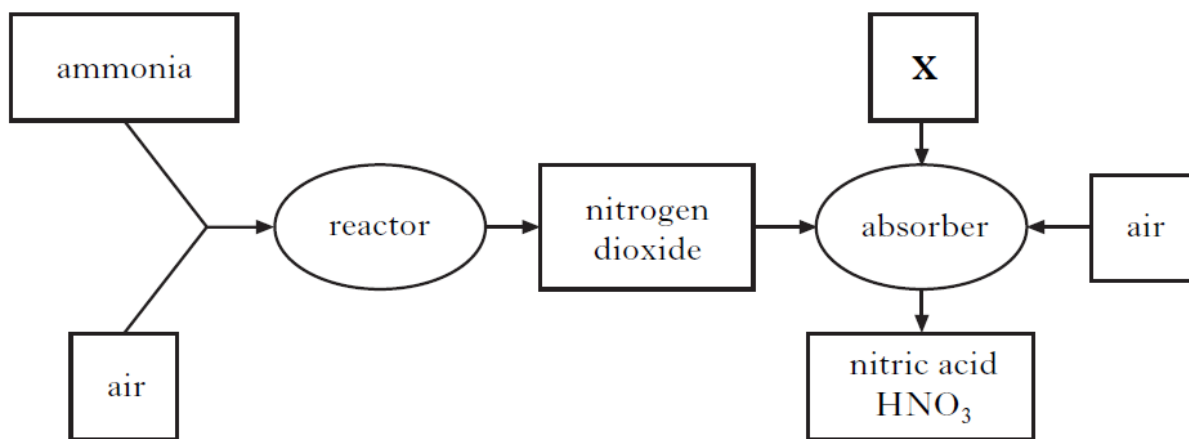




National 5 Chemistry
Fertilisers Past Paper Revision questions

1 (a) The flow diagram shows how ammonia is converted to nitric acid.



(i) Name the industrial process used to manufacture nitric acid.

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(ii) The reactor contains a platinum catalyst which must be above a certain temperature to work. However, it is **not** necessary to continue heating the catalyst once the reaction has started. What does this suggest about the reaction?

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.....-1

(iii) Name substance X.

..... 1

(b) Ammonia and nitric acid react together to form ammonium nitrate, NH_4NO_3 .
Calculate the percentage by mass of nitrogen in ammonium nitrate.
Show your working clearly.

_____ % 2

2 Elements can be used in different ways.

A	chlorine	B	potassium	C	platinum
D	hydrogen	E	neon	F	iron

(a) Identify the element which is a reactant in the Haber process.

Answer _____

1

(b) Identify the element used as the catalyst in the Haber process.

Answer _____

1

3 The grid shows pairs of chemicals.

A	copper carbonate + dilute sulphuric acid	B	lead nitrate solution + potassium iodide solution	C	potassium hydroxide + nitric acid
D	copper + water	E	silver + hydrochloric acid	F	ammonium nitrate + sodium hydroxide

Which **two** boxes contain a pair of chemicals that react together to form a gas?

