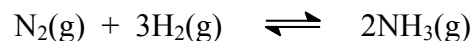


**Marks**  
**3**

- Ammonia is synthesised according to the following reaction.



At 500 °C this reaction has a  $K_c$  of  $6.0 \times 10^{-2}$ .  $\Delta H^\circ$  for this reaction is  $-92 \text{ kJ mol}^{-1}$ . Calculate the value of  $K_c$  at 200 °C.

**The equilibrium constant varies with temperature according to the van't Hoff equation:**

$$\ln \frac{K_2}{K_1} = \frac{-\Delta H^\circ}{R} \left( \frac{1}{T_2} - \frac{1}{T_1} \right)$$

Hence:

$$\ln \frac{K_2}{6.0 \times 10^{-2}} = \frac{+92 \times 10^3}{8.314} \left( \frac{1}{(200 + 273)} - \frac{1}{(500 + 273)} \right)$$

$$K_2 = 530$$

Answer: **530**