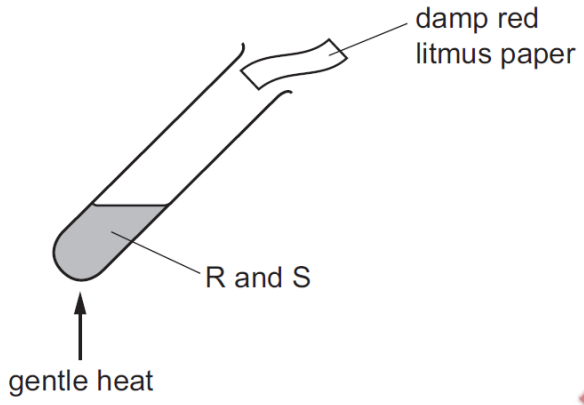
## Nitrogen and Compounds – 2019 June

**1.** 0620/11/M/J/19/No.31

A mixture of two substances, R and S, is heated.

The damp red litmus paper turns blue.




What are R and S?

| | R | S |
|---|---|---|
| **A** | a basic oxide | ammonium chloride |
| **B** | a basic oxide | sodium nitrate |
| **C** | an acidic oxide | ammonium chloride |
| **D** | an acidic oxide | sodium nitrate |

**2.** 0620/12/M/J/19/No.31

Ammonia gas is produced when compound X is warmed with an ammonium salt.

What is X?

**A** calcium carbonate

**B** calcium hydroxide

**C** sodium chloride

**D** potassium nitrate

**3.** 0620/13/M/J/19/No.31

Which gas is produced when ammonium chloride is warmed with aqueous sodium hydroxide?

**A** ammonia

**B** chlorine

**C** hydrogen

**D** nitrogen

**4.** 0620/21,22/M/J/19/No.31,32

Ammonia is manufactured by the Haber Process.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

The forward reaction is exothermic.

Which conditions maximise the yield of ammonia?

| | pressure | temperature |
|---|---|---|
| **A** | high | high |
| **B** | high | low |
| **C** | low | high |
| **D** | low | low |

**5.** 0620/23/M/J/19/No.32

Ammonia is manufactured in an exothermic reaction.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

What is the effect of lowering the temperature on the rate of formation and equilibrium yield of ammonia?

| | rate of formation | equilibrium yield |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | increases | decreases |
| **D** | increases | increases |

**6.** 0620/22/F/M/19/No.33

The raw materials for the Haber process are hydrogen and nitrogen.

What are the sources of the hydrogen and nitrogen?

**A** hydrogen from ethanol and nitrogen from NPK fertilisers

**B** hydrogen from methane and nitrogen from air

**C** hydrogen from sulfuric acid and nitrogen from air

**D** hydrogen from water and nitrogen from ammonium nitrate