

Core Concepts:

- **Exothermic reactions** transfer energy *to* the surroundings, usually as heat, causing the temperature of the surroundings to increase.
- **Endothermic reactions** take in energy *from* the surroundings, usually as heat, causing the temperature of the surroundings to decrease.
- Energy is **taken in** to **break bonds** and **released** when **new bonds are formed**.
- The overall energy change of a reaction is the difference between the energy needed to break bonds and the energy released when bonds are formed.

Section A: Key Terms & Concepts

A1. Match the following key terms to their correct definitions by drawing a line between them.

Exothermic
Endothermic
Activation Energy
Enthalpy Change

The minimum energy required for a reaction to start.

A reaction that takes in energy from the surroundings.

The overall energy change of a reaction, often measured as heat.

A reaction that releases energy to the surroundings.

A2. Complete the following sentences using the words provided. (*Words: released, surroundings, absorbed, decrease, increase, bonds, products, reactants*)

- (i) In an exothermic reaction, energy is _____ to the _____, causing the temperature to _____.
- (ii) In an endothermic reaction, energy is _____ from the _____, causing the temperature to _____.
- (iii) Energy is always required to break _____ in the _____, and energy is always _____ when new bonds are formed in the _____.

Section B: Core Concepts & Explanations

B1. Explain what an exothermic reaction is, giving one common example.

B2. Explain what an endothermic reaction is, giving one common example.

B3. Describe the energy changes involved in bond breaking and bond making during a chemical reaction.

B4. How can observing the temperature change of the surroundings help you determine if a reaction is exothermic or endothermic?

Section C: Exam Application & Extended Writing

C1. The diagram below shows an energy level profile for a chemical reaction.

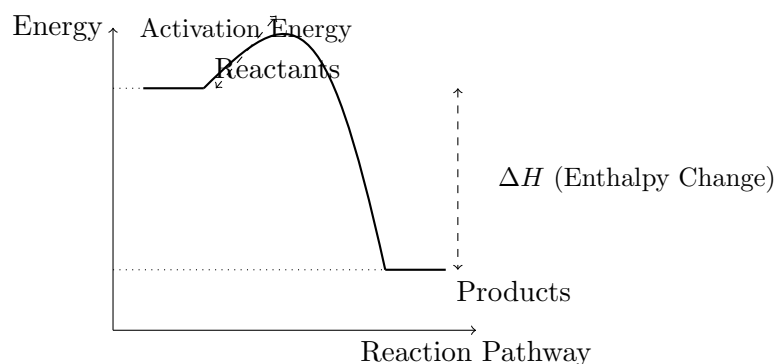


Figure 1: Energy Level Profile

(i) Is the reaction shown in Figure 1 exothermic or endothermic? Justify your answer by referring to the diagram.

C2. Explain, in detail, the key differences between exothermic and endothermic reactions, including how energy is transferred, the overall energy change, and provide a practical application for each type of reaction. (6 marks)
