

CHEMISTRY
TEST PAPER ONE (NITROGEN & SULPHUR)
TIME: 1 HOUR **S.4, 2020**

NAME:.....STREAM.....NO...

Attempt **all** questions.

1. Nitric acid is manufactured by catalytic oxidation of ammonia.

(a) Name

(i) two raw materials, other than ammonia that are used in the manufacture of nitric acid.

.....

.....

(ii) the catalyst used

.....

.....

(b) Write equation for the reaction between nitric acid and ammonia.

.....

.....

(c) State one use of the product in (b).

.....

2. (a) Write one equation in each case for the reaction in which sulphuric acid behaves as;

(i) an acid

.....

.....

(ii) an oxidizing agent

.....

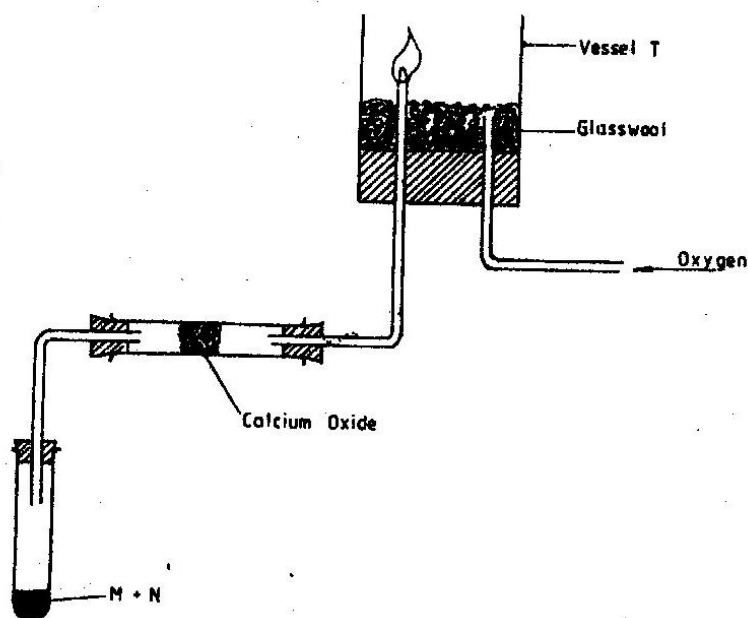
.....

(b) State the conditions for each of the reaction in (a)

.....

.....

3. In the apparatus shown in the diagram below, components M and N are reacted to produce ammonia which is conveyed to vessel T where it is burnt.



(a) Name the substance

(i) M

.....

.....

(ii) N

.....

.....

(b) State the role of;

(i) the glass wool

.....

.....

(ii) calcium oxide

.....

.....

(c) Write an equation for the combustion of ammonia.

.....

.....

(d) State one industrial use of ammonia

.....

.....

CHEMISTRY
TEST PAPER TWO (NITROGEN & SULPHUR)
TIME: 1 HOUR **S.4, 2020**

NAME:.....STREAM.....NO...

Attempt **all** questions.

1 (a) Smoke was put in a glass – cell and viewed under a microscope.

(i) State what was observed.

.....
.....

(ii) Explain the observation in (i)

.....
.....
.....

(b) One piece of cotton wool was soaked in concentrated ammonia and another in concentrated hydrochloric acid. The two pieces of cotton wool were placed in a glass tube as shown in figure 2.

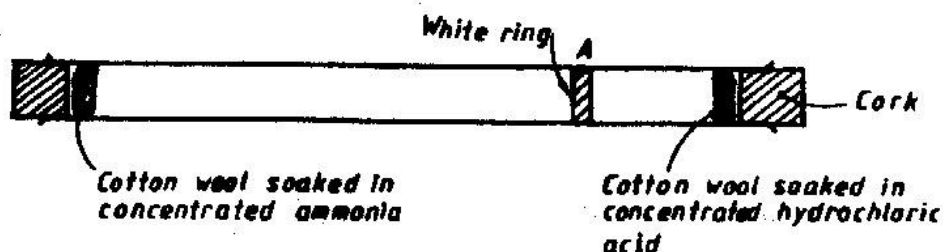


Fig. 2

(i) Write the formula of the substance that formed the white ring.

