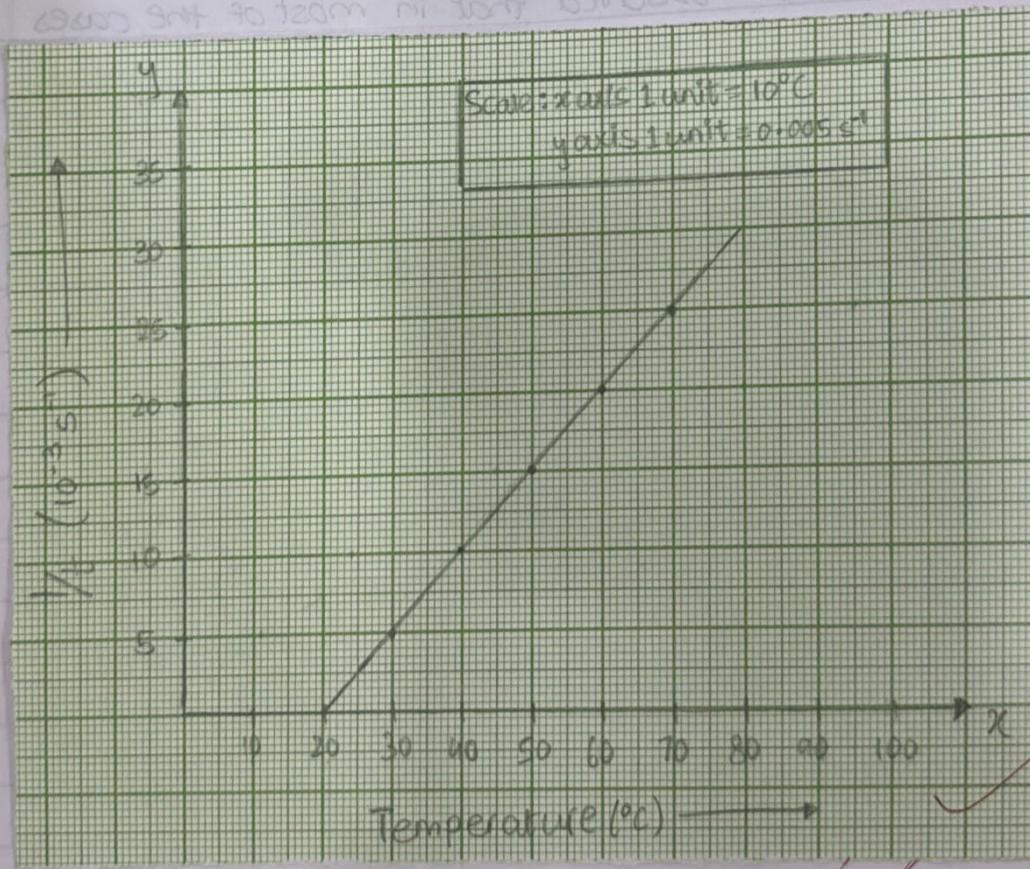
OBSERVATIONS:

Volume of 0.05M  $\text{Na}_2\text{S}_2\text{O}_3$  solution taken each time = 25ml

Volume of 0.05M HCl added each time = 10ml  $\text{stc}$

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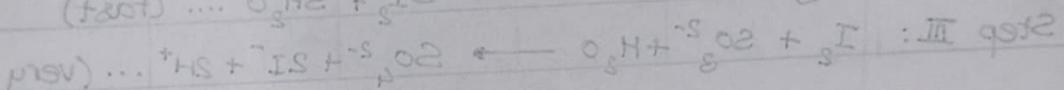
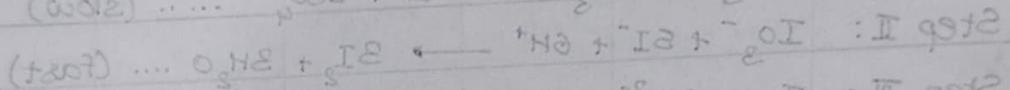
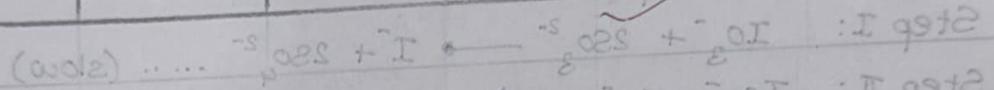
Sr. No.	Temperature ( $^{\circ}\text{C}$ )	Time taken for cross to become invisible (s)	$\frac{1}{t} (\text{s}^{-1})$
1.	30	180	0.005
2.	40	90	0.011
3.	50	60	0.016
4.	60	45	0.022
5.	70	38	0.026



### III - iodine titration

#### OBSERVATION TABLE:

Flask	Volume of 0.1M $KIO_3$ (ml)	Volume of dil. $H_2SO_4$ (ml)	Volume of water (ml)	Starch solution (ml)	Volume of 0.01M $Na_2S_2O_3$ added (ml)	Time of appearance of blue colour(s)
1.	10	10	80	5	20	360 sec
2.	20	20	70	5	20	180 sec
3.	30	30	60	5	20	120 sec
4.	40	40	50	5	20	90 sec



(trot)

samples ior leact min posiswion bldnck  
at kssiboi as oksitant, anoi shiboi ior. Ioboi  
jiboi pd leacton nif mols. Iobine  
towms pd leacte imwsiblity with sibk  
ioboi tormd cewmrd, hte ipselede iobine will use  
as comwsy any mols dhs pds com, if sibk  
be posisw. Tht spes leacton can be  
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Wutiolele bedmings: A cominc hte  
- gte, stt pds bldnck

stt pds mols M. O. rbs

, stt pds mols hte bestpns

### III - Primary Emulsions

principles ni zinaga principles fo gao ent pblts of min  
OBSERVATION TABLE: dia transffis fo noisiums ent

Test tube	Oil used for emulsification	Time taken for separation of layers	
		Without soap	With soap
A	Coconut oil	180 sec	158 sec
B	Groundnut oil	90 sec	57 sec
C	Mustard oil	90 sec	180 sec
D	Castor oil	60 sec	240 sec

DATE	10.10.10

REMARKS

: Fluor

all toxic foreign top to semi developed from all emulsion  
from this species operate right if it clear and careful

.1 lot of 100

growing its surface minimum cover the bottom  
a layer of the leaves minimum cover the lower

: 27 description of classification

.1 lot of 100 , coconut oil , mustard oil , oil of turmeric

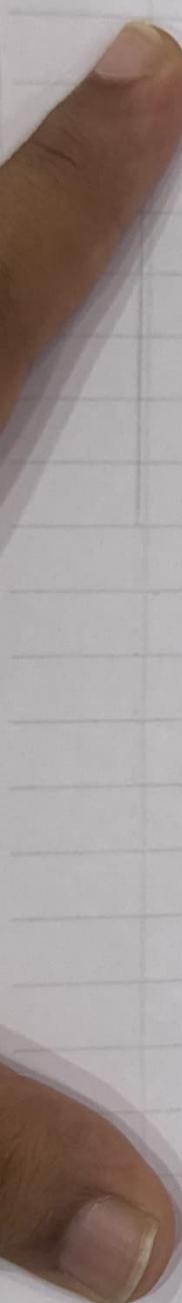
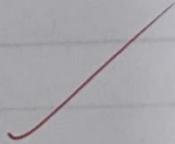
: description

100 of nothin

no 2

21 pristine

out not ready



DATE	07.04.18

Sl. No.	Colour of the spot	Distance travelled by components from reference line	Distance travelled by solvent from reference line	R <sub>f</sub> values
1.	Faint green	2 cm	0.3 cm	0.667
2.	Orange brown	3.6 cm	1.3 cm	0.833

~~CALCULATION:~~ R<sub>f</sub> values can be calculated by plusing the following expression:

$$R_f = \frac{\text{Distance travelled by substance from the reference line (cm)}}{\text{Distance travelled by solvent from the reference line (cm)}}$$

Distances travelled by solvent & from the reference line (cm)

Distances travelled by solvent & from the reference line (cm)

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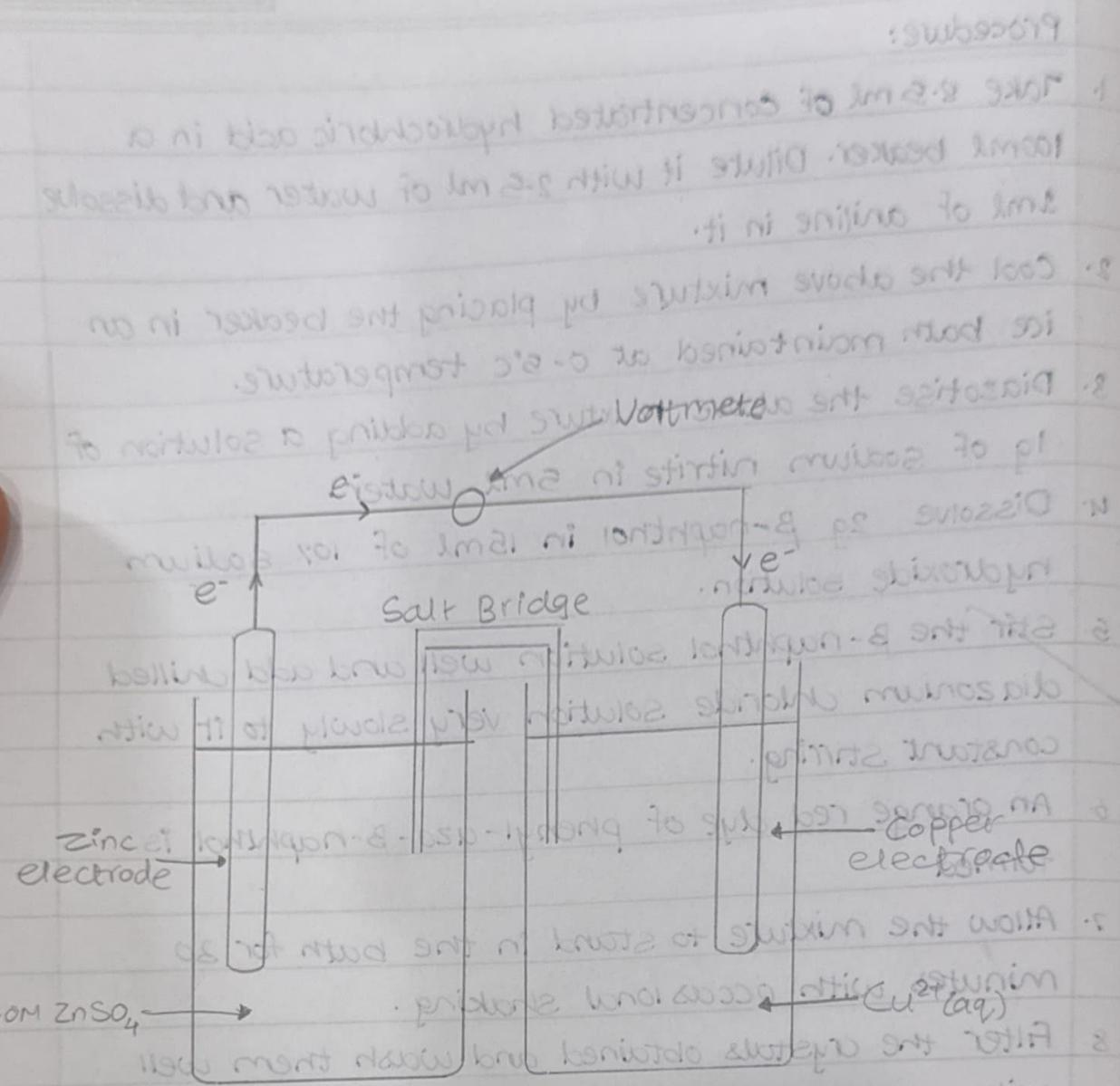
Distances travelled by solvent & from the reference line (cm)

$$R_f = \frac{\text{Distance travelled by substance from the reference line (cm)}}{\text{Distance travelled by solvent from the reference line (cm)}}$$