Answers _____

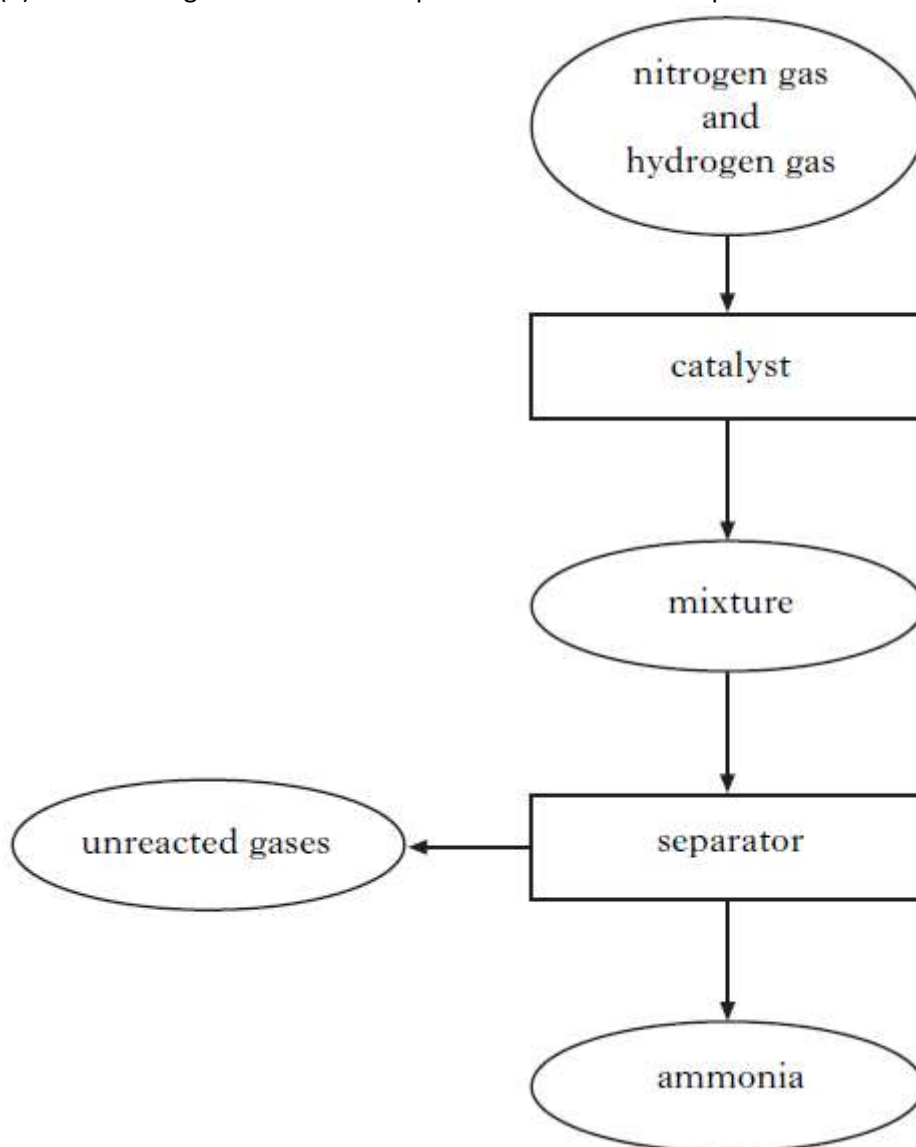
4 The grid shows the symbols of some elements.

A	O	B	K	C	P
D	F	E	Li	F	Al

Identify the **two** elements which would react together to form a molecule with the same shape as an ammonia molecule.

Answers _____

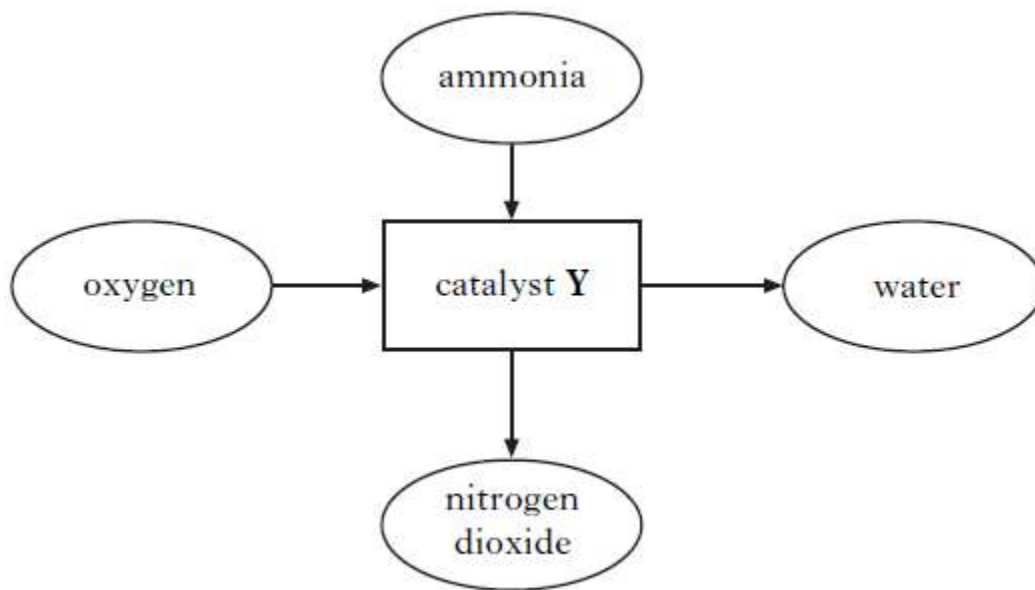
5. Catalysts can be used in different processes.
(a) The flow diagram shows the steps involved in the Haber process.