.....

(ii) Explain why the white ring is formed in position A and not in the middle of the tube.

.....

.....

2. Substances A and B were obtained from a reaction between ammonia gas and copper oxide using the apparatus in diagram in figure 2.

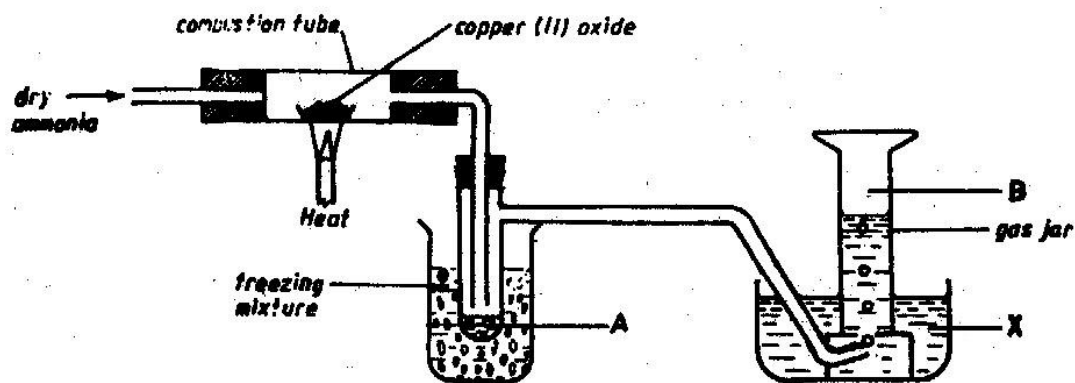


Fig. 2

(a) Name substance

(i) A

(ii) B

(iii) X

(b) Write an equation for the reaction that takes place in the combustion tube.

.....
.....

(c) State why it is not possible to collect excess ammonia in the gas jar.

.....
.....

(d) Name one other oxide that can be used instead of copper (II) oxide.

.....

3 (a) Describe how sulphur is extracted by the Frasch process.

(b) Write equations to show how fuming sulphuric acid can be obtained from sulphur.

(c) State what would be observed if concentrated sulphuric acid is added to sugar.

CHEMISTRY
TEST PAPER THREE (NITROGEN & SULPHUR)

TIME: 1 HOUR

S.4, 2020

NAME:.....STREAM.....NO...

Attempt **all** questions.

1. (a) Name the process by which ammonia is obtained on a large scale.

.....

(b) One of the main uses of ammonia is the production of fertilizers. Two such fertilizers are ammonium sulphate, $(\text{NH}_4)\text{SO}_4$ and urea, $\text{CO}(\text{NH}_2)_2$. Calculate the percentage of nitrogen in

(i) ammonium sulphate

.....

.....

.....

.....

.....

(ii) Urea

.....

.....

(c) Which one of the fertilizers in (b) is a better fertilizer?

.....

2. When compound P is heated with concentrated sulphuric acid, a gas which forms dense white fumes with ammonia is liberated

(a) Identify the anion in P.

.....

(b) Write an equation for the reaction between a solution of P and silver Nitrate solution.

.....

.....

(c) State what would be observed if lead (II) nitrate solution was added to a solution of P and the mixture heated.

.....

.....

3. Lead (II) nitrate was heated strongly in the apparatus shown in the diagram in figure 1.

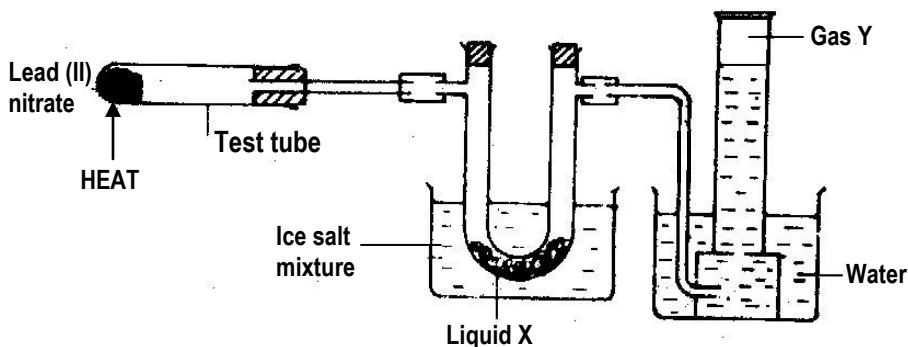


Fig 1

Liquid X

.....

gas Y

.....