(cm)

(cm)

DATE	09.09.
PERIOD	



Setup of  $Zn(s)/Zn^{2+}(aq) \parallel Cu^{2+}(aq)/Cu(s)$  cell

(1.0M) (2.0M)

islands

→ B.A.N. e. Iontophor - B-e-n-y-l-i-o-n-t-o-n-i-t-e  
→ Methyl bovine IgG - B-e-n-y-l-i-o-n-t-o-n-i-t-e  
→ Cation of Glucosamine - IgG O-glyc -

bile canaliculi

→ Migration of leukocytes in the tissues of O-2C  
during infection

Amidase and proteases  
enzymes in neutrophils migrate to the site of infection

## Practical Work

Notes: (1) Mass of zinc in burrolog 116.5 to 116.75 gm  
 (2) Mass of copper to calculate mass of zinc

**OBSERVATION TABLE** prepared over 10 days

Concentration of $ZnSO_4$ solution	Concentration of $CuSO_4$ solution	EMF of the cell
1M	1M	1.11V
0.5M	0.5M	1.09V
0.25M	0.25M	1.052V
0.125M	0.125M	1.049V
0.0625M	0.0625M	1.047V
0.03125M	0.03125M	1.045V

Notes: (1) Zinc is more reactive than copper.  
 (2) Zinc is less reactive than copper.  
 (3) Zinc is more reactive than copper.  
 (4) Zinc is more reactive than copper.

$$\frac{[M]_{\text{pol}} - [M]_0}{[M]} = e^{-\frac{E}{RT}}$$

Methodology: To find out the effect of concentration of zinc sulphate on the emf of the cell.

Notes: (1) Zinc is more reactive than copper.  
 (2) Zinc is more reactive than copper.  
 (3) Zinc is more reactive than copper.

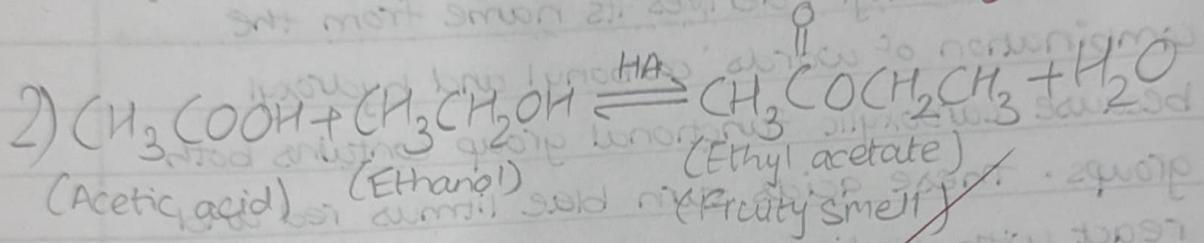
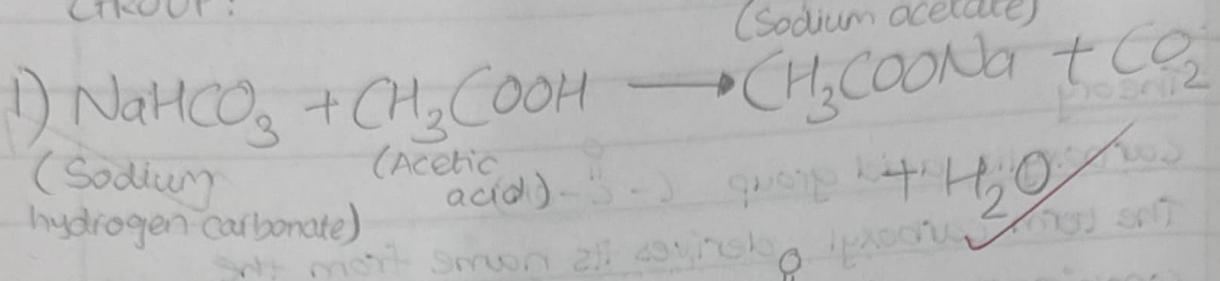
Results:

- To take copper sulphate solution in a clean beaker.
- Clean the copper sulphate solution with water.
- To take zinc sulphate solution in a clean beaker.

J - group reaction

## CHEMICAL REACTIONS FOR CARBOXYLIC ACID (in J-group)

GROUP:



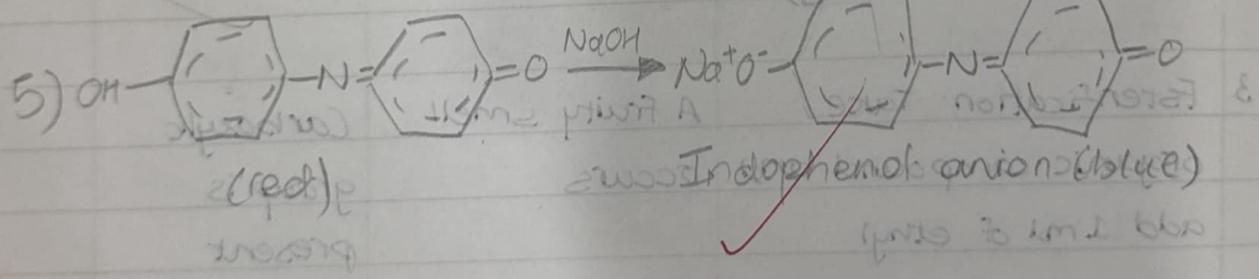
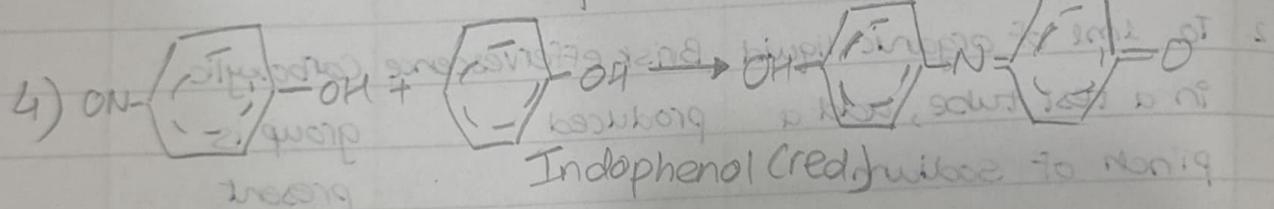
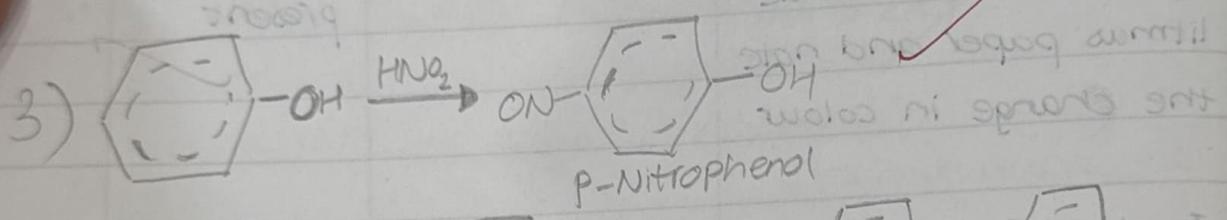
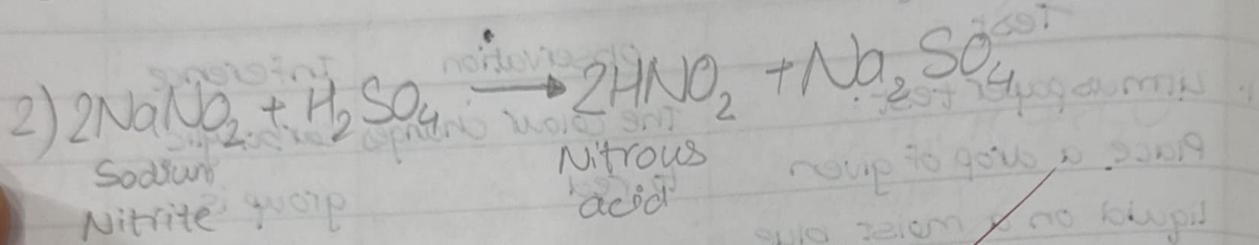
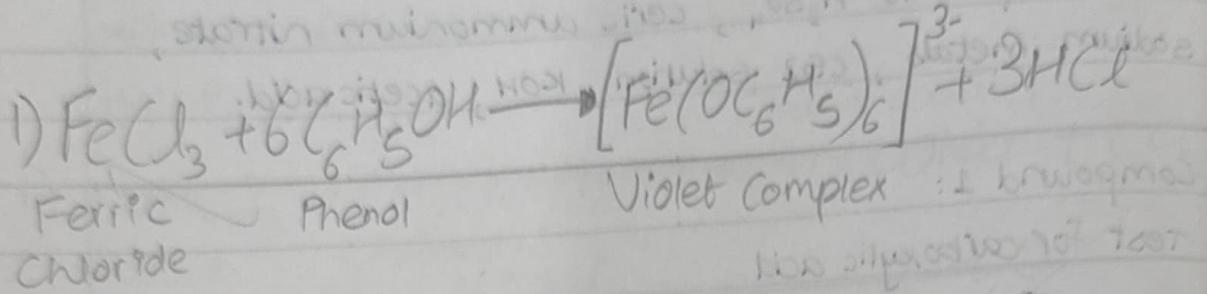
(HO-RA) group structure

radio part of hydroxyl carbonyl group HO- RA  
group HO- silicon is called ester group no to  
the part, silicon acids give esters  
esters are formed from HOH or acids  
in which one of either protein or sugar  
moieties structure polymer molecule

(HO) group structure

Acidic nature of carboxylic acids comes  
from the fact that it is a strong acid.  
It has shortness, more basic form is H-

