

GCSE Chemistry B (Twenty First Century Science)

J258/03 Breadth in chemistry (Higher Tier)

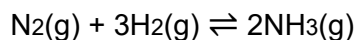
Question Set 22

1

Ammonia and its compounds are used world-wide as fertilisers.

Ammonia is made by the Haber process.

This is an equation for the reaction:



The forward reaction is exothermic.

(a) The \rightleftharpoons sign shows that the reaction is 'in equilibrium'.

Which two statements are correct for this reaction at equilibrium?

Tick (✓) **two** boxes.

The reaction $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$ has stopped.

There is a mixture of N_2 , H_2 and NH_3 .

The reaction $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$ is going in both directions.

The reaction $2\text{NH}_3(\text{g}) \rightarrow \text{N}_2(\text{g}) + 3\text{H}_2(\text{g})$ does not happen.

[2]

(b) Which two statements about the Haber Process are correct?

Tick (✓) **two** boxes.

Nitrogen is the most expensive raw material.

Hydrogen is made from natural gas and steam.

Ammonia is separated and the nitrogen and hydrogen are recycled.

The reaction is faster at low pressures.

[2]

(c) In the Haber process a temperature of 450 °C is often used.

Nina says,

'The Haber process should be run at a lower temperature. More ammonia is produced per day at a lower temperature.'

Discuss Nina's statement.

[3]

(d) Jamal, another student, says,

'Fertilisers that contain ammonium compounds should be banned.'

Give **one** argument for and **one** argument against these types of fertilisers being banned.

[2]

Total Marks for Question Set 22: 9

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