(b) State what was observed in the test tube during the heating.

.....

.....

(c) Write an equation for the reaction that took place.

.....

.....

4. (a) Draw a labeled diagram of the apparatus that can be used to prepare ammonia in the laboratory.

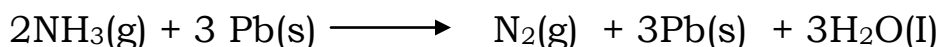
(b) Describe an experiment that can be carried out to show that ammonia is a soluble alkaline gas

(c) A copper coil was heated strongly and held over concentrated solution of ammonia in a beaker.

(i) State what was observed.

(ii) Explain the observation in (i).

(d) Ammonia react with lead (II) oxide according to the equation.



Calculate the volume of ammonia at room temperature that would be required to completely react with 2.5g of lead (II) oxide.

CHEMISTRY
TEST PAPER FOUR (NITROGEN & SULPHUR)

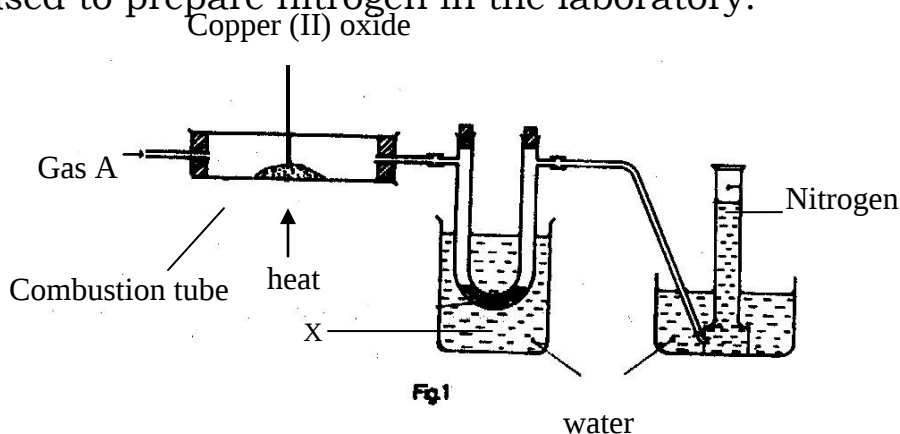
TIME: 1 HOUR

S.4, 2020

NAME:.....STREAM.....NO...

Attempt **all** questions.

1. The diagram in figure 1 shows the apparatus which can be used to prepare nitrogen in the laboratory.



- (a) Name gas A.

.....

- (b) (i) State what would be observed in the combustion tube during the reaction.

.....

.....

- (ii) Write an equation for the reaction.

.....

(c) Name

(i) substance X

.....

(ii) one reagent that can be used to identify X.

.....

2. State what is observed when

(a) (i) crystals of Iron (II) sulphate, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, are heated strongly. Write equation(s) for the reaction(s) that occur(s).

(ii) Concentrated nitric acid is added to a solution of iron (II) sulphate.

3. (a) (i) State two properties which show that air is a mixture.

(ii) Name two gases, other than oxygen, that are constituents of air and give their approximate percentage in air.

(b) Describe an experiment to determine the percentage of oxygen in air. Show how the percentage can be calculated from the results.

(c) Write the name and formula of the product of the reaction between sulphur and oxygen.

CHEMISTRY
TEST PAPER FIVE (NITROGEN & SULPHUR)

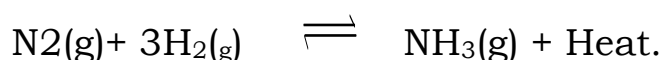
TIME: 1 HOUR

S.4, 2020

NAME:.....STREAM.....NO...

Attempt **all** questions.

1. Nitrogen reacts with hydrogen to produce ammonia according to the following equation



The table below shows the percentage yield of ammonia at various temperatures and pressures.