## CHEMICAL REACTIONS FOR PHENOLIC GROUP

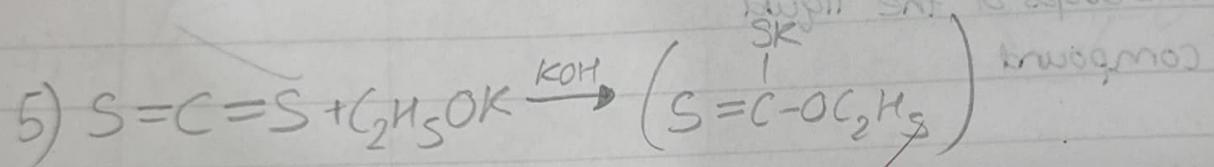
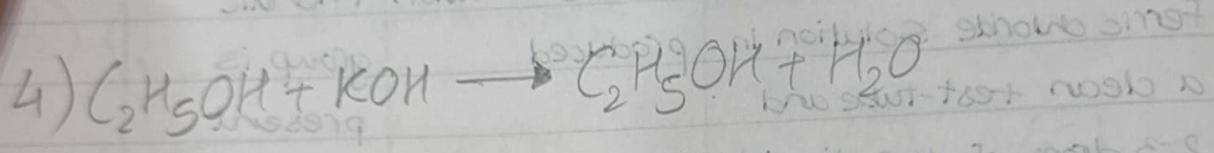
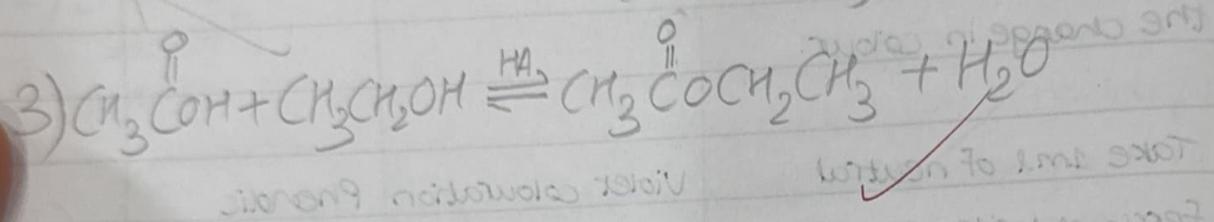
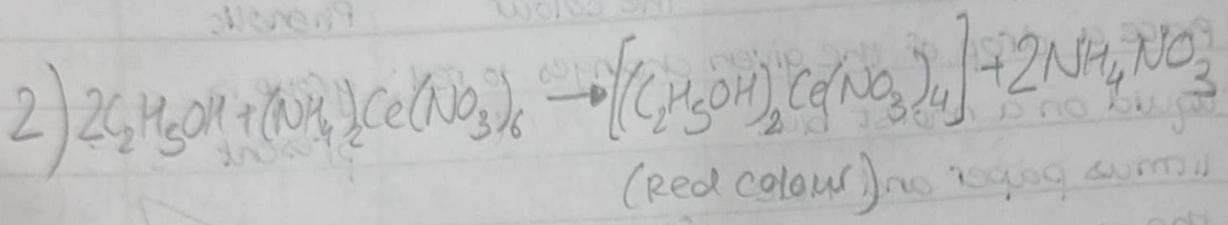
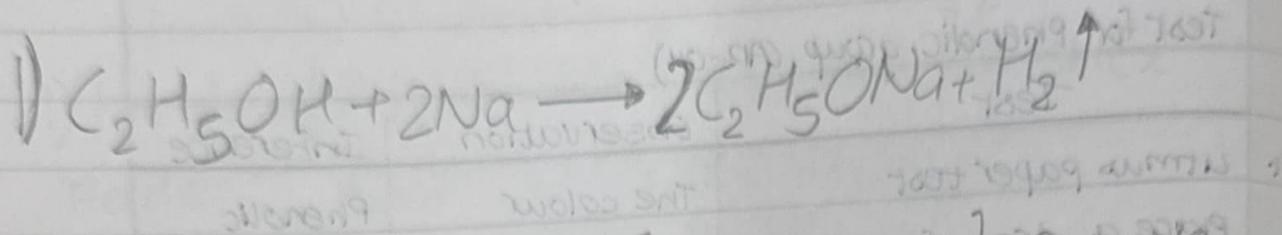


Reactions of substituted phenols involve simple nucleophilic substitution reactions because the substituent group is relatively inert.

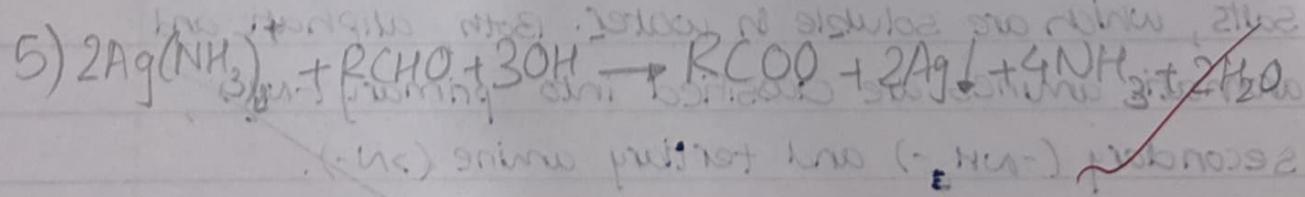
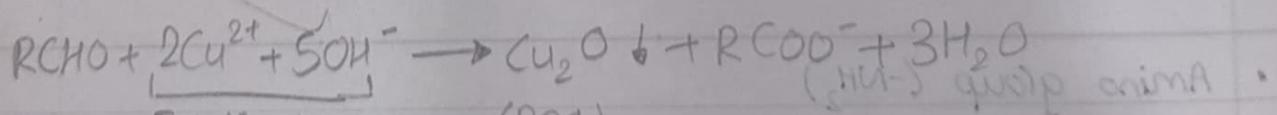
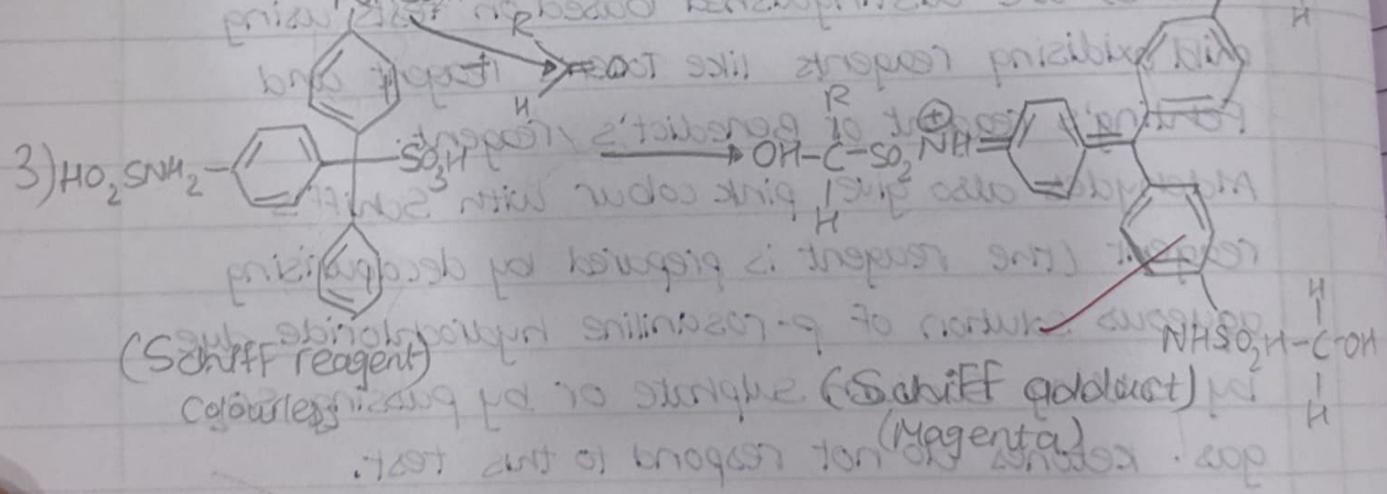
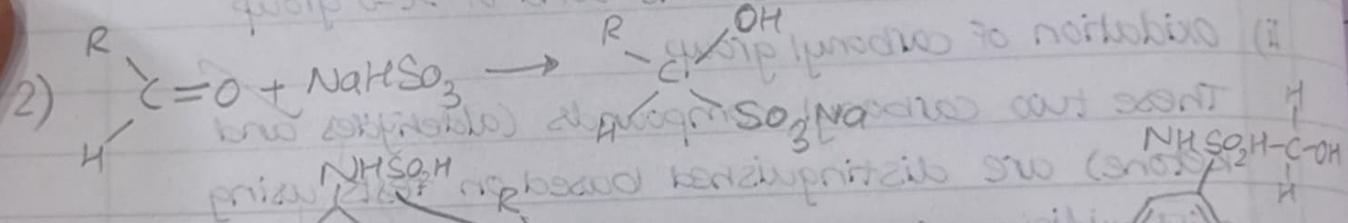
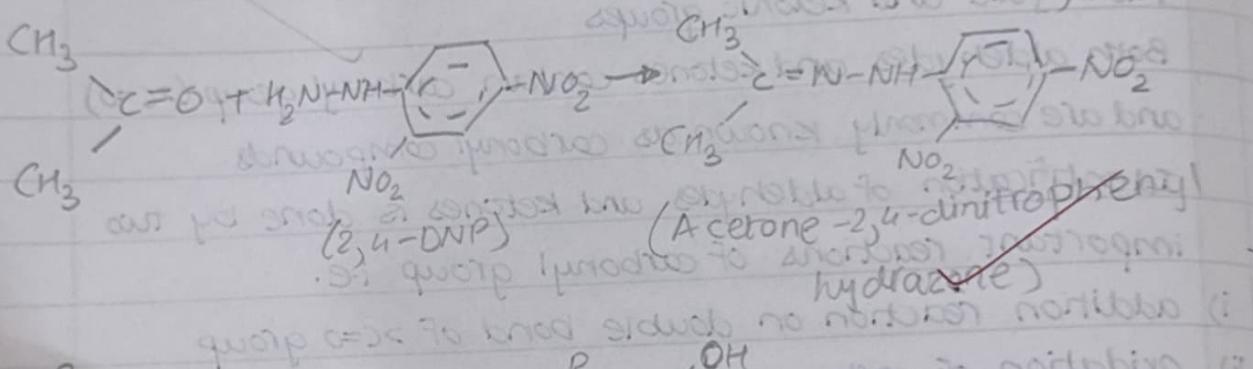
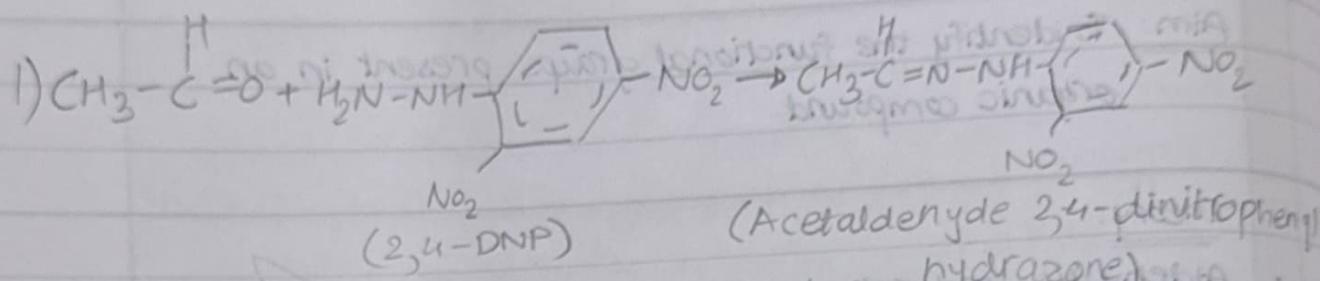
(H<sub>3</sub>O<sup>+</sup>)  $\rightarrow$  white

