

CALCUTTA AIRPORT ENGLISH HIGH SCHOOL (H.S.)

24/9/20

EXAM YEAR - 201

NAME Class - X

SUBJECT DATE

CLASS SECTION ROLL No.

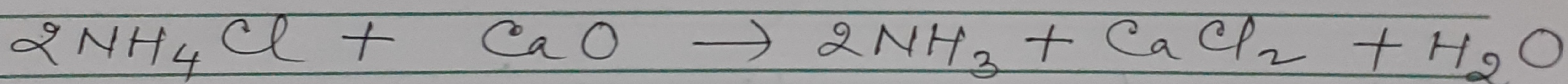
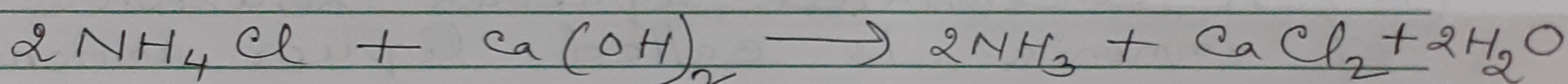
INVIGILATORS SIGNATURE	EXAMINERS SIGNATURE	MARKS OBTAINED

Inorganic Chemistry in the Laboratory and in Industry.

AMMONIA (NH_3)

Preparation :

Laboratory preparation.

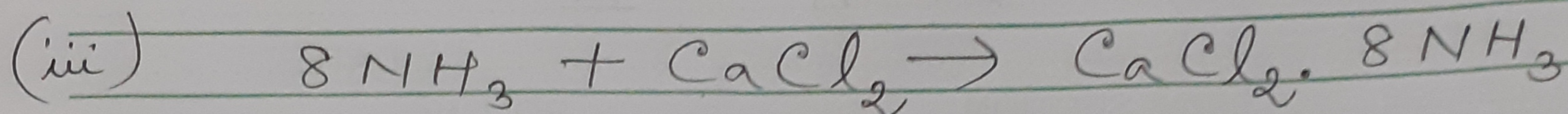
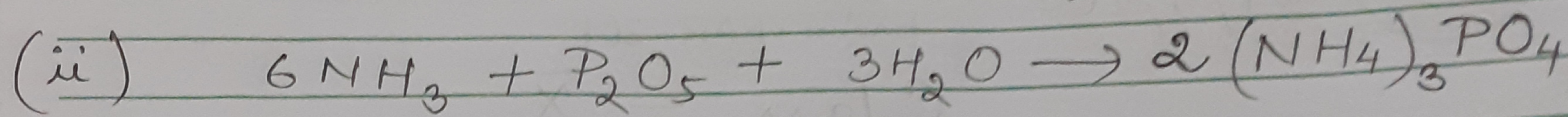
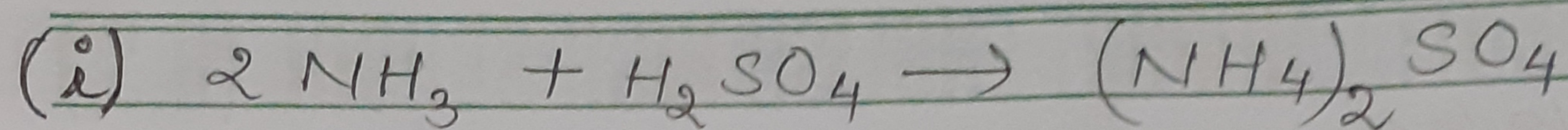


When ammonium chloride reacts with slaked lime or powdered quicklime at 1:3 ratio.

Drying of ammonia : As ammonia is a base, it cannot be dried by an acidic drying agent.

So, it can be dried by CaO , which is basic in nature.

Other dehydrating agents like conc. H_2SO_4 , P_2O_5 , anhydrous CaCl_2 etc cannot be used for drying of ammonia. They react with NH_3 & develop new compds.



Physical properties :

(i) It is lighter than air.

(ii) It is colourless & has a pungent smell.