On the flow diagram above draw an arrow to show how the process is made more economical.

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Ammonia can be used to produce nitrogen dioxide, which can then be used to make nitric acid, as shown.



(b) Name catalyst Y.

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(c) Catalysts are also used in catalytic converters.

What is the purpose of a catalytic converter in a car exhaust system?

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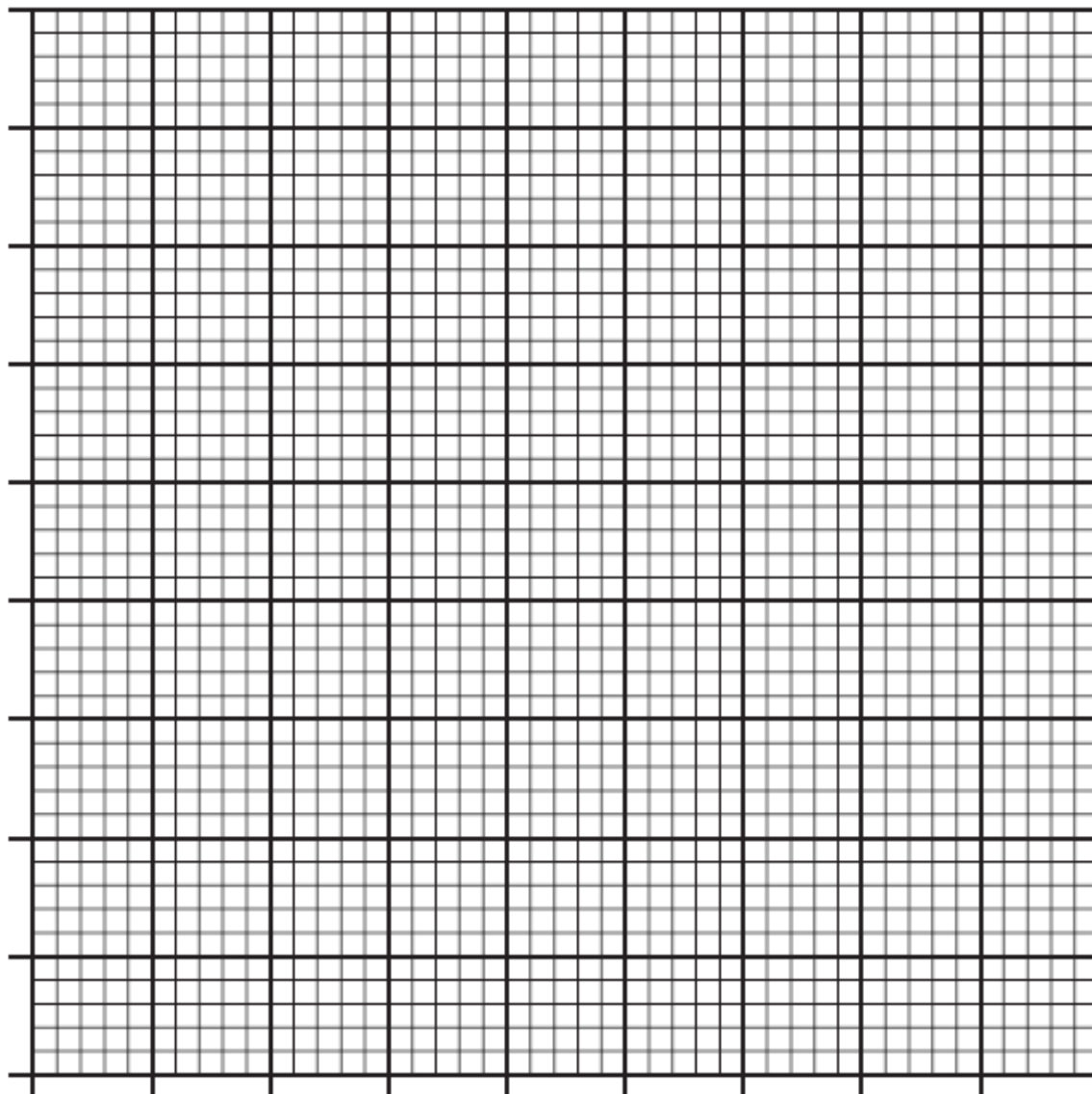
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6. Ammonia is produced in the Haber process.
The percentage yield of ammonia, obtained at different pressures, is shown in the table.