## CHEMICAL REACTIONS FOR ALCOHOLIC GROUP:

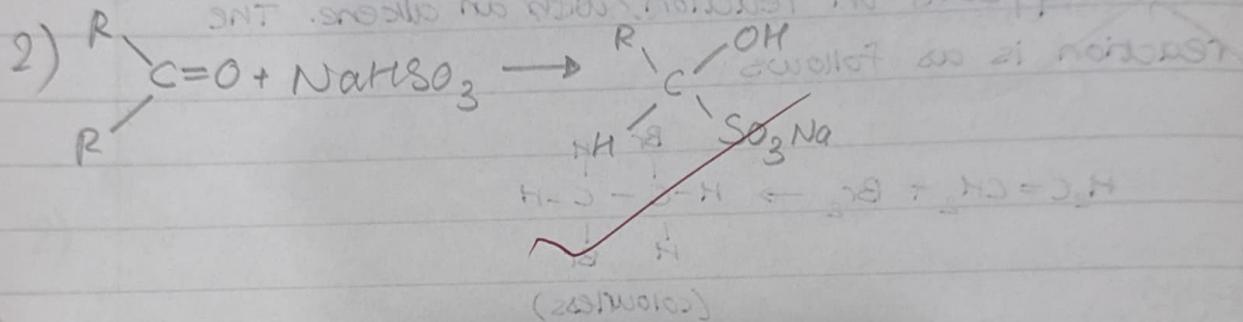
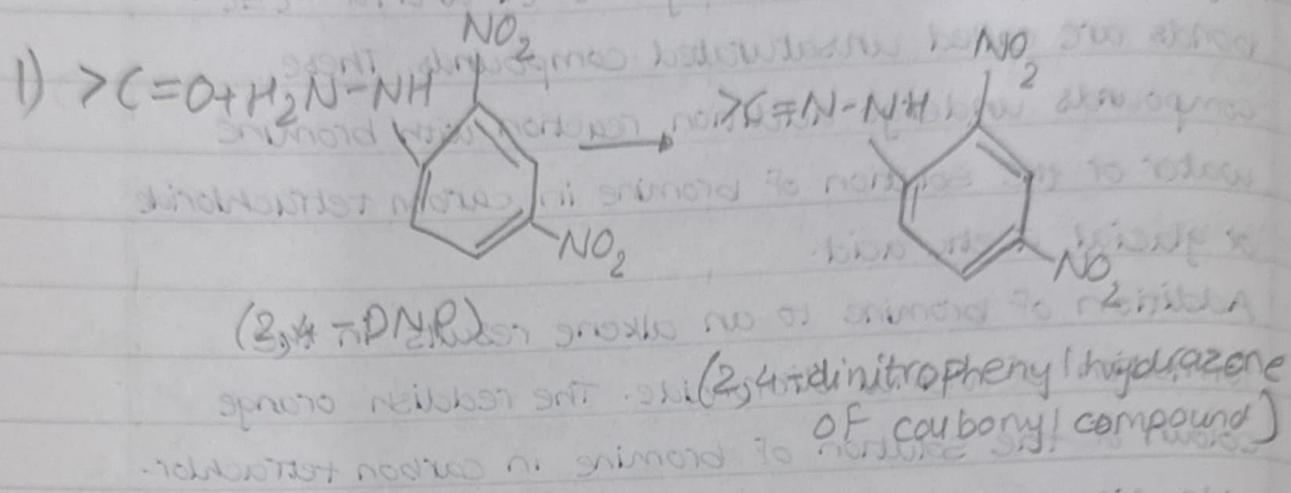
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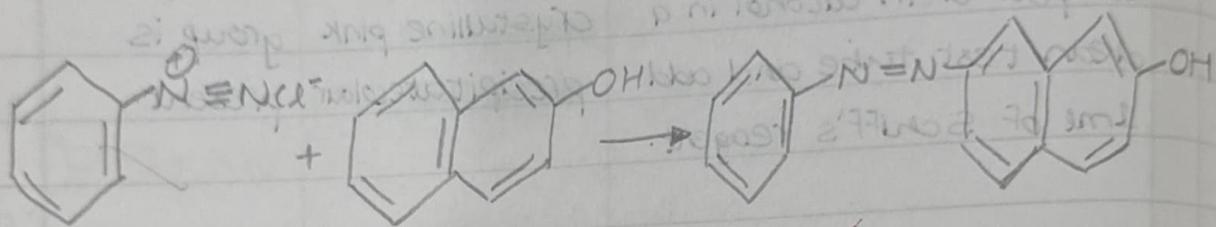
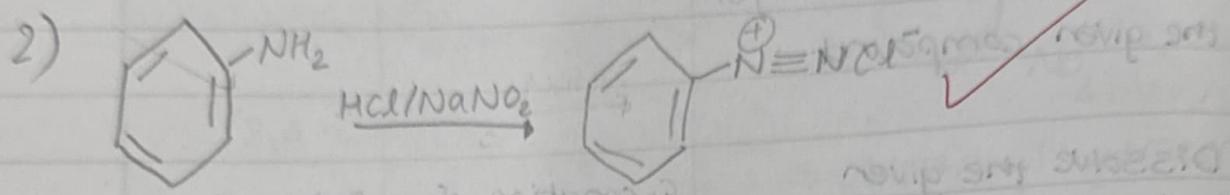
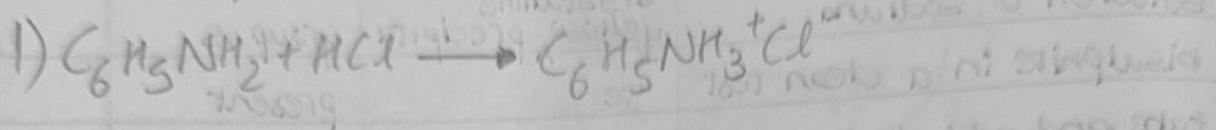
## CHEMICAL REACTIONS FOR ALDEHYDE GROUP:



# CHEMICAL REACTIONS FOR KETONE GROUP



## CHEMICAL REACTIONS FOR AMINO GROUP:

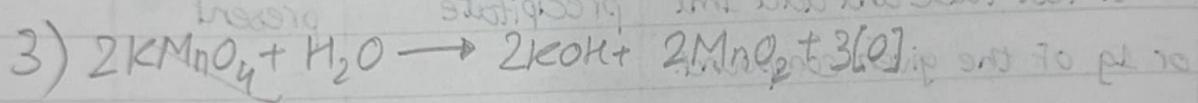


Aromatic compounds + nitro groups → aromatic nitro compounds  
 Aniline + Phloracetophenone → 2-(2-hydroxyphenyl)-4-nitroaniline

React: Phenyl aldehydes  
 Product: Phenyl ketones  
 General:  $\text{R}_2\text{C=O} + \text{R}'_2\text{C}(=\text{O})\text{R}' \rightarrow \text{R}_2\text{C}(=\text{O})\text{R}' + \text{R}'_2\text{C=O}$

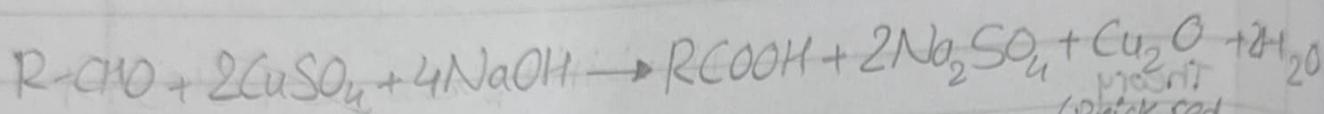
General:  $\text{R}_2\text{C=O} + \text{R}'_2\text{C}(=\text{O})\text{R}' \rightarrow \text{R}_2\text{C}(=\text{O})\text{R}' + \text{R}'_2\text{C=O}$

## CHEMICAL REACTIONS FOR UNSATURATION

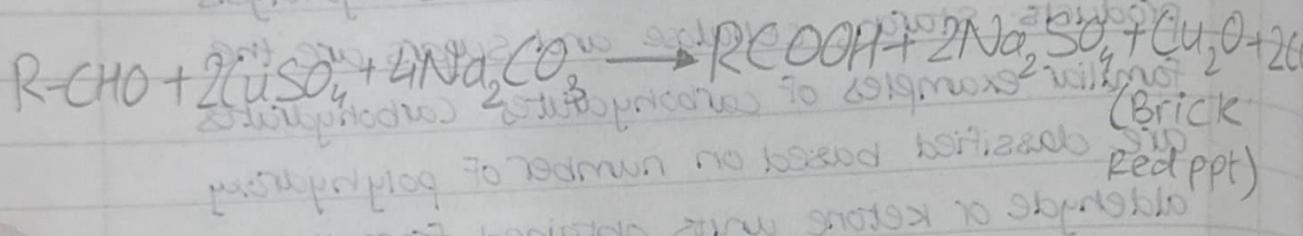


## CHEMICAL REACTIONS FOR CARBOHYDRATES:

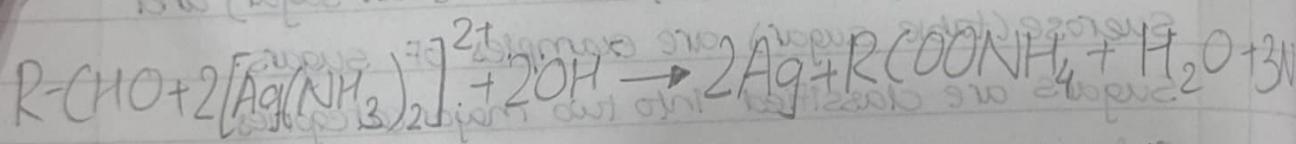
1) Fehling's solution test: (Brick red ppt)



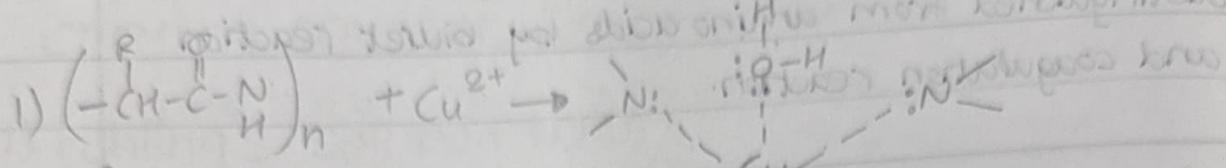
2) Benedict's test: (Brick Red ppt)



3) Tollen's test: (Silver mirror)



## CHEMICAL REACTIONS FOR PROTEINS



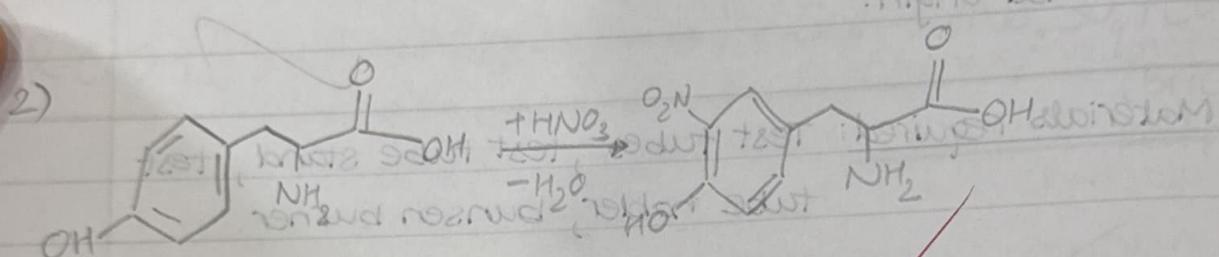
Proteins

R groups will not react with metal ions because they do not have double bonds or triple bonds.

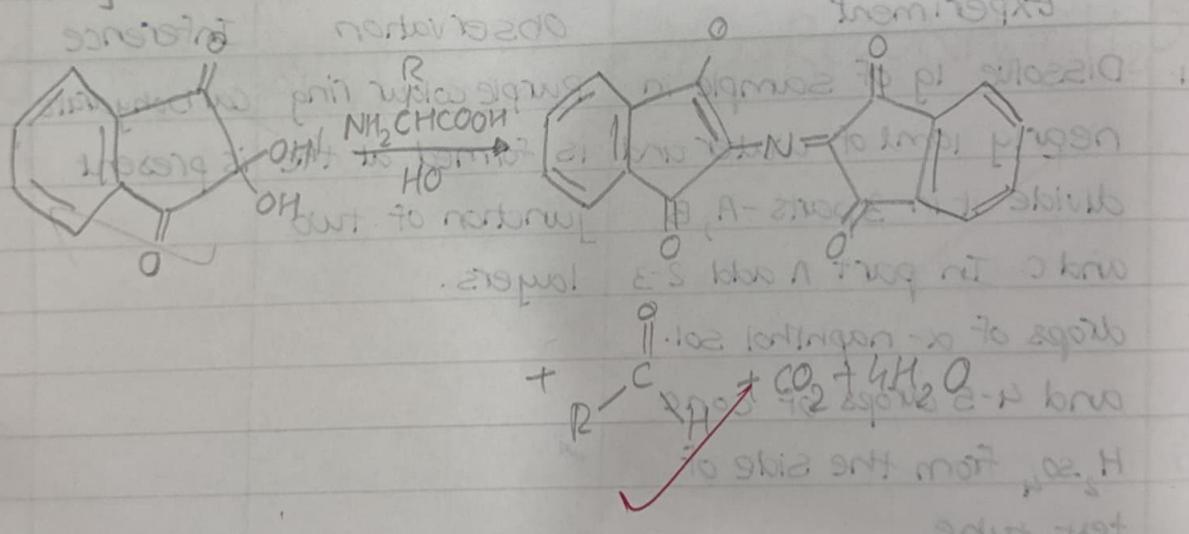
Hydroxyl groups H-O-H may act as ligands to form complex.