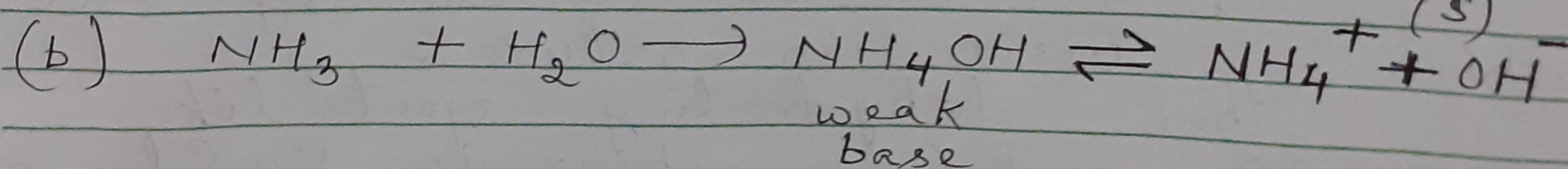
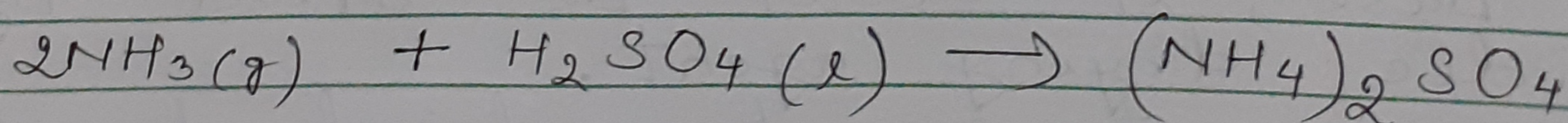
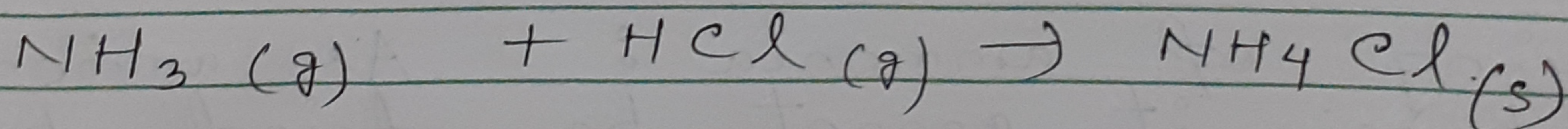
(iii) It can be liquified easily. At 10°C & under 6 atm. pressure, gaseous ammonia converts to colourless liquid ammonia. At -78°C , liquid ammonia solidifies.

(iv) A concentrated aqueous solution of ammonia is called liquor ammonia.

Chemical properties :

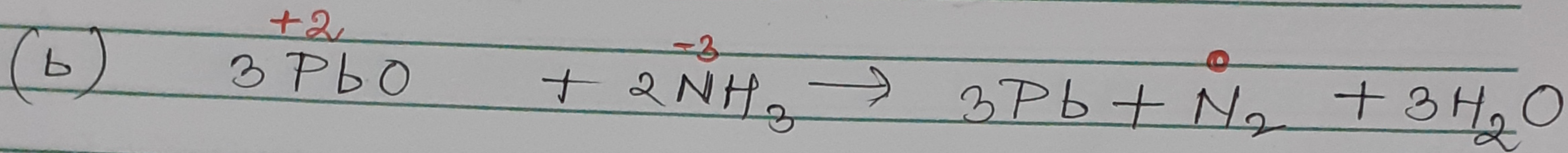
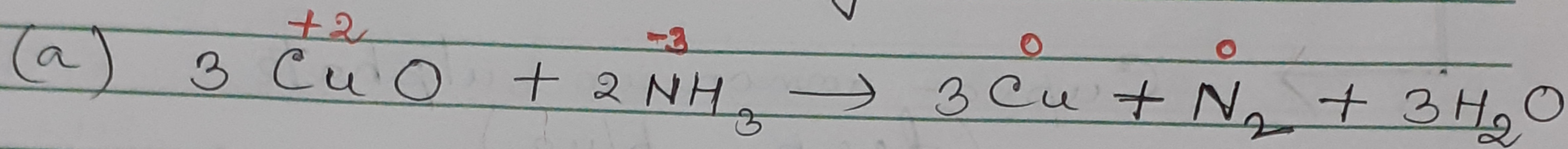
(i) Basic nature

(a) NH_3 reacts with acids forming ammonium salts.



(ii) Reducing property of ammonia

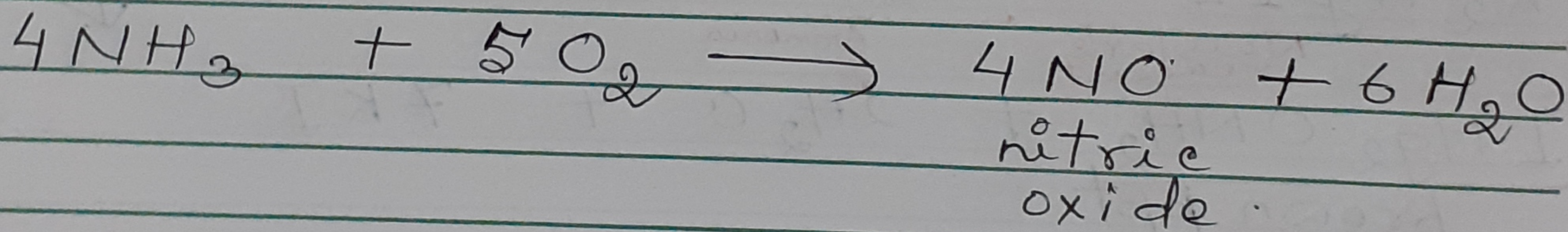
When NH_3 gas is passed over red hot cupric oxide, it is reduced to metallic copper & NH_3 is oxidised to nitrogen.



(iii) Catalytic oxidation

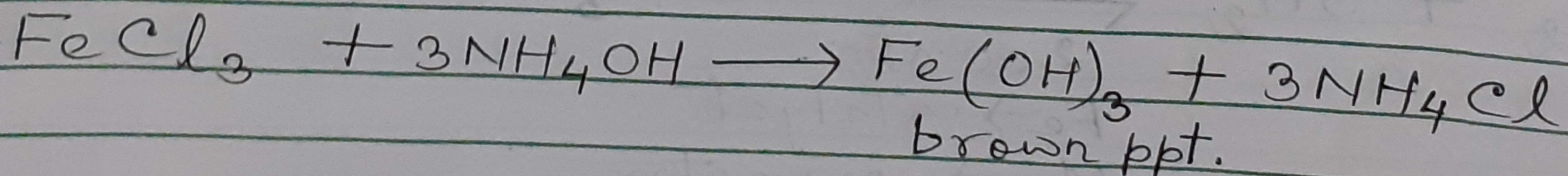
NH_3 is neither combustible nor supporter of combustion.

