



(v) The forward reaction in (a) is exothermic. State and explain the effect on the value of  $K_c$  if temperature is increased.

[2]

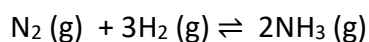
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(vi) State the effect on the position of equilibrium and the value of  $K_c$  if a catalyst is used.

[2]

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2. (a) The Haber process is used to produce ammonia:



(i) State and explain how the equilibrium would be affected by increasing the volume of the container at constant temperature.

[3]

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(ii) The percentage yield of ammonia is 25% at 400°C and 11% at 500°C. State and explain whether the reaction is exothermic or endothermic in the forward direction.

[2]

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Total 16 marks (24 minutes)