Violet colour

Complex



### 3) Ninhydrin Test:



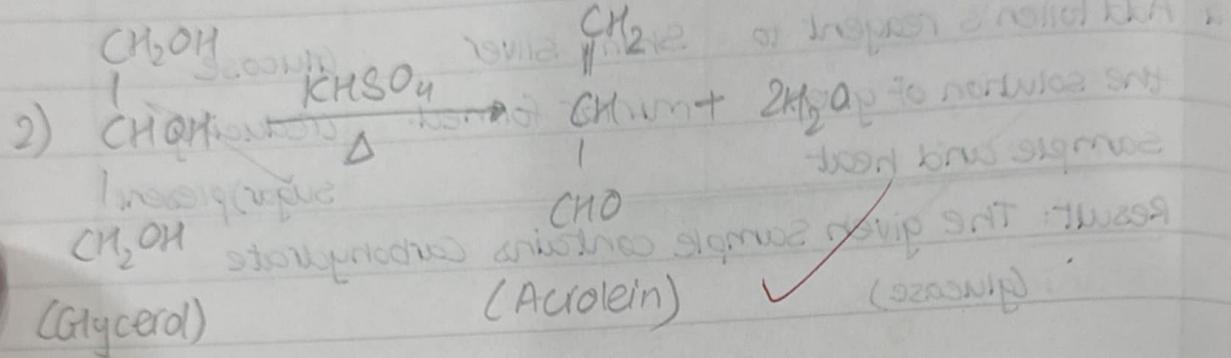
Blue is a primary color

Blue is formed by -NH<sub>2</sub> group

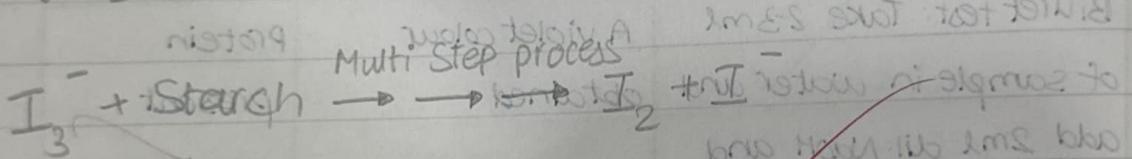
Blue is formed by NH<sub>2</sub> group

## CHEMICAL REACTIONS FOR FATS

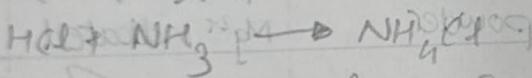
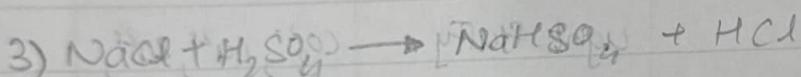
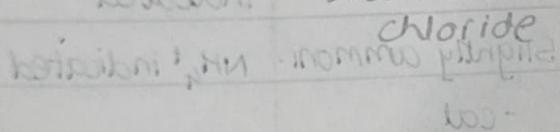
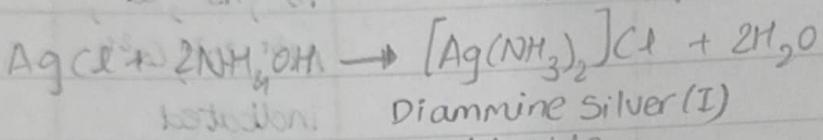
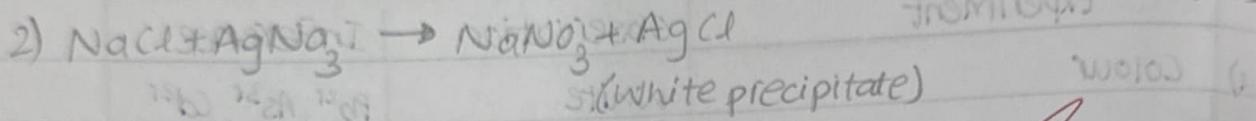
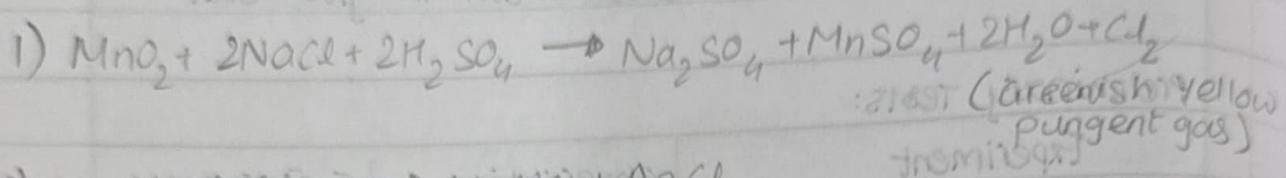
1) Oil or fat  $\xrightarrow{\Delta}$  Glycerol + Fatty acids (most in keto form)



## CHEMICAL REACTIONS FOR STARCH



## TEST FOR CHLORIDE ION ( $\text{Cl}^-$ ).



(white fumes)

(white fumes)

(white fume)

test solution

column 1

Column 2

white fume

white fume

mild fume - white fume

white fume

test solution

white fume

white fume

white fume

white fume

test solution

white fume

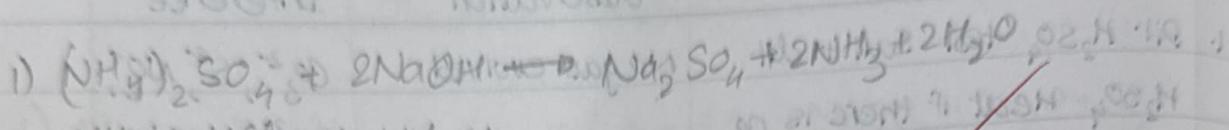
white fume

## TEST FOR AMMONIUM (ION) ( $\text{NH}_4^+$ ) will go to diaform

analysing

nitration

from 10g x 3



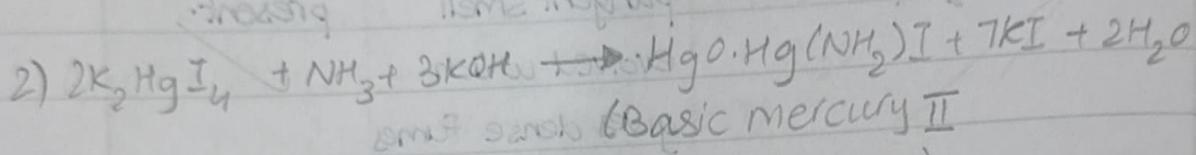
↓ white (Dense white)

so form (fumes) ammonia

- heating

forming

test like shrivelling and

 $\text{CO}_2 + \text{CaCO}_3 \rightarrow \text{CaO}$ 

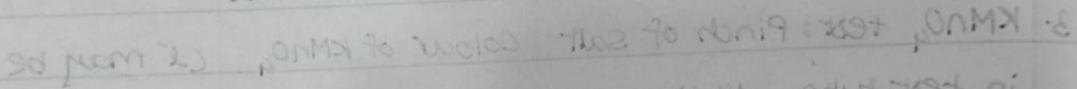
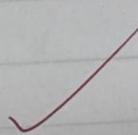
(Basic Mercury II)

to cold. Amido-Iodine

no, no in brown

brownish colour

brown test to white



- heating

topwards at

in test tube + all  $\text{H}_2\text{O}$ but now more all  $\text{H}_2\text{O}$ now add  $\text{KMO}_4$ 

- sulphuric acid

## 4. CUPROSCOPIC TEST

1. Take 1 g of sample in a crucible

2. heat sample over a bunsen burner till

3. wood smoke appears. Evaporate water in

4. ash of colour. After heating for 15

5. Heat the crucible until charred

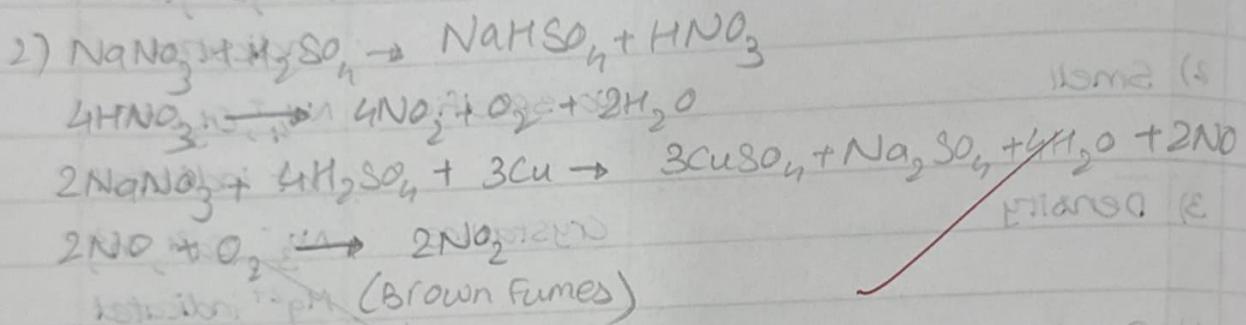
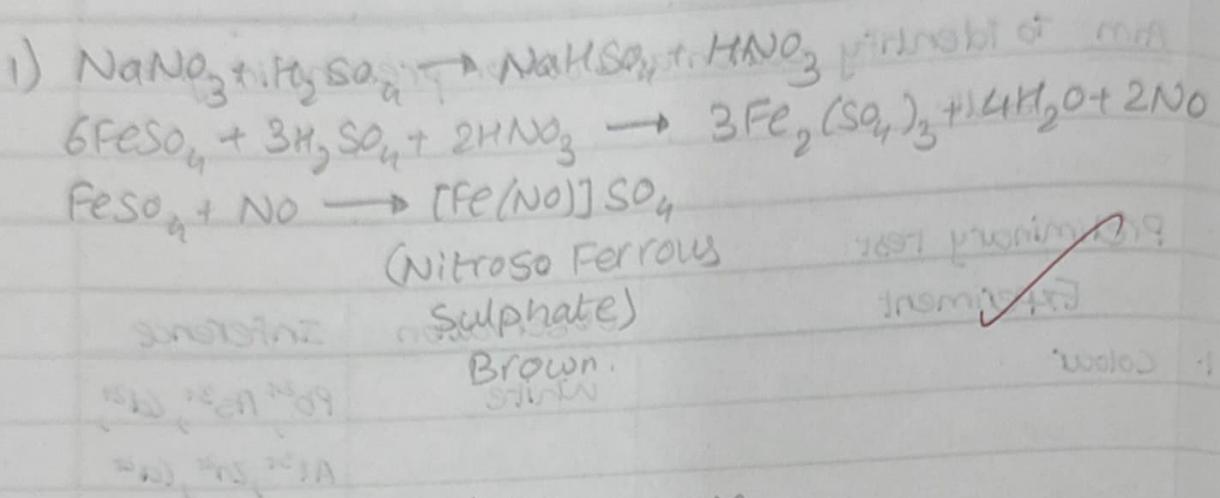
mixtures

6. A few drops of dilute HCl to remove carbon

solution

normal solution

## TEST FOR NITRATE ION ( $\text{NO}_3^-$ )



Instruction: Add few drops of concentrated sulphuric acid slowly to dilute nitric acid.

