Question 34 **(10 marks)**

The Haber process is used to make ammonia. The balanced equation for the process is:

$$N_2(g) + 3\,H_2(g) \rightleftharpoons 2\,NH_3(g) + 92\ kJ$$
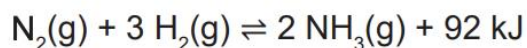
The Haber process provides challenges for industrial operators in relation to the rate of ammonia production and the ammonia yield. This is reflected in the following quotation taken from *Chemistry and Engineering News*:

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(a)   State whether you agree with the claims about the effects of temperature on the yield of ammonia. Justify your statement using Le Châtelier's Principle.   (4 marks)

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(b) State whether you agree with the claims about the effects of temperature on the rate of the Haber process. Justify your statement using collision theory.   (6 marks)

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