Pressure/ atmospheres	Percentage yield of ammonia
50	6
100	10
150	14
200	19
250	22
350	29
400	32

(a) Draw a **line** graph of the results.



(b) Using your graph, estimate the yield of ammonia at 300 atmospheres.

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(c) Describe the relationship between pressure and percentage yield of ammonia.

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(d) Temperature is another factor which affects the percentage yield of ammonia.

Temperature/°C	Percentage yield of ammonia
200	88
300	67
400	49
500	18

Suggest a reason why 500 °C is the temperature chosen to operate an industrial ammonia plant rather than 200 °C.

1

7. The table shows information about some useful compounds.

Compound	Formula
Y	Na_3PO_4
ammonia	NH_3
ammonium nitrate	NH_4NO_3

(a) (i) Name compound Y.

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(ii) Compound Y can be used as a fertiliser. Why are fertilisers added to soil?

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8. The manufacture of potassium nitrate, for use in fertilisers, can be split into three stages.

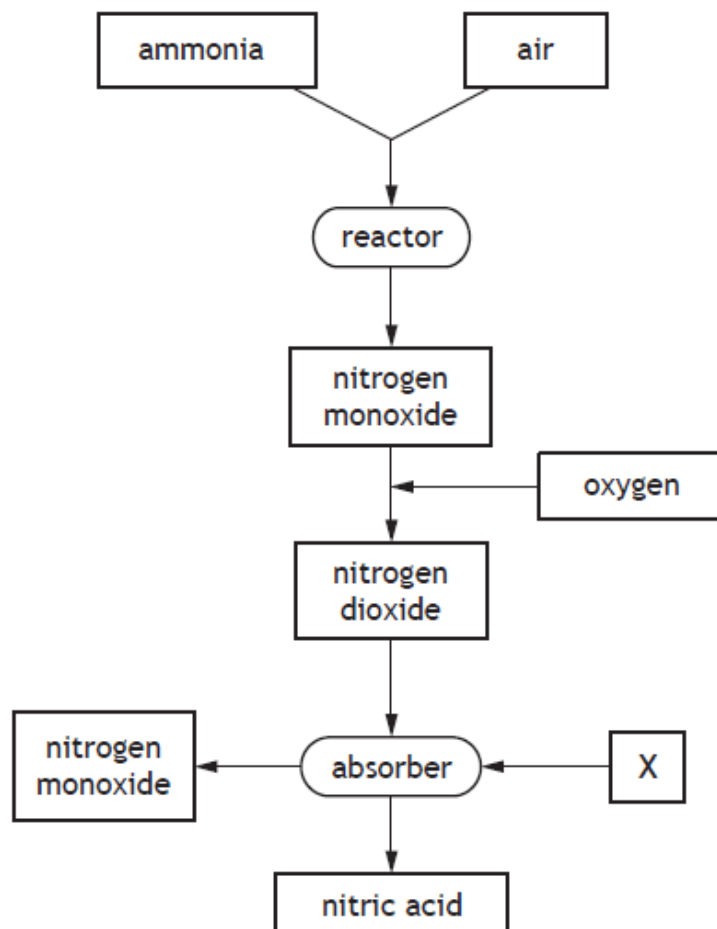
(a) (i) In stage 1, ammonia is produced. Name the industrial process used to manufacture ammonia.

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(ii) Draw a diagram to show how all the outer electrons are arranged in a molecule of ammonia, NH_3

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(b) In stage 2, ammonia is converted into nitric acid, HNO_3 , as shown in the flow diagram.



(i) Name substance X.

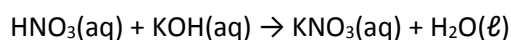
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(ii) **On the flow diagram**, draw an arrow to show how the process can be made more economical.

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(c) In stage 3, nitric acid is converted to potassium nitrate.

The equation for the reaction taking place is



(i) Name the type of chemical reaction taking place in stage 3.

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(ii) State how a sample of **solid** potassium nitrate could be obtained from the potassium nitrate solution.

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