Temperat ur ^o C	Pressure (atmospheres)		
	10	200	1000
250	30%	75%	96%
500	1%	18%	60%
1000	0%	0.1%	1%

- (a) (i) State how the percentage yield of ammonia varies with pressure at constant temperature.

.....

- (i) State the temperature and pressure which gives maximum yield of ammonia.

.....
.....

- (ii) Calculate the volume of ammonia produced at s.t.p when 18.5 g of hydrogen gas is reacted with excess nitrogen.

(H = 1, N = 14, 1 mole of a gas occupies 22.4 litres at s.t.p.)

.....
.....
.....
.....

2. (a) State what would be observed if concentrated Sulphuric acid is added to sugar. Explain your answer.

.....
.....
.....
.....
.....
.....

- (b) Dilute sulphuric acid was added to Zinc carbonate. State what was observed and write equation for the reaction.

.....
.....

(c) State the conditions under which sulphuric acid reacts with copper and write equation for the reaction.

.....

.....

.....

(d) Describe a test that can be carried out to identify the sulphate ion in sulphuric acid.

.....

.....

.....

.....

(e) State one use of sulphuric acid.

.....

CHEMISTRY
TEST PAPER SIX (NITROGEN & SULPHUR)

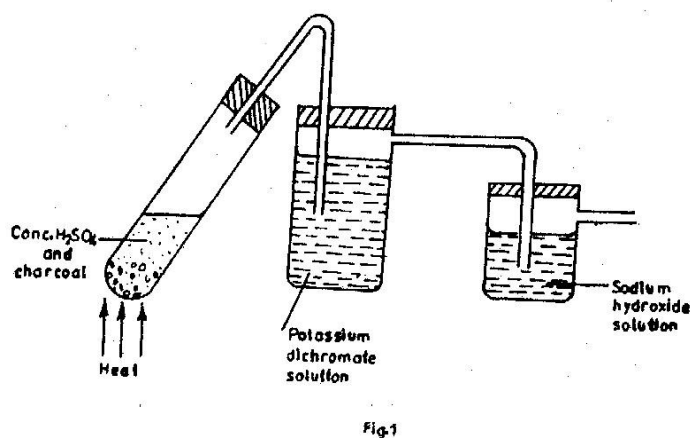
TIME: 1 HOUR

S.4, 2020

NAME:.....STREAM.....NO...

Attempt **all** questions.

1. Concentrated sulphuric acid was heated with charcoal in the apparatus shown in figure 1 below.



- (a) Name the gas produced during the reaction between concentrated sulphuric acid and charcoal.

.....
.....

- (b) (i) State what was observed in the tube containing potassium dichromate.

.....

(ii) What is the purpose of sodium hydroxide solution ?

.....
.....

(c) State two uses of one of the gases named in (a).

.....
.....

2. (a) Write equation for the reaction leading to the formation of ammonia on large scale.

.....
.....

(b) State any two conditions for the reaction.

.....
.....

(c) Write equation for the reaction between ammonia and copper(II) oxide.

.....
.....

3. (a) (i) Draw a labelled diagram to show how a dry sample of ammonia can be prepared from ammonium chloride in the laboratory.

(ii) Write equation for the reaction leading to the formation of ammonia.

(b) Dry ammonia gas was passed over-heated lead(II) oxide

(i) State what was observed.

(ii) Write equation for the reaction that takes place.

(c) Describe how ammonia can be converted to nitric acid. Use equations to illustrate your answer.

CHEMISTRY
TEST PAPER SEVEN (NITROGEN & SULPHUR)

TIME: 1 HOUR 2020

NAME:.....STREAM.....No...

Attempt **all** questions.

1. (a) Write an ionic equation to show how sulphur dioxide can be formed from sodium sulphite and hydrochloric acid.

.....
.....

 (b) (i) Name one reagent that can be used to test for sulphur dioxide.

.....
.....

 (ii) State what would be observed if sulphur dioxide was reacted with the reagent you have named in b(i).

.....
.....

 (c) Sulphur dioxide was passed into a beaker containing a red flower and water.

.....
.....

(i) State what was observed

.....
.....

(ii) Give a reason for your answer in c(i)

.....