It is oxidised by oxygen in presence of platinum gauze catalyst, when heated to 700°C .

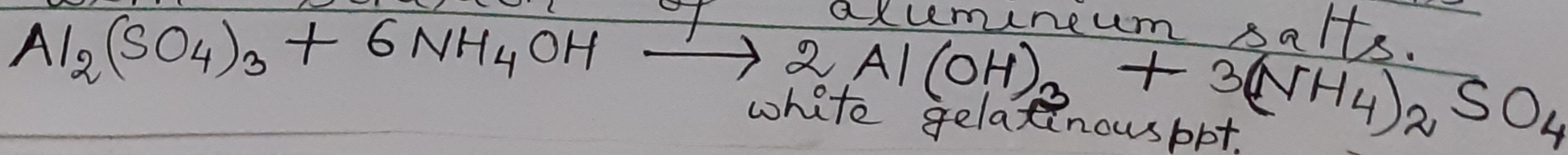


(iv) Action on metallic salts :

(precipitate \rightarrow ppt.)
(a) Aqueous solution of ammonia reacts with solution of ferric salts



(b) Aqueous solution of ammonia reacts with solution of aluminium salts.



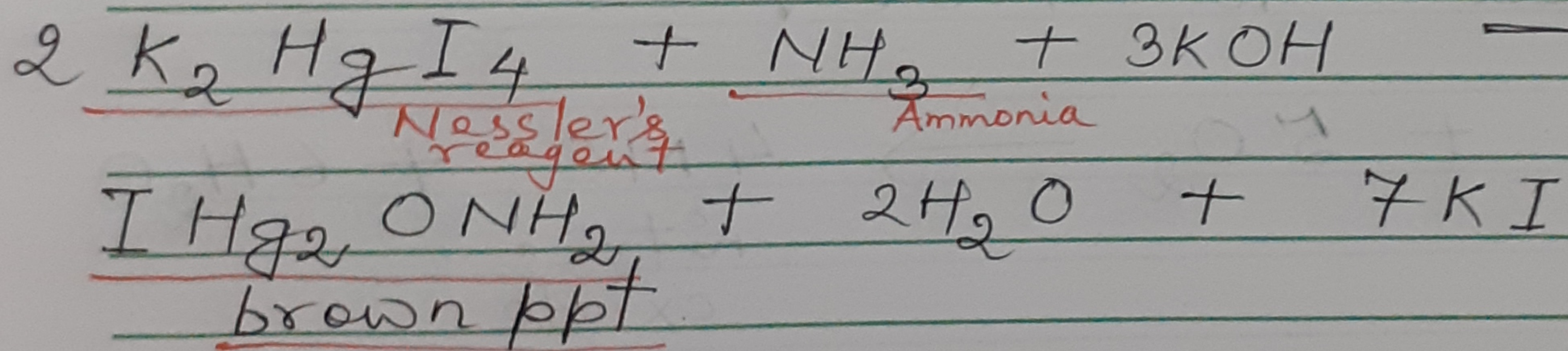
(v) Reaction with CuSO_4

Ammonium hydroxide + Copper sulphate
excess ammonium hydroxide + basic copper sulphate (bluish white)
↓
Cupro-ammonium sulphate (deep blue)

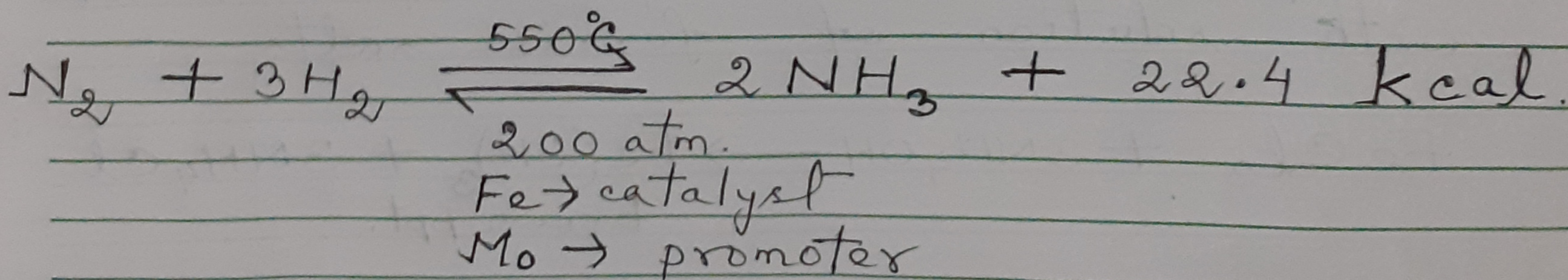
(vi) Action of Nessler's reagent :

Nessler's reagent → K_2HgI_4

(Solu. of potassium mercuric iodide in excess of KOH.)



