

AS level Chemistry A

H032/02 Depth in chemistry

Question Set 10

1. The reaction of ammonia, NH_3 , with oxygen to form nitrogen monoxide, NO , is an important industrial process.

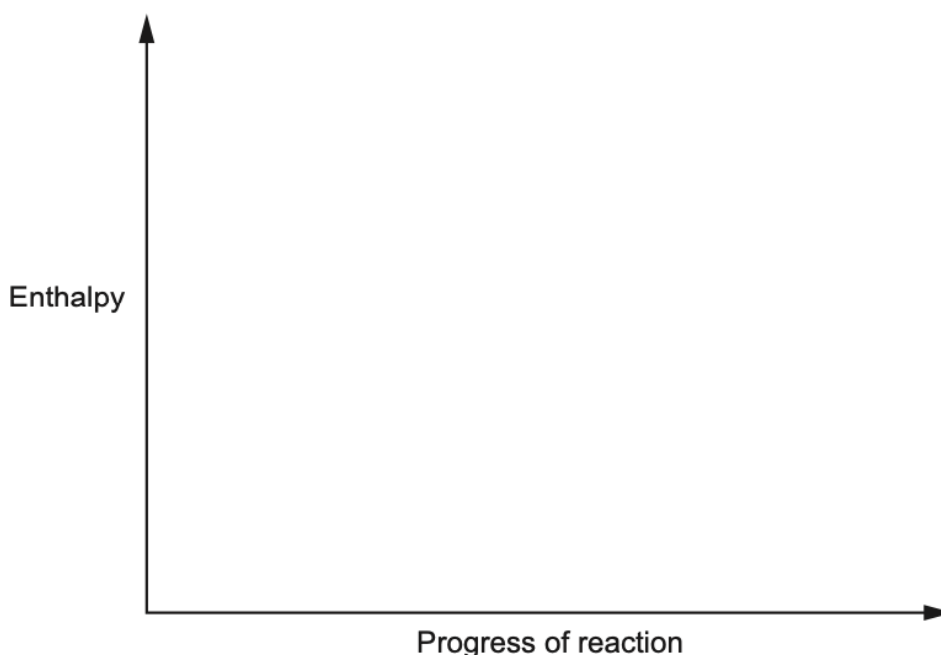
The equation for this reaction is shown in **equilibrium 4.1** below.



- (a) The forward reaction in **equilibrium 4.1** converts NH_3 into NO .
(i) Complete the enthalpy profile diagram for this reaction.

On your diagram:

- Label the activation energy, E_a
- Label the enthalpy change of reaction, ΔH
- Include the formulae of the reactants and products.



- (ii) 5.10 tonnes of NH_3 are converted into NO . [2]
Calculate the energy released, in kJ, for this conversion.
- Give your answer in **standard form** and to an **appropriate** number of significant figures. [4]
- (b) Write an expression for the equilibrium constant, K_c , in **equilibrium 4.1**. [1]
- (c) Predict the conditions of temperature and pressure for a maximum equilibrium yield of nitrogen monoxide in **equilibrium 4.1**. [5]
- Explain your prediction in terms of Le Chatelier's principle.
 - State and explain how these conditions could be changed to achieve a compromise between equilibrium yield, rate and other operational factors.

Total Marks for Question Set 4: 12

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