2. Although nitrogen is generally un-reactive , it readily reacts with a burning magnesium ribbon.

(a) Give a reason why nitrogen is generally inert.

.....

.....

(b) Burning magnesium reacts with nitrogen.

.....

.....

(i) Give a reason for the reaction.

.....

.....

(ii) Write an equation for the reaction.

.....

.....

(c) Water was added to the product in (b). Write an equation for the reaction.

.....

.....

3. (a) (i) Name one substance that is reacted with hydrochloric acid to produce sulphur dioxide in the laboratory.
- (ii) State the conditions for the reaction.
- (iii) Name a substance that can be used to dry the sulphur dioxide formed.
- (iv) Write equation for the reaction leading to the formation of sulphur dioxide.
- (b) State what would be observed and explain what would happen if sulphur dioxide is passed through a solution containing
- (i) acidified potassium dichromate
- (ii) a dye.
- (c) Briefly describe how sulphur dioxide can be converted to sulphuric acid. Your answer should include equations and conditions for the reactions(s).

CHEMISTRY
TEST PAPER EIGHT (NITROGEN & SULPHUR)

TIME: 1 HOUR 2020

NAME:.....STREAM.....No...

Attempt **all** questions.

1. (a) Write an equation for the formation of sulphur dioxide from sulphuric acid and sodium sulphite.

.....
.....

- (b) Sulphur dioxide was bubbled through an acidified solution of potassium dichromate.

- (i) State what was observed.

.....
.....

- (ii) Briefly explain your observation in (b)(i).

.....
.....

2. Ammonium chloride was placed in a dry test tube and heated while holding at the mouth of the test tube a glass rod containing a drop of lead(II) nitrate solution.

- (a) State what was observed;
 (i) in the test tube.

.....
.....

(ii) on the glass rod.

.....
.....

(b) Write an ionic equation for the reaction that took place on the glass rod.

.....
.....

(c) (i) Name a reagent that can be used to test for the second product which was not tested for when lead(II) nitrate was used.

.....
.....

(ii) State what would be observed if the reagent named in (c) (i) was used.

.....
.....

3. (a) Describe how a dry sample of ammonia can be prepared in the laboratory.

*(Diagram **not** required.)*

(b) Name a reagent that can be used to test for ammonia and state what would be observed if ammonia is tested with the reagent.

(c) (i) Draw a labelled diagram of the set up of the apparatus that can be used to show that ammonia can burn in oxygen.

(ii) Write an equation for the combustion of ammonia in oxygen.

(d) Dry ammonia was passed over heated copper(II) oxide.

- (i) State what was observed.
- (ii) Write an equation for the reaction.

CHEMISTRY
TEST PAPER NINE (NITROGEN & SULPHUR)

TIME: 1 HOUR 2020

NAME:.....STREAM.....No...

Attempt **all** questions.

1 (a) When dilute hydrochloric acid was added to iron(II) sulphide, a gas was evolved.

Write an equation for the reaction that took place.

(b) State:

(i) how the gas was identified.

.....

.....

.....

(ii) why the gas is normally prepared in a fume cupboard or outside the laboratory.

.....

.....

.....

(c) The gas was reacted with sulphur dioxide.

(i) State what was observed.

.....

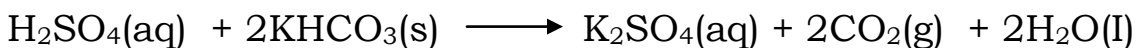
.....

- (ii) Give a reason for your answer in (c)(i).

.....
.....
.....

- 13 (a) Sulphuric acid is a strong dibasic acid.
(i) Explain the terms strong acid and basicity.
(ii) Write an equation to show how sulphuric acid ionizes in water.

(b) Sulphuric acid reacts with potassium hydrogen carbonate according to the equation:



Calculate the volume of carbon dioxide produced at s.t.p when 20cm³ of 0.5M sulphuric acid is reacted with excess potassium hydrogen carbonate.

(c) (i) State the conditions under which sulphuric acid reacts with potassium nitrate.

(ii) state what is observed and write an equation for the reaction.

- (d) Explain what happens when a mixture of sulphur and concentrated nitric acid is heated.