(SO<sub>4</sub>)<sub>2</sub> present no

SO<sub>3</sub><sup>2-</sup>

ketone

is of yellow colour

leptidines

Na<sup>+</sup> + Cl<sup>-</sup> in HCl

clouds in water soluble

soluble in water

soluble in water

soluble in water

soluble in water

yellow solution

yellow

yellow fume

clouds lot of bubbles in HCl

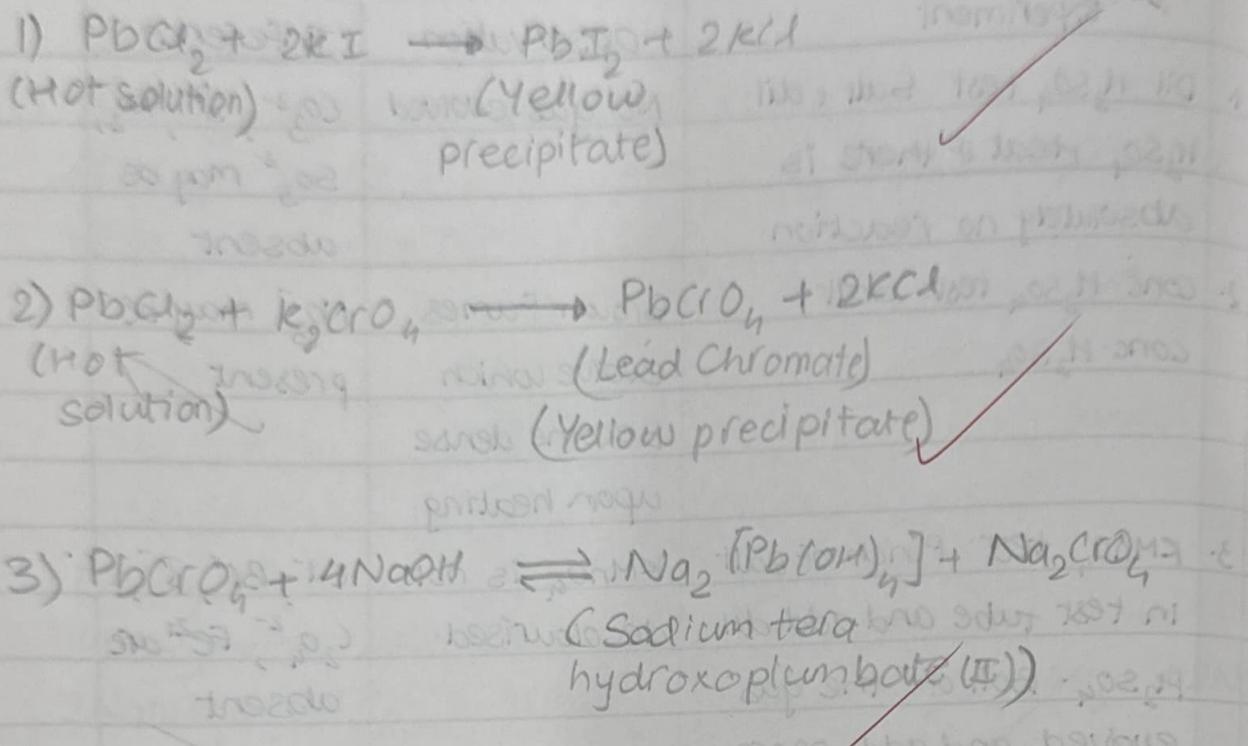
yellow and green

yellow cloud fume

yellow

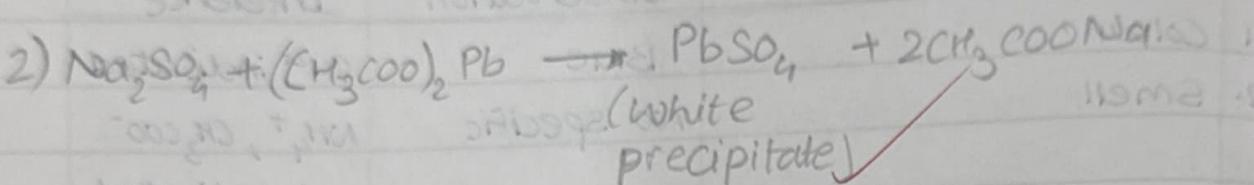
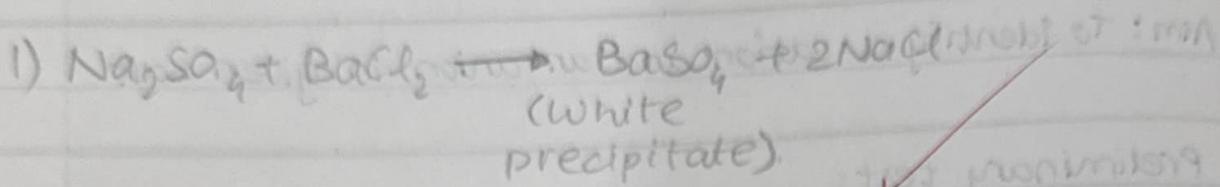
yellow

## TEST FOR LEAD ION ( $Pb^{2+}$ )

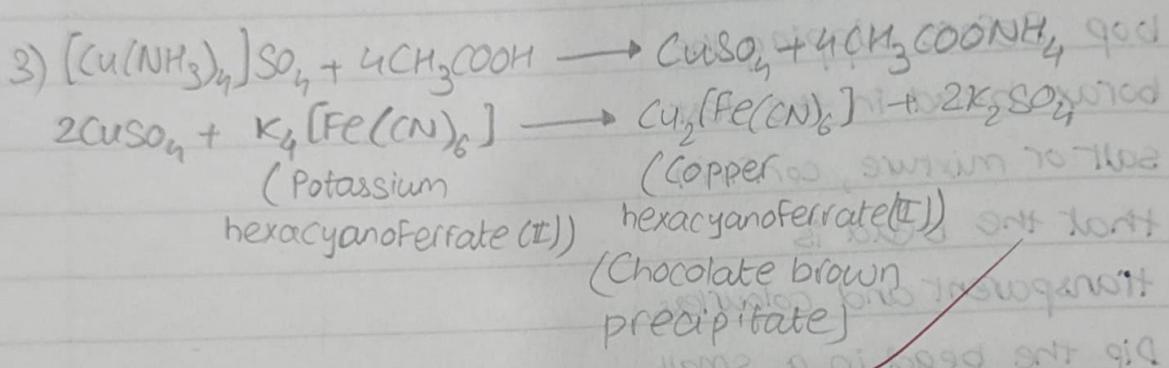
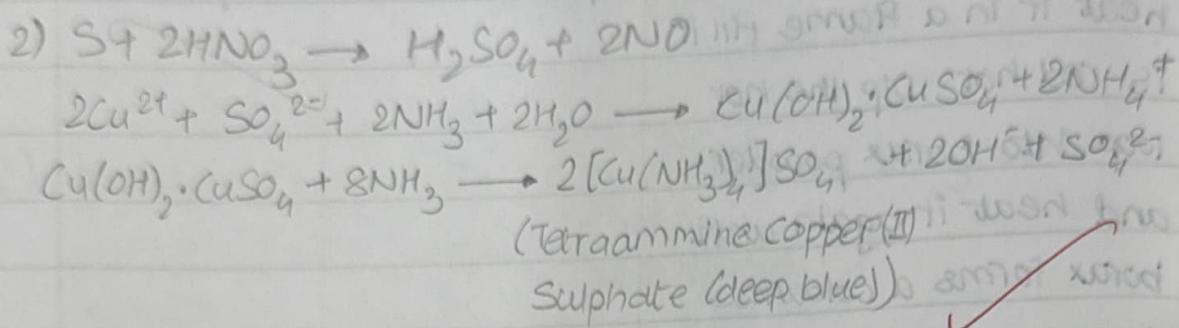
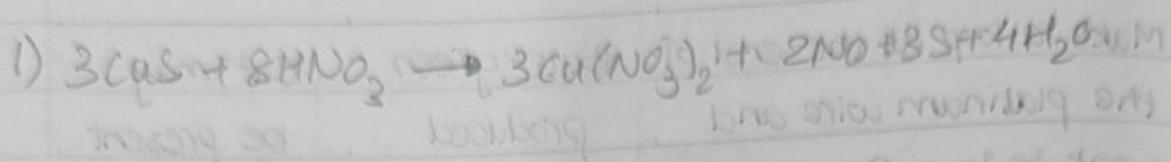


STAN	Am. 09

## TEST FOR SULPHATE ION ( $SO_4^{2-}$ )



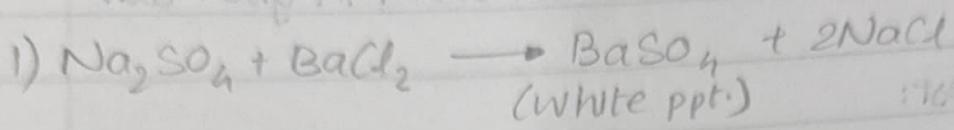
## TEST FOR CUPRIC ION ( $Cu^{2+}$ )



( $\text{SO}_4^{2-}$ )  $\text{Ba}^{2+}$  sulphate test

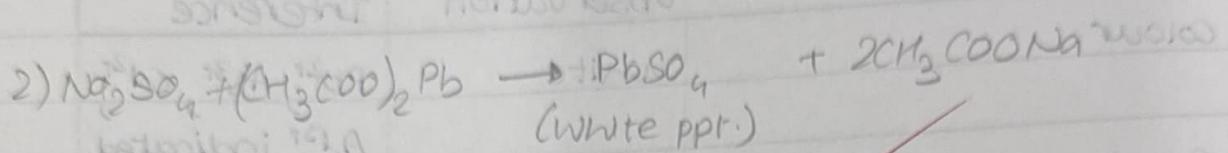
## TEST FOR SULPHATE ION ( $\text{SO}_4^{2-}$ )

