



Energy Changes

Multiple Choice Questions

Set 3

Tick **one** box.

1. What is an endothermic reaction?

- A. a reaction that releases more energy to the surroundings than it takes in, decreasing the temperature of the surroundings
- B. a reaction that releases more energy to the surroundings than it takes in, increasing the temperature of the surroundings
- C. a reaction that takes in more energy from the surroundings than it releases, decreasing the temperature of the surroundings
- D. a reaction that takes in more energy from the surroundings than it releases, increasing the temperature of the surroundings

2. A group of students carried out an investigation into temperature changes during chemical reactions. **Table 1** shows the students' results.

Table 1

Concentration of Hydrochloric Acid (mol/dm ³)	Temperature Change (°C)			
	Trial 1	Trial 2	Trial 3	Mean
0.5	16	16	16	16
1.0	22	21	23	22
1.5	21	30	30	30

What is the independent variable in the students' investigation?

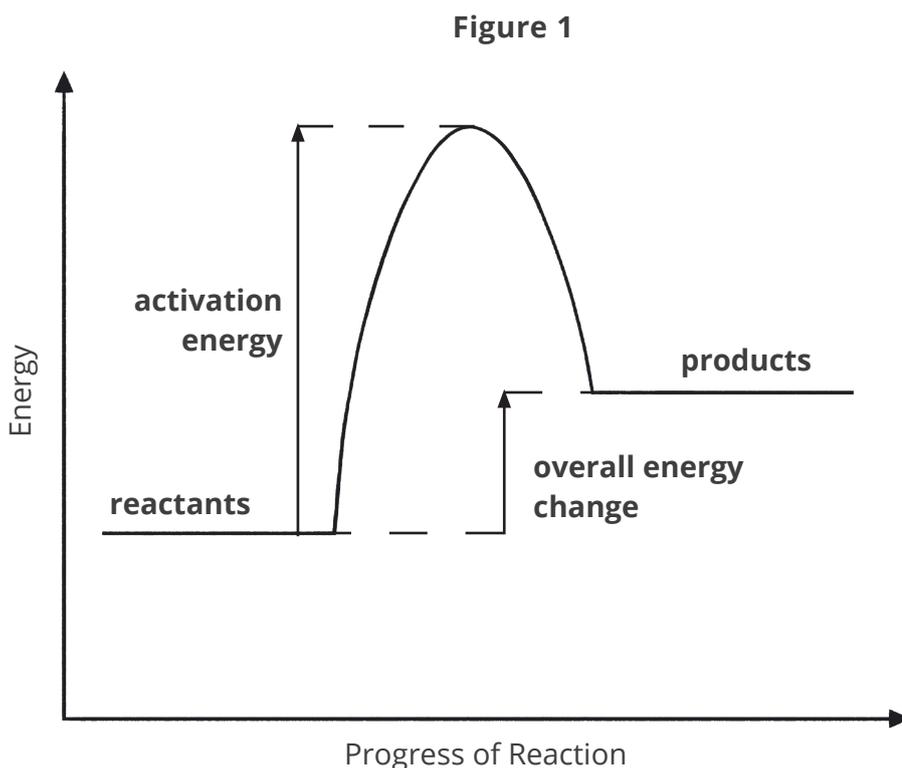
- A. the volume of acid
- B. the concentration of acid
- C. the number of trials carried out
- D. the temperature change

3. There is an anomalous result in **Table 1**. The temperature recorded is lower than it should be. What could be the cause of this anomalous result?
- A. the reaction mixture was not stirred
 - B. the temperature of the room increased
 - C. the thermometer did not have a high enough resolution
 - D. too much hydrochloric acid was added

4. Which object below uses an endothermic reaction?

- A. hand warmer
- B. hot water bottle
- C. self-heating food can
- D. sports injury pack

5. **Figure 1** shows a reaction profile for a chemical reaction.



Which reaction below could be represented by the reaction profile in **Figure 1**?

- A. combustion of ethanol
- B. displacement reaction between magnesium and copper sulfate
- C. neutralisation reaction between ethanoic acid and sodium carbonate
- D. thermal decomposition of calcium carbonate

6. Which statement is correct? (**HT only**)

- A. breaking bonds always transfers more energy than making bonds
- B. energy is released when bonds are broken
- C. energy is released when bonds are made
- D. the amount of energy in the universe will increase when a chemical reaction takes place

When heated, ethanol reacts as shown in the equation in **Figure 2**.

Figure 2

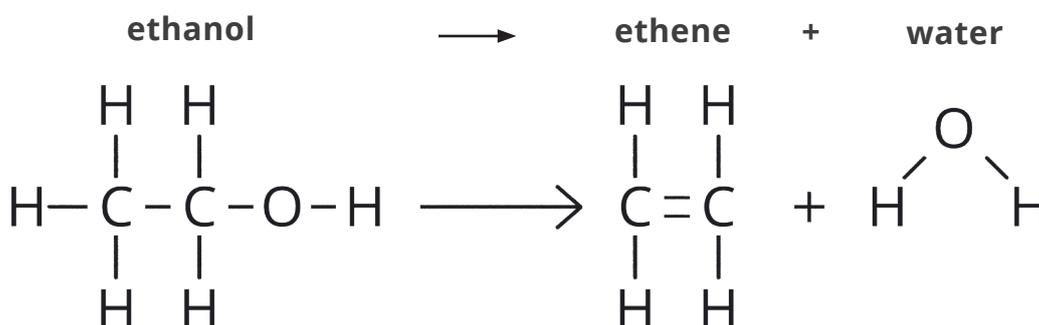


Table 2 shows some bond energy data.

Table 2

Bond	C-H	C-O	C-C	O-H	C=C
Bond Energy (kJ/mol)	413	360	348	464	612

7. How much energy is transferred when bonds are broken in the reaction shown in **Figure 2**? (**HT only**)

- A. 2425kJ/mol
- B. 2877kJ/mol
- C. 3192kJ/mol
- D. 3237kJ/mol

8. How much energy is transferred when new bonds are formed in the reaction shown in **Figure 2**? (**HT only**)

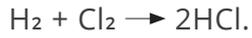
- A. 2425kJ/mol
- B. 2877kJ/mol
- C. 3192kJ/mol
- D. 3237kJ/mol



9. What is the overall energy change for the reaction shown in **Figure 2?** (**HT only**)

- A. -812kJ/mol
- B. -45kJ/mol
- C. 45kJ/mol
- D. 812 kJ/mol

10. The equation for the reaction between hydrogen and chlorine is



The overall energy change for this reaction is -184kJ/mol.

Table 3 shows some bond energy data.

Table 3

Bond	Cl-Cl	H-Cl
Bond Energy (kJ/mol)	242	431

What is the value for the bond energy of a H-H bond? (**HT only**)

- A. -184kJ/mol
- B. 5kJ/mol
- C. 247kJ/mol
- D. 436kJ/mol