Industrial manufacture of ammonia HABER'S PROCESS



Physicochemical conditions of the process to have a satisfactory yield :

(i) Temperature \rightarrow The optimum temp. is 550°C . Lowering of temp. favours NH_3 production but it decreases the rate of reaction.

(ii) Pressure \rightarrow 200 atm. pressure is needed. High pressure favours the formation of NH_3 .

(iii) Concentration \rightarrow As NH_3 can be removed quickly, so to balance the conc. at right side immediately the formation of NH_3 increases.

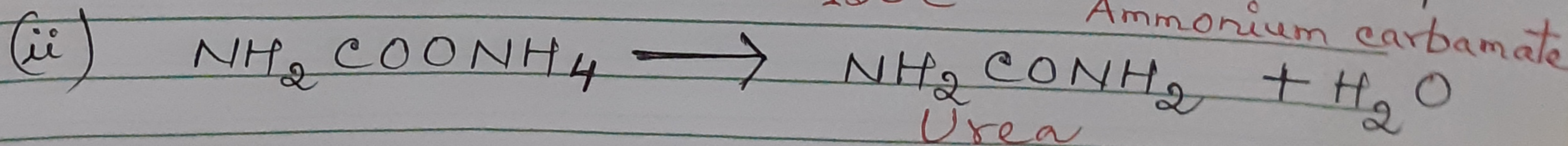
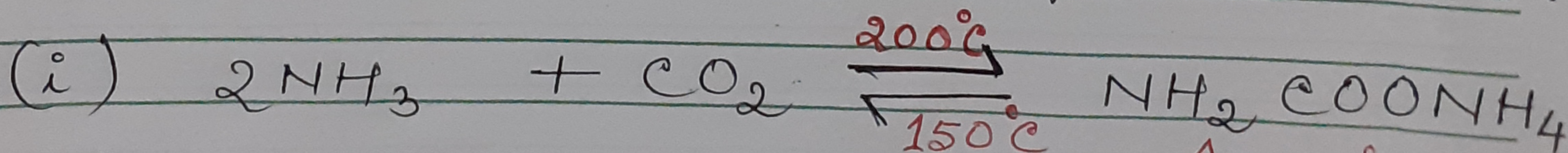
(iv) Reactants \rightarrow

Ratio of the ^{mixture of} pure & dry N_2 & H_2 is \rightarrow 1 : 3.

As the catalyst is susceptible to poisoning, the mixture should be free from impurities.

Manufacture of UREA :

Liquid NH_3 reacts with liquid CO_2 at 200°C & 150 atm. pressure in presence of trace of moisture.



Home work

1. What are the immediate health effects of ammonia exposure?
2. Write the uses of NH_3 .
3. Give the uses of urea.



CALCUTTA AIRPORT ENGLISH HIGH SCHOOL (H.S.)

EXAM YEAR - 201

Class - X

NAME

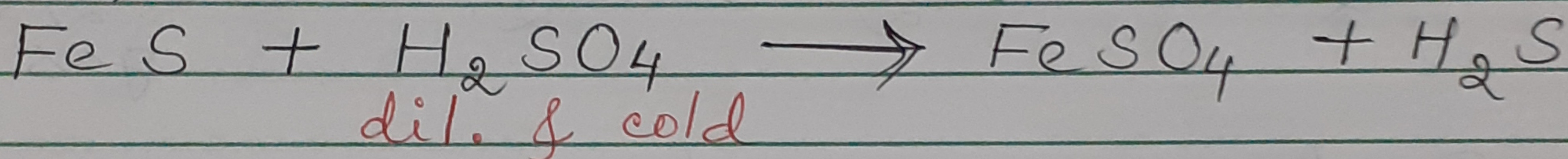
SUBJECT DATE

CLASS SECTION ROLL No.

INVIGILATORS SIGNATURE	EXAMINERS SIGNATURE	MARKS OBTAINED

Hydrogen Sulphide (H_2S)

Preparation



Apparatus \rightarrow Kipp's apparatus is used to prepare H_2S gas.

Properties

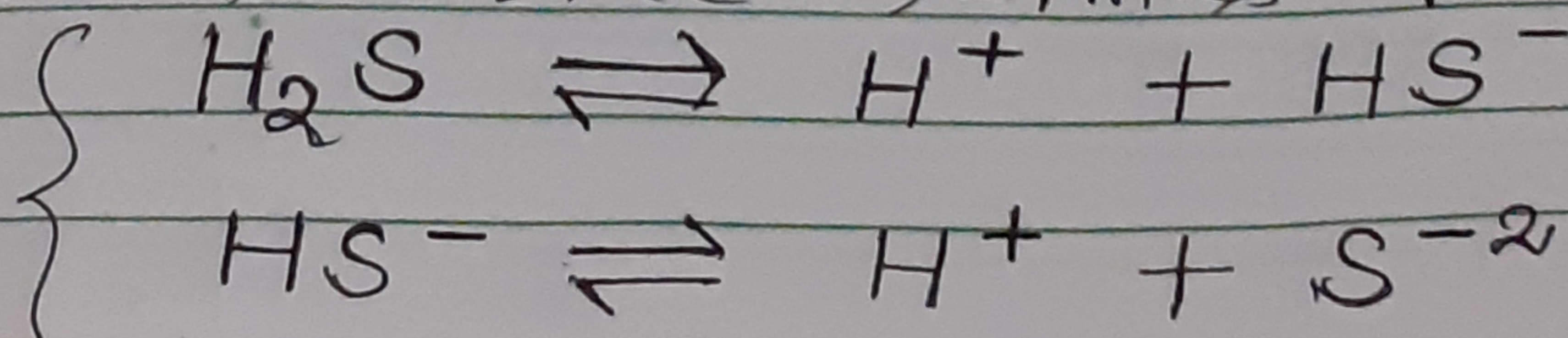
Physical properties (i) It has the characteristic unpleasant smell of rotten egg.

