The contact process – production of sulphuric acid

- Sulphuric acid is a commercially important raw material
- It is manufactured from \( H_2O \), air and sulphur
- Catalyst – \( V_2O_5 \)
- Temperature – 450\(^\circ\)C
- Pressure – 1-2 atm

Steps in the contact process

1. Formation of \( SO_2 \)
   - \( S + O_2 \rightarrow SO_2 \)

2. Formation of \( SO_3 \) (the contact process)
   - \( SO_2 + O_2 \rightarrow 2SO_3 \) (an exothermic reaction)
   - The catalyst used in this is vanadium pentoxide
   - 1) \( V_2O_5 + SO_2 \rightleftharpoons V_2O_4 + SO_3 \)
   - 2) \( V_2O_4 + \frac{1}{2} O_2 \rightleftharpoons V_2O_5 \)

3. Formation of oleum
   - \( SO_3 + \text{conc} H_2SO_4 \rightarrow H_2S_2O_7 \)
   - Reaction of water with \( SO_3 \) is too exothermic and forms a fine mist of acid, so they can’t be directly reacted

4. Dilution of oleum
   - \( H_2O + H_2S_2O_7 \rightarrow 2H_2SO_4 \)
   - The oleum is diluted to give the desired concentration of sulphuric acid