**Managing Chemical Processes – practice test**

1. Energy Profile diagrams can be used to describe the energy changes that take place during a chemical reaction
   1. Draw energy profile diagrams of
      1. an exothermic reaction

(2 marks)

* + 1. an endothermic reaction

(2 marks)

* 1. Clearly label ΔH and the activation energy on your diagrams (2 marks)
  2. Explain why heat is needed initially for both types of reaction

(1 mark)

* 1. With the use of an energy profile diagrams describe how a catalyst affects the rate of reaction

(3 marks)

1. Ammonia is produced commercially via the Haber process

N2 + 3H2 ⇌ 2NH3  ΔH = -92.4 kJ mol-1

* 1. state the features of a reaction at equilibrium

(2 marks)

* 1. name two experimental conditions that will increase the *rate* of this reaction and using *collision theory* explain why these conditions lead to an increased rate

(6 marks)

* 1. Use Le Chateliers principle to explain the effect of pressure on the *yield* of ammonia

(3 marks)

* 1. Describe the effect on the yield and reaction rate by the use of a catalyst

(2 marks)

* 1. If the reaction has a Kc value of 0.3 at 200°C, does the reaction have a greater proportion of reactants or products?

(1 mark)

* 1. The following reaction was undertaken at a temperature of 3000°C. Fill in the following table for this reaction.

|  |  |  |  |
| --- | --- | --- | --- |
|  | N2 | H2 | NH3 |
| Mole Ratio |  |  |  |
| Initial (mol) | 1.0 | 2.0 | 0.0 |
| Change (mol) |  |  |  |
| Equilibrium (mol) |  |  | 1.0 |

(3 marks)

* 1. If the reaction was done in a 10.0L reaction vessel calculate the concentrations of reactants at equilibrium

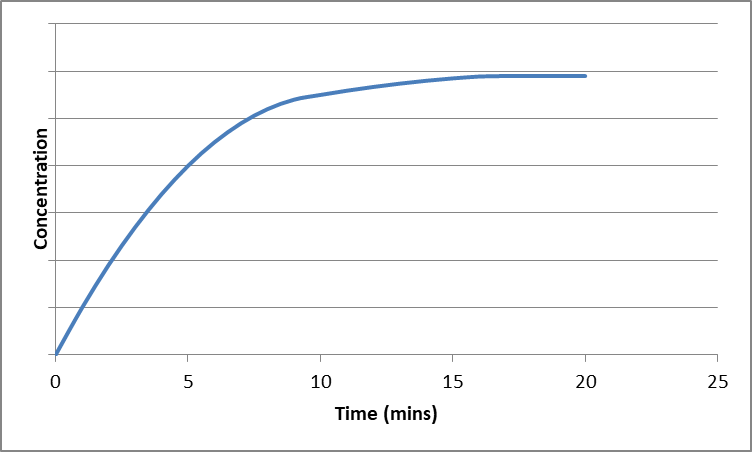
(2 marks)

* 1. calculate Kc for this reaction

(2 marks)

* 1. if equilibrium was established after 10 mins, draw a graph of concentration versus time for 15 mins of H2, N2 and NH3 on the same graph.

(4 marks)

1. Changes can be made to reactions that alter either the yield or rate.
   1. State the time at which the equilibrium was reached

(1 mark)

* 1. A change was made to the reaction conditions. The effect of the change is shown below. Identify the change that was made

(1 mark)

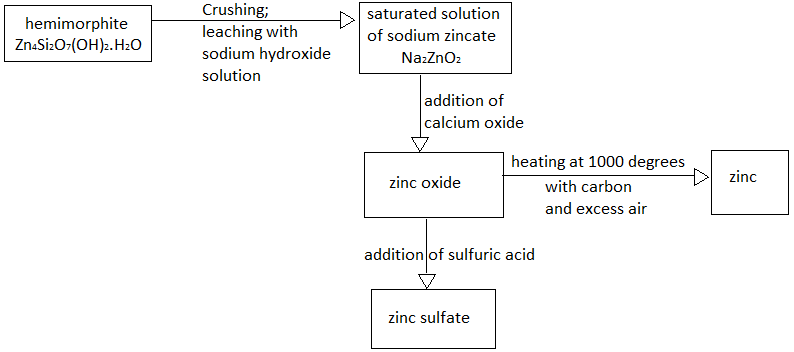
* 1. A reaction had a Kc value of 5. When the temperature of the reaction was increased, the Kc value fell to 2. Is the reaction exothermic or endothermic? Justify your answer

(2 marks)

* 1. Does this equilibrium mixture contain a greater proportion of reactants or products? How can you tell?

(2 marks)

1. Zinc can be obtained from the mineral hemimorphite, as shown in the flow chart below:



* 1. Name the process used to increase the rate of reaction of hemimorphite with sodium hydroxide solution.

(1 mark)

* 1. Write the formula of the by-product of this process

(2 marks)

* 1. Explain, using collision theory, why this increases the rate of reaction

(2 marks)

* 1. State the function of the carbon in the conversion of zinc oxide to zinc

(1 mark)

* 1. A saturated aqueous solution of sodium zincate establishes an equilibrium in which the products are zinc oxide and sodium hydroxide. Write an equation for this equation:

(2 marks)