(ii) It is heavier than air & moderately soluble in water but insoluble in hot water.

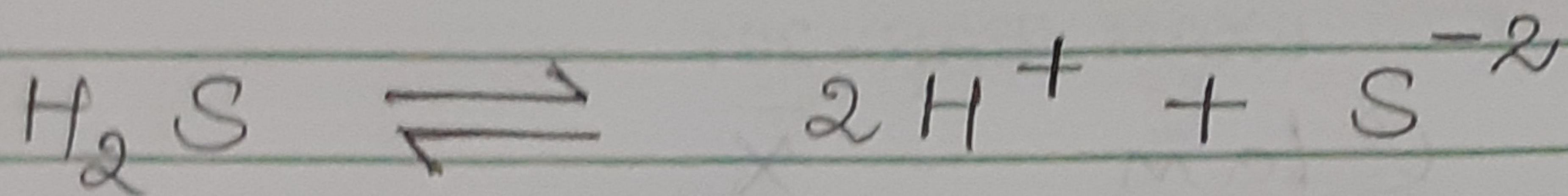
(iii) Density of the gas is 1.53 g/L at NTP.

Chemical properties

(i) Acidic property \rightarrow Aqueous solu. of H_2S acts as a weak dibasic acid. It turns blue litmus to red.

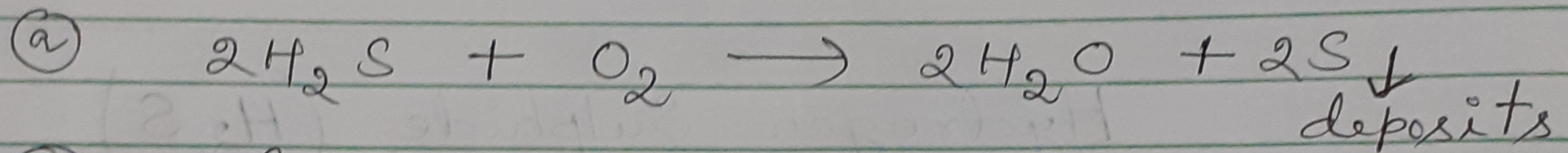


OR

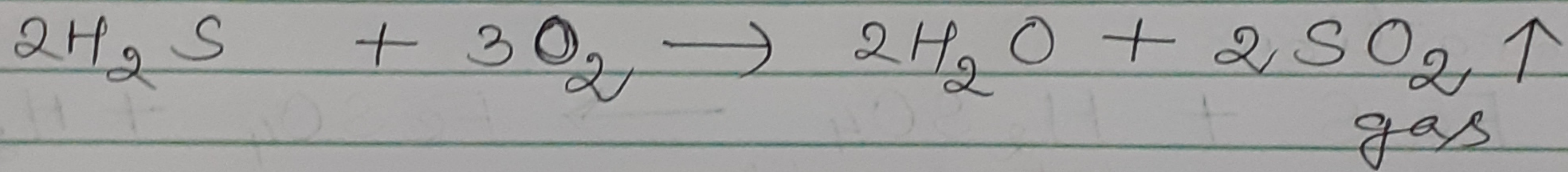


(ii) It is itself combustible but does not support combustion.