These reagents are known as tests for the presence of  $\text{SO}_4^{2-}$



surahit  
narkat

test for presence of  $\text{SO}_4^{2-}$   
narkat



test for  $\text{SO}_4^{2-}$   
ion  
-  $\text{CH}_3\text{COO}^-$   
-  $\text{NH}_3^+$   
-  $\text{Na}^+$   
-  $\text{Ca}^{2+}$   
-  $\text{Ba}^{2+}$

name - s

purpose - s

test proceed in

test + NaCl

previous test

no precipitate

comes to liquid

show test

comes to white solid in case BaSO<sub>4</sub> formed

NaCl + BaCl<sub>2</sub> +  $\text{CH}_3\text{COO}^-$

smell

character could test

comes to white solid in case  $\text{PbSO}_4$  formed

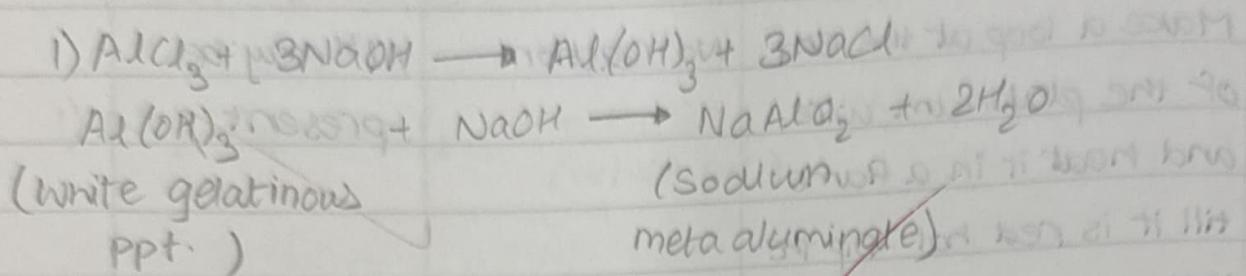
NaCl + BaCl<sub>2</sub> +  $\text{CH}_3\text{COO}^-$

comes to white solid in case  $\text{BaSO}_4$  formed

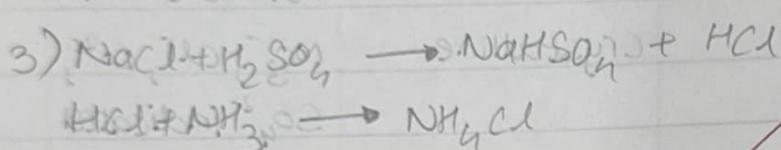
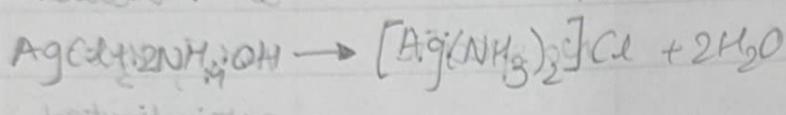
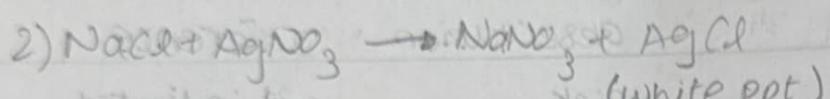
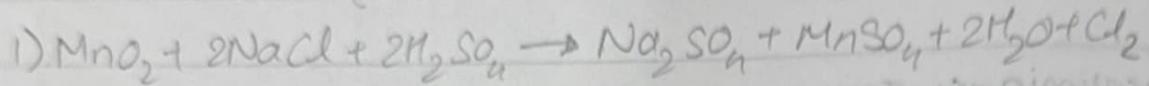
show test

TEST	BASE

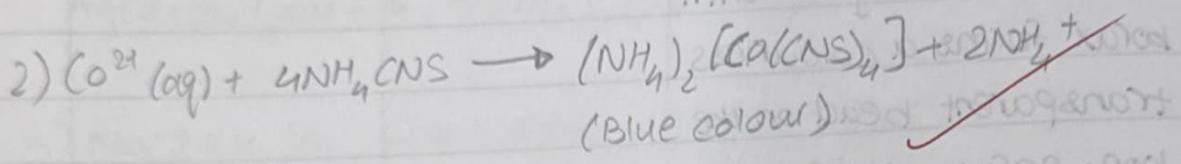
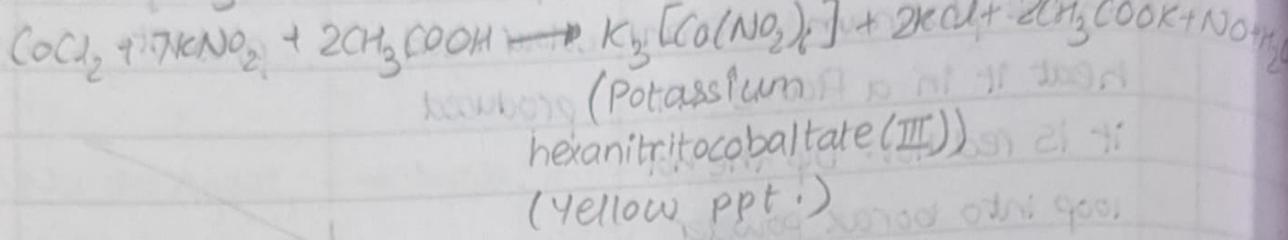
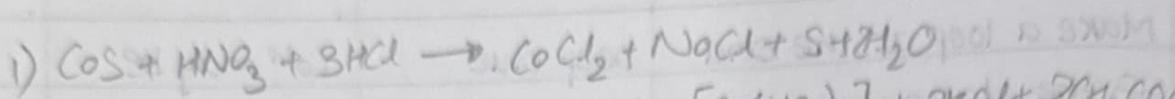
## TEST FOR ALUMINIUM ION ( $\text{Al}^{3+}$ )



## TEST FOR CHLORIDE ION ( $\text{Cl}^-$ )



## TEST FOR COBALT ION ( $\text{Co}^{2+}$ )



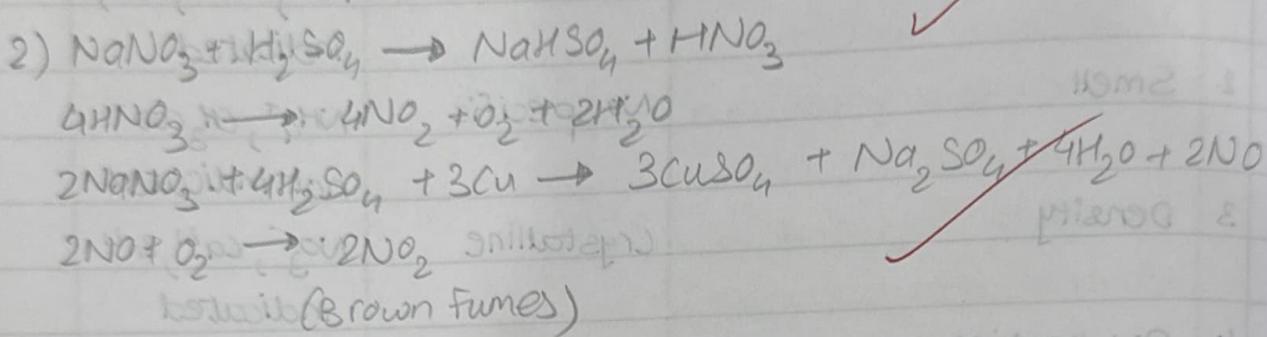
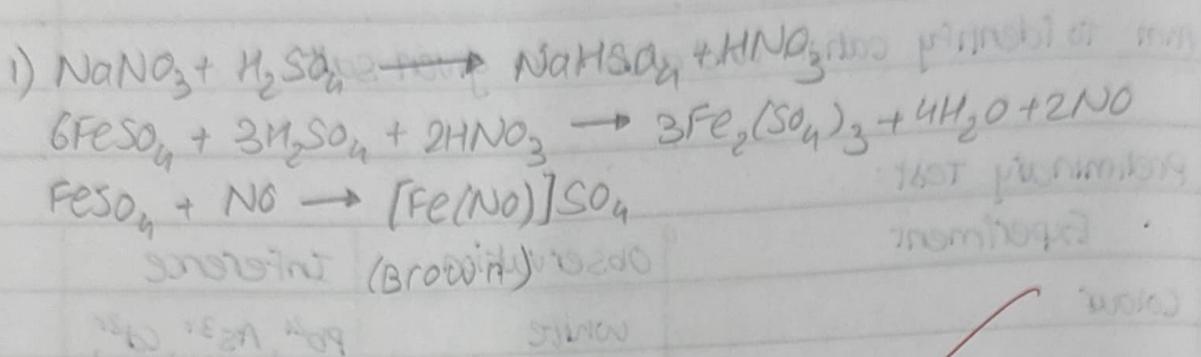
$\text{Co}^{2+}$  is not  
detectable

8. Cobalt nitrate test

Since this is a  
basic test for  
cations, it is  
not suitable

(not suitable for acidic cations)

## TEST FOR NITRATE ION ( $\text{NO}_3^-$ ) (continued)



brown fumes  
brown colour  
smell of  
brown

TEST phenomenon  
Ebullition

purple  
no colour  
 $\text{NO}_2$

brown colour

brown

brown fume

brown fume  
brown colour  
smell of

brown fume

$\text{Ca}^{2+}$   
 $\text{CO}_3^{2-}$ ,  $\text{CH}_3\text{COO}^-$

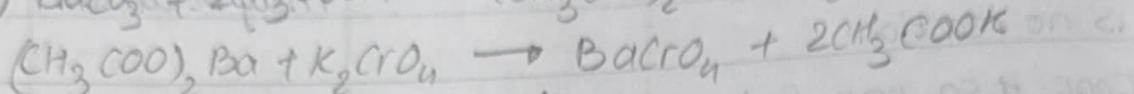
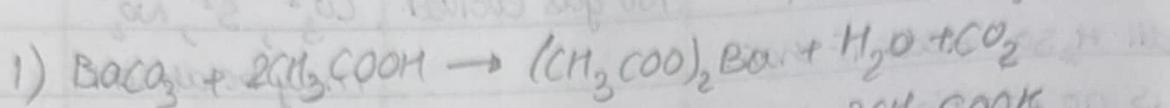
$\text{Na}_2\text{SO}_4$   
smell of

$\text{CaCO}_3 + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$   
white precipitate

small amount of  
big white

ability to precipitate

## TEST FOR BARIUM ION ( $\text{Ba}^{2+}$ )



(Barium chromate)  
 (Yellow ppt.)

purple precip.

yellow precipitate  
 shows  
 BaCrO<sub>4</sub>

N. Colorimetric test.

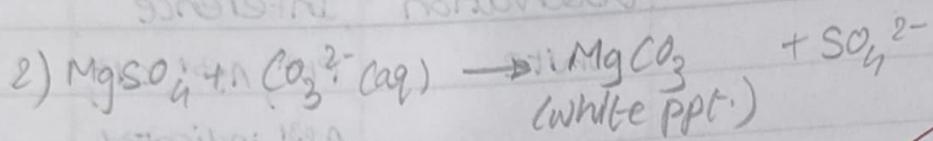
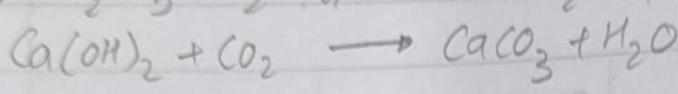
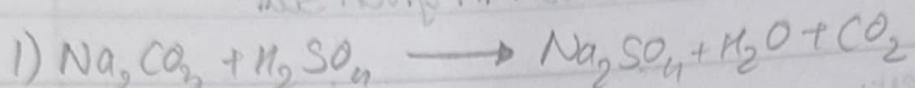
1. Add equal volumes of  $\text{BaCl}_2$  and  $\text{K}_2\text{CrO}_4$ .  
 If yellow precipitate forms, then  $\text{Ba}^{2+}$  is present.

2. Add equal volumes of  $\text{BaCl}_2$  and  $\text{Na}_2\text{S}$ .  
 If black precipitate forms, then  $\text{Ba}^{2+}$  is present.

