10 Ammonia

Set A **Foundations**

Name	Time **45 minutes**	Total **24 marks**	Score ____ / 24

Use a copy of the Periodic Table where you need one.

A From the lesson

11 MARKS

1 Which statement about the iron catalyst in the Haber process is correct?

A It increases the yield of ammonia.
B It speeds up the reaction.
C It stops ammonia breaking down.
D It is used up in the reaction.

/1

Answer ____ [1]

Source: Learners' Alley, Ammonia slides

2 Which change increases the yield of ammonia in the Haber process?

A increasing the pressure
B increasing the temperature
C adding more iron catalyst
D removing the cooler

/1

Answer ____ [1]

Source: Learners' Alley, Ammonia slides

3 Answer these questions about the Haber process.

(a) Write the equation for the Haber process with state symbols.

..... [1]

(b) State the source of the hydrogen used.

..... [1]

(c) Why are unreacted nitrogen and hydrogen recycled?

.....

..... [1]

(d) What is meant by a reversible reaction?

..... [1]

/4

Source: Learners' Alley, Ammonia slides

4 Which reaction is irreversible?

A heating hydrated copper(II) sulfate
B heating ammonium chloride

C burning charcoal

D making ammonia by the Haber process

Answer ☐ [1]

/1

Source: Learners' Alley, Ammonia slides

5 Solid ammonium chloride is heated in a test tube. A piece of damp red litmus paper is held at the mouth of the tube.

(a) Write the equation, with state symbols, for this reversible reaction.

..... [1]

(b) The damp red litmus paper turns blue before any hydrogen chloride reaches it. Explain why.

.....

..... [2]

(c) A white solid forms near the top of the tube. Name the solid and state why it forms there.

.....

..... [1]

/4

Source: Learners' Alley, Ammonia slides

B Practice

13 MARKS

6 In the Haber process, nitrogen and hydrogen react to form ammonia. What is the source of hydrogen?

A cracking of oil fractions

B electrolysis of water

C fractional distillation of liquid air

D reaction between acid and metal

Answer ☐ [1]

/1

Source: 2024 AMKSS Prelim P1 Q15

7 Which statement about the Haber process is **not** correct?

A A catalyst of iron is used.

B Hydrogen is obtained from fractional distillation of liquid air.

C The reaction is reversible.

D Each nitrogen molecule reacts with three hydrogen molecules to form two molecules of ammonia.

Answer ☐ [1]

/1

Source: 2024 Dunman Prelim P1 Q25

8 Which statement about the manufacture of ammonia in the Haber process is **incorrect**?

A A 100% yield of ammonia will not be obtained in the reaction.

B High pressure is used to increase the yield of ammonia.

C Iron is used to increase the yield of ammonia.

D Nitrogen is obtained from fractional distillation of liquid air.

Answer ☐ [1]

Source: 2024 CHIJ Prelim P1 Q17

/1

9 Which of the following can increase the yield of ammonia in the Haber process?

A increase the pressure to 450 atm

B increase the temperature to 1000 °C

C use equal volumes of nitrogen and hydrogen

D use platinum as a catalyst

/1

Answer [1]

Source: 2024 AMKSS Prelim P1 Q16

10 Ammonia gas is produced using the Haber process. Which statement best explains why a higher temperature of 450 °C is used, although a lower temperature of 250 °C produces a higher yield of ammonia?

A At 250 °C, a smaller volume of ammonia will be collected.

B At 250 °C, the rate of ammonia production is too low.

C At 450 °C, the catalyst will be more effective.

D At 450 °C, ammonia will be collected in the gaseous state.

/1

Answer [1]

Source: Broadrick Prelim P1 Q23

11 Which statement about the Haber process is correct?

A Both gaseous reactants are obtained from fractional distillation of liquid air.

B Finely-divided iron is used to increase the rate and yield of the reaction.

C High pressure is used to increase the rate and yield of the reaction.

D High temperature is used to increase the rate and yield of the reaction.

/1

Answer [1]

Source: 2024 SJI Prelim P1 Q17

12 Ammonia gas can be made industrially by reacting nitrogen with hydrogen in the Haber process. The conditions are 450 °C and 250 atm, with finely divided iron as the catalyst. The reaction is reversible.

(a) Write the chemical equation for the formation of ammonia in the Haber process.

..... [2]

(b) State the source of either nitrogen or hydrogen.

.....

..... [1]

/3

Source: 2023 XMS Sec 3 WA3 Q7(b)

13 The Haber process uses iron as a catalyst and involves a reversible reaction.

(a) What is meant by a reversible reaction?

.....

..... [1]

(b) State two other conditions used in the Haber process.

/2

.....

[1]

Source: 2024 Jurongville Prelim P2 Q7(b)

14 The Haber process is used to manufacture ammonia in the chemical industry.

(a) State the optimum conditions used in the Haber process.

.....

[1]

(b) Explain why the yield of ammonia produced in the Haber process can never be 100%.

.....

.....

[1]

/2

Source: 2022 SJI Prelim P2 A3(c)