(iii) Oxidation by oxygen

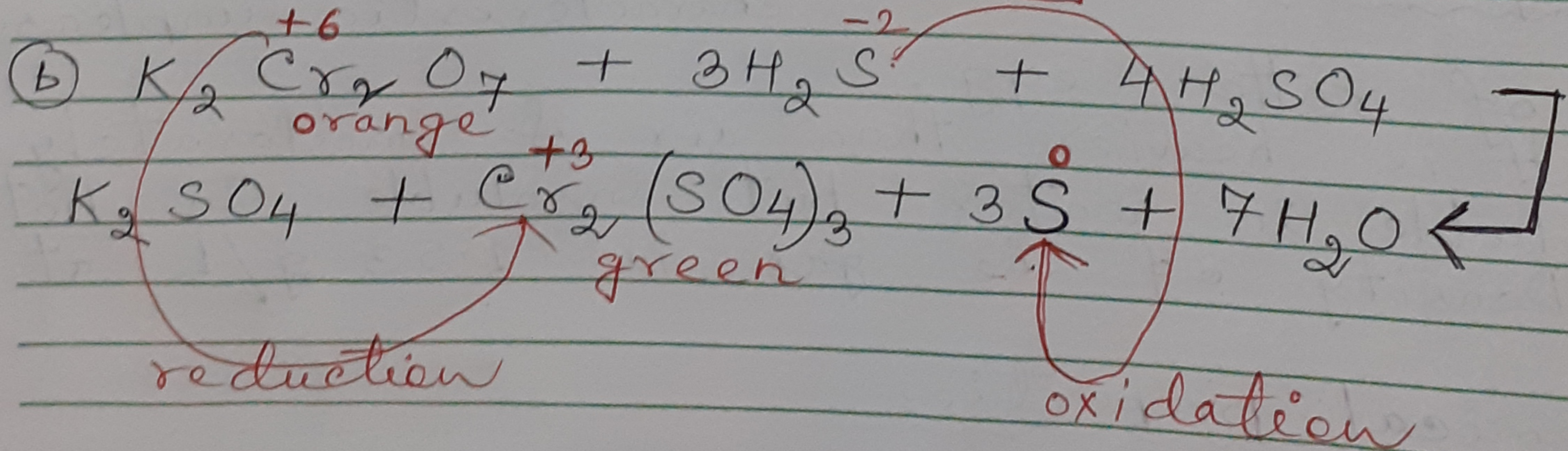
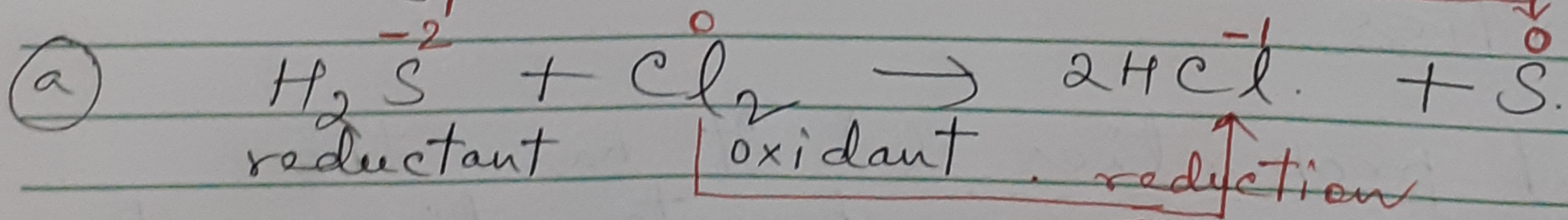


(b) In excess O_2 .

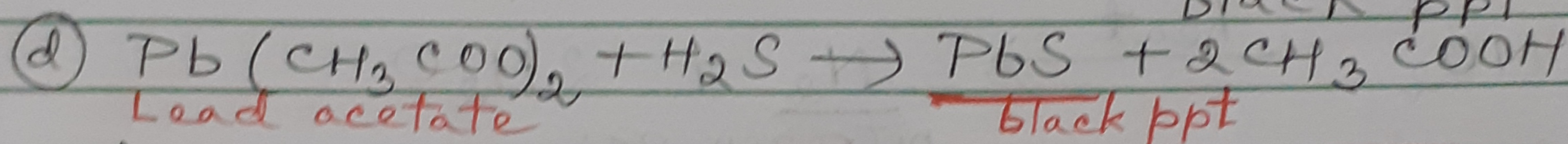
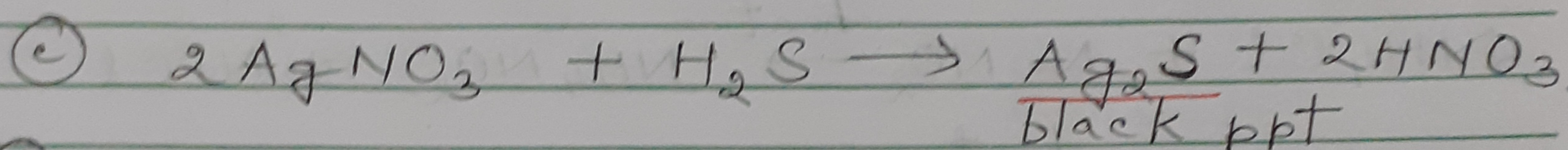
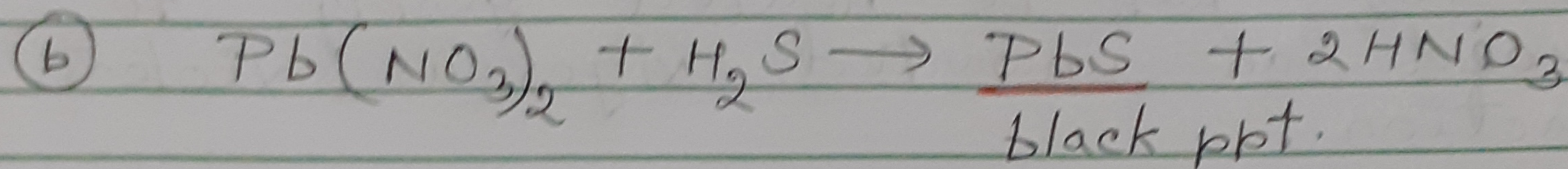
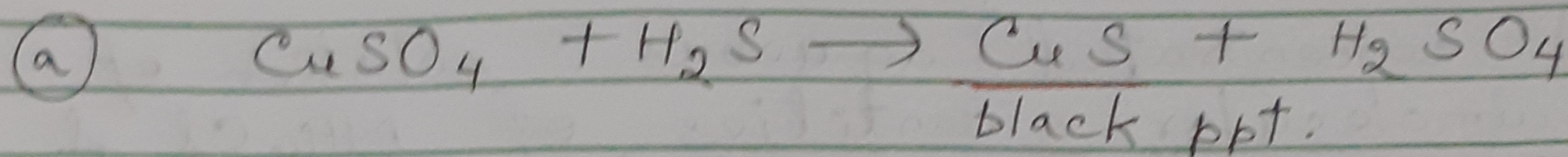


(iv) Reducing property

H_2S acts as a strong reducing agent.