Answers to problems (with solutions)

(QPM) III - Displacement Method

## TEST FOR CARBONATE ION ( $\text{CO}_3^{2-}$ )



reactions  
of  $\text{CO}_3^{2-}$   
with acids  
and alkalis  
to form  
carbonates

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

reactions  
of  $\text{CO}_3^{2-}$   
with  
acids  
to form  
CO<sub>2</sub>

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

displacing  
insoluble

reactions

of  $\text{CO}_3^{2-}$

of  $\text{CO}_3^{2-}$

to displace  
less soluble  
salts

of  $\text{CO}_3^{2-}$

to displace  
less soluble  
salts

of  $\text{CO}_3^{2-}$

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

reactions  
of  $\text{CO}_3^{2-}$   
with  
acids  
to form  
CO<sub>2</sub>

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

reactions  
of  $\text{CO}_3^{2-}$   
with  
acids  
to form  
CO<sub>2</sub>

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

reactions  
of  $\text{CO}_3^{2-}$   
with  
acids  
to form  
CO<sub>2</sub>

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

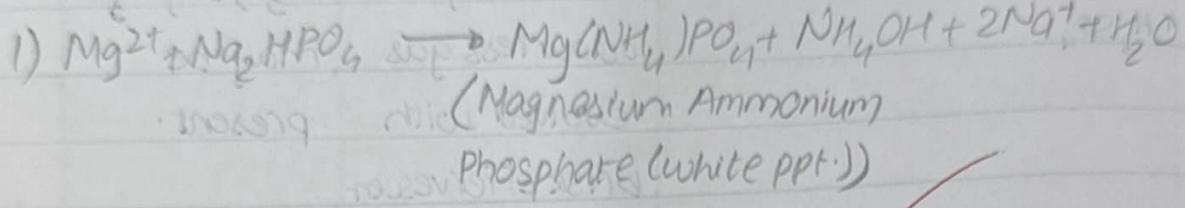
reactions  
of  $\text{CO}_3^{2-}$   
with  
acids  
to form  
CO<sub>2</sub>

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

reactions  
of  $\text{CO}_3^{2-}$   
with  
acids  
to form  
CO<sub>2</sub>

reactions  
of  $\text{CO}_3^{2-}$   
with  
alkalis  
to form  
carbonates

## TEST FOR MAGNESIUM ION ( $Mg^{2+}$ )



- carbonates do not react with  
solutions with  $H_2S$  present  
black effervescent  
- colourless

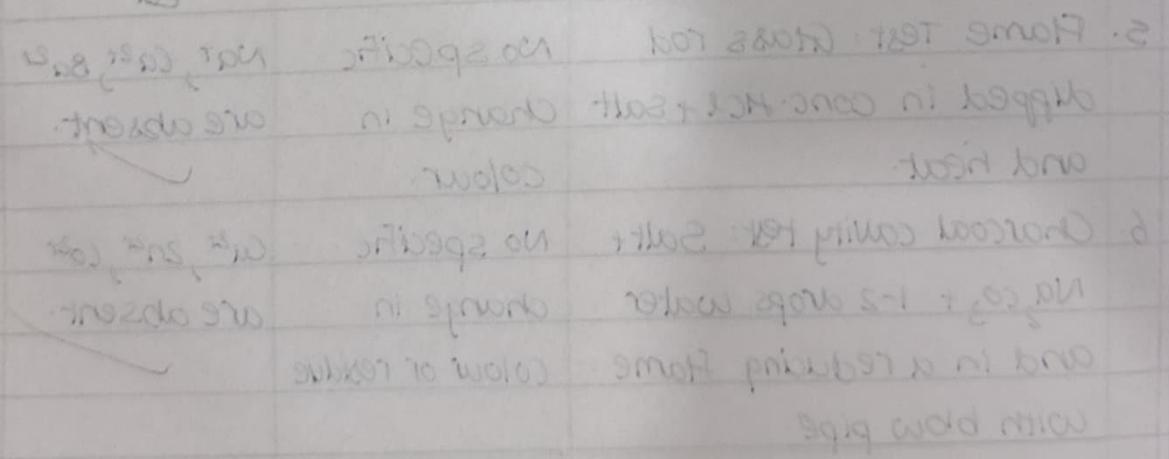
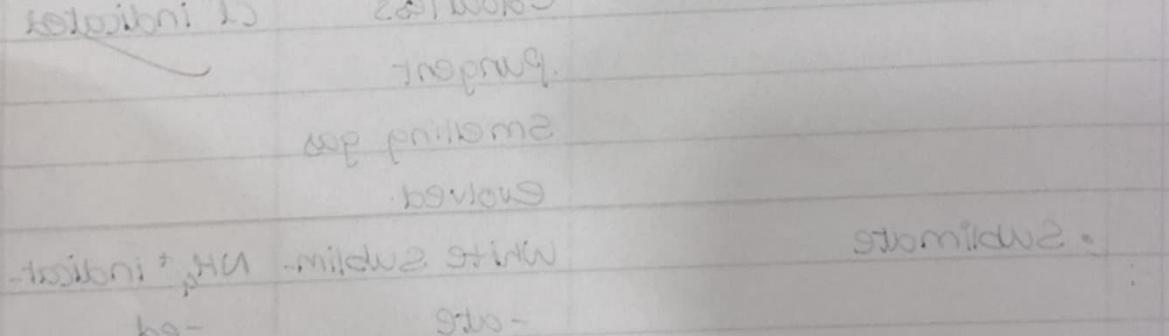
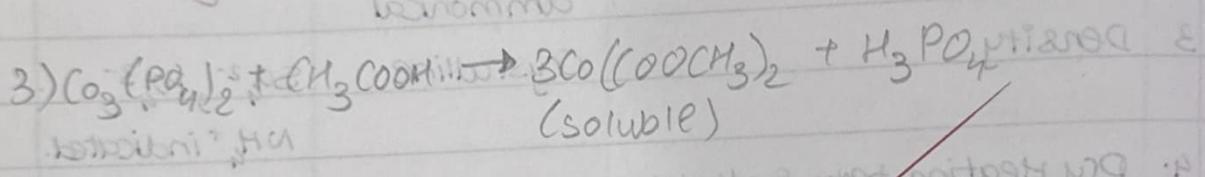
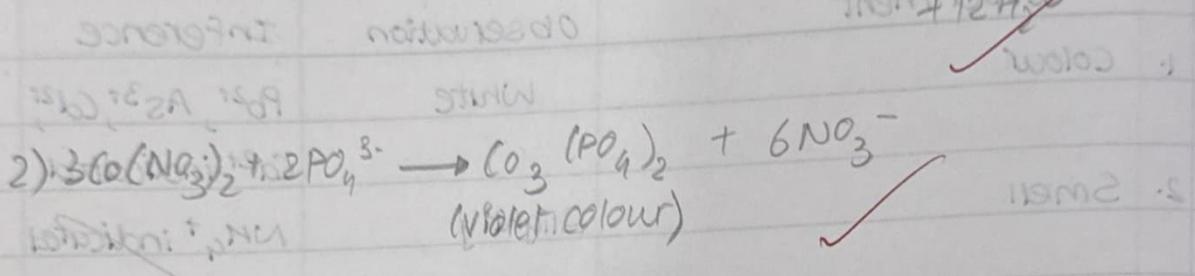
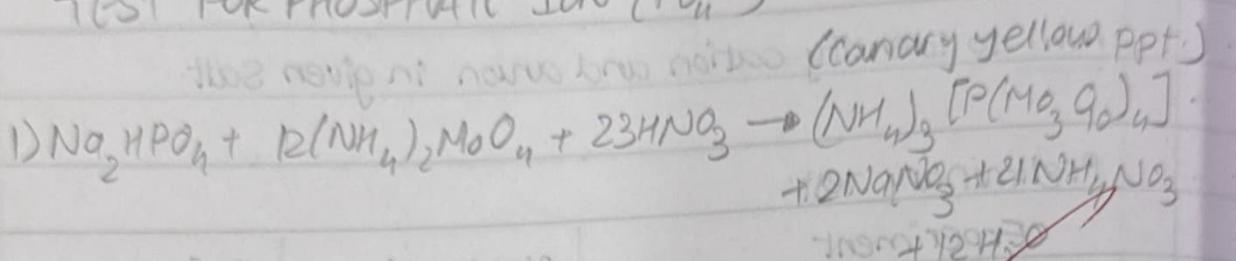
- carbonates do not react with  
solutions with  $H_2S$  present  
black effervescent  
- colourless

- carbonates do not react with  
solutions with  $H_2S$  present  
black effervescent  
- colourless

- colourless

( $\text{NH}_4$ )<sub>2</sub>MoO<sub>4</sub>) + 2 $\text{HNO}_3$  → (canary yellow ppt.)

## TEST FOR PHOSPHATE ION ( $\text{PO}_4^{3-}$ )



(Formation of colourless precipitate)

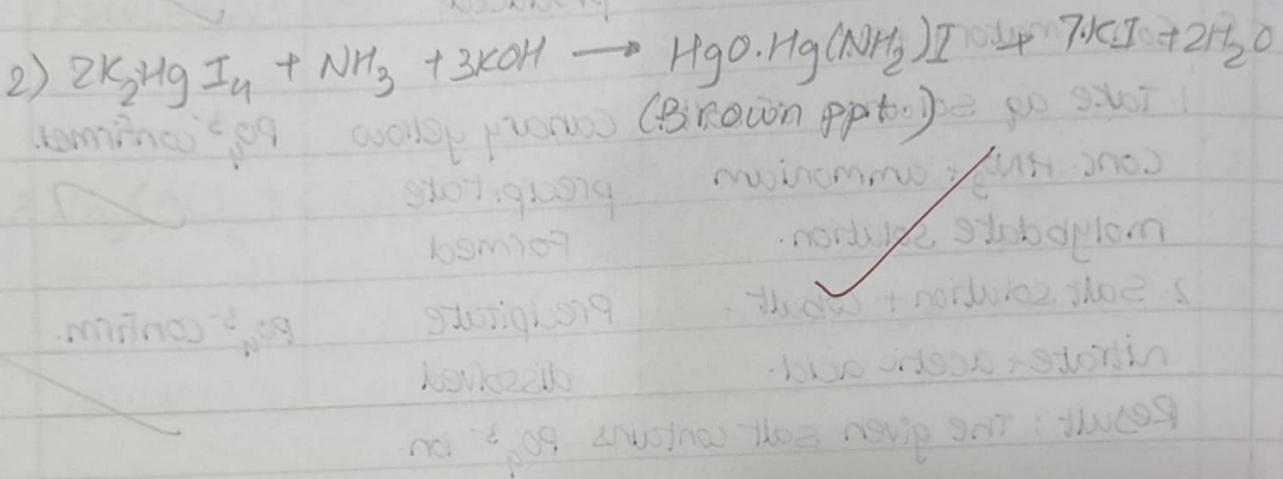
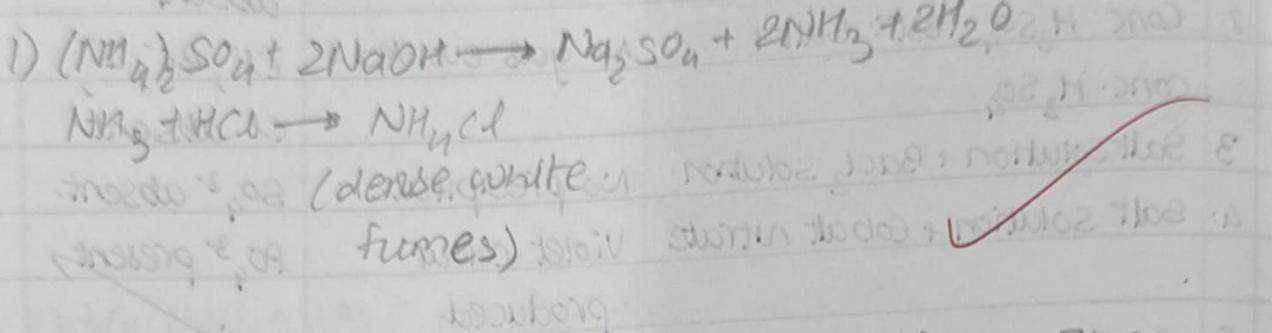
QUESTION

ANSWER

EXPLANATION

### TEST FOR AMMONIUM ION ( $\text{NH}_4^+$ )

Method



QUESTION

ANSWER

EXPLANATION

$\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$

so a drop of

blue litmus

ANSWER

so white

copper sulphate

so colourless

ANSWER

so white + blue litmus

so colourless and blue

so colourless

so colourless