(v) Precipitating property



(vi) Reaction with alkaline sodium nitroprusside solution \rightarrow Detection of H_2S

Hydrogen sulphide gas + Sodium nitroprusside solution

Violet or purple colour complex is formed

(vii) Drying agent $\rightarrow H_2S$ can be dried by P_2O_5 .

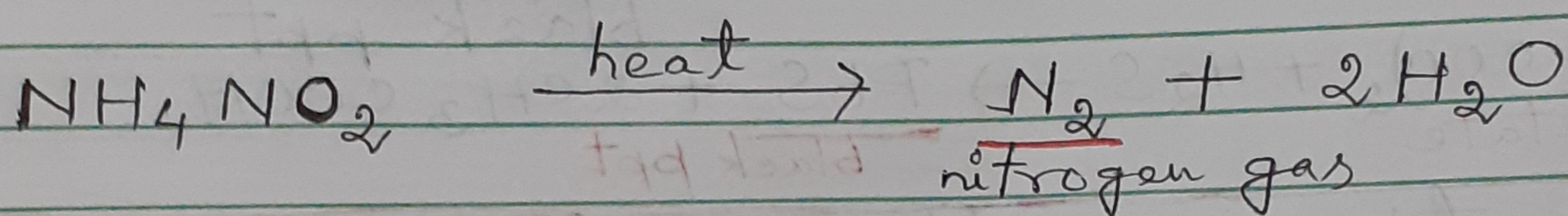
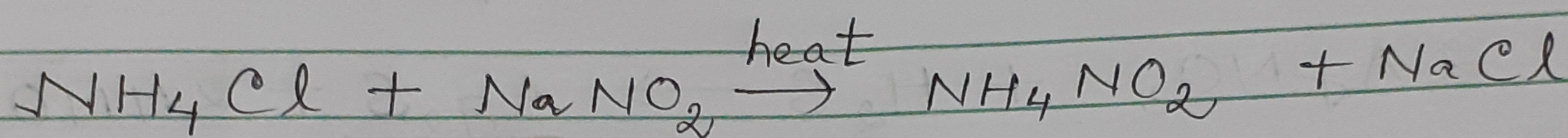
Home work

1. Write the demerits of the use of H_2S . (Toxic effects)

Class X NITROGEN (N₂)

Laboratory method of preparation of nitrogen

A concentrated aqueous solution of equimolecular quantities of NH₄Cl & NaNO₂ will be heated gently to avoid an unwanted vigorous, violent reaction.



Properties of nitrogen

Physical properties :

(i) It is colourless, odourless gas.

(ii) Density of the gas is 1.25 g/L at NTP.

(iii) Liquid N₂, boiling point → -195.8 °C

Solid N₂, melting point → -209.8 °C.

(iv) N₂ is incombustible & non-supporter of combustion.

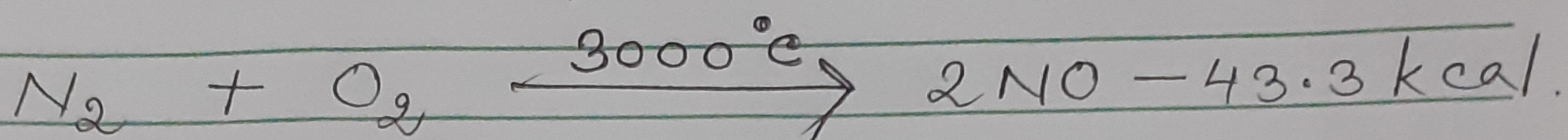
Chemical properties :

(i) With H₂ → @ Under the influence of electric spark. $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$.

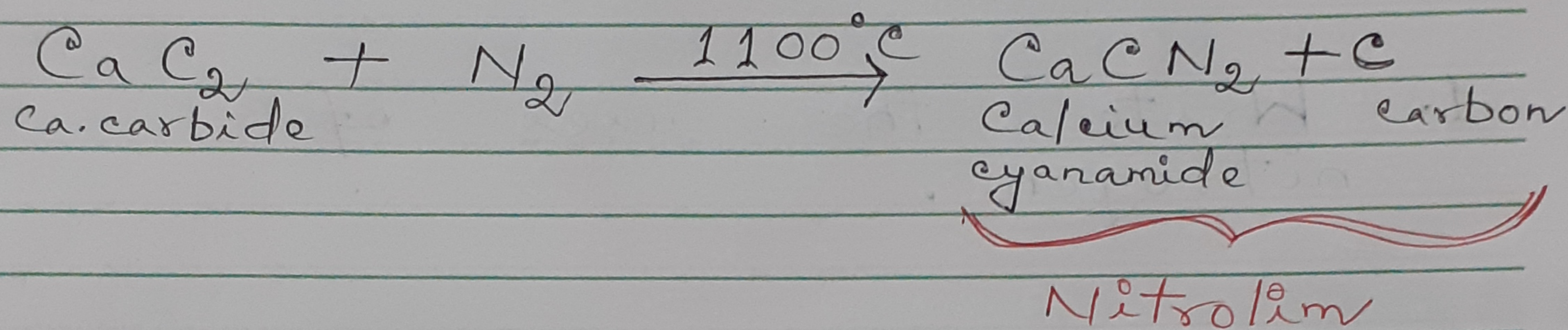
(b) $\text{N}_2 + 3\text{H}_2 \xrightarrow[200 \text{ atm.}]{550^\circ\text{C, Fe}} 2\text{NH}_3 + 22.4 \text{ kcal.}$

(ii) With O_2

Under the influence of electric spark.

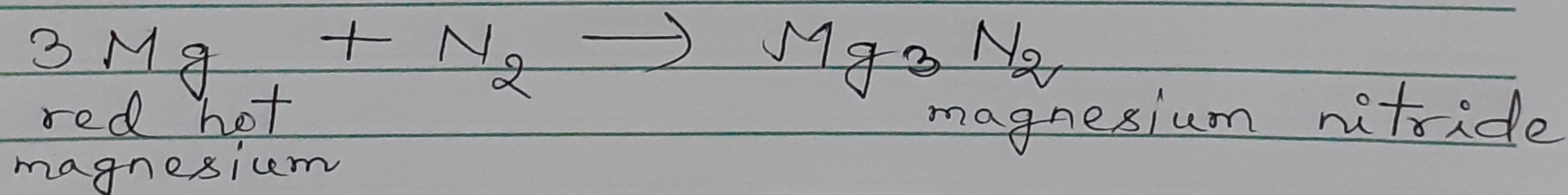


(iii) With CaC_2 (Calcium carbide)



Nitrolim \rightarrow Brown colour mixture, used as ~~ferri~~ organic fertilizer.

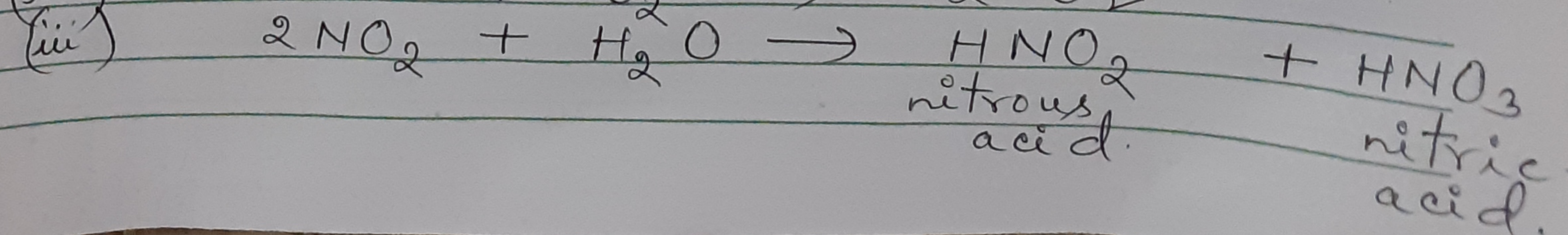
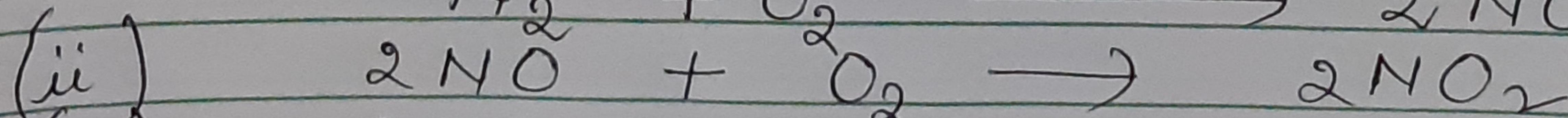
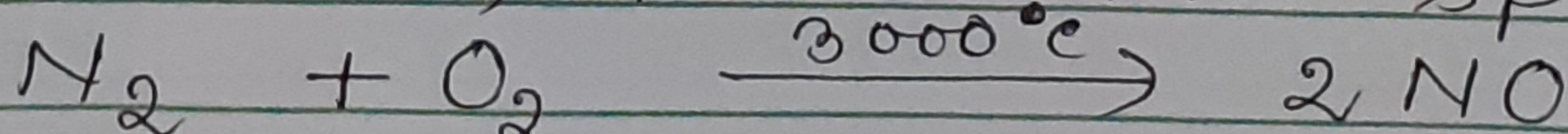
(iv) With Mg



FIXATION OF NITROGEN

The conversion of free atmospheric nitrogen into useful nitrogenous compound is called fixation of nitrogen.

(i) At $3000^\circ C$, in electric spark.



Nitric acid reacts with alkalis
i.e. bases present in the soil
and form soluble nitrate salts.

Home work

1. Write the uses of nitrogen.