

What is Enthalpy?

Worksheet

Enthalpy (H) is a state function that measures heat content. The heat of reaction $H = H_{\text{products}} - H_{\text{reactants}}$; negative H means exothermic (releases heat), positive means endothermic (absorbs heat).

$$\Delta H = H_{\text{products}} - H_{\text{reactants}}$$

Questions

1. $H = 45 \text{ kJ/mol}$. Exothermic or endothermic?

- A) Endothermic
- B) Exothermic
- C) Neutral
- D) Neither

2. What does H measure?

- A) Entropy change
- B) Heat of reaction
- C) Temperature
- D) Pressure

3. Boiling water at 100°C , H is

- A) Negative (exothermic)
- B) Positive (endothermic)
- C) Zero
- D) Unknown

4. Freezing water, H is

- A) Positive
- B) Negative
- C) Zero
- D) Depends on temperature

5. Combustion of methane: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$, $H = 890 \text{ kJ/mol}$. Is this exothermic?

6. Melting ice at 0°C absorbs 6 kJ/mol . What is H?

7. A neutralization releases 57 kJ/mol . Standard formation gives $H_{\text{neutralization}} = 57.3 \text{ kJ/mol}$. Why negative?

8. Define: What is enthalpy H?

9. Define: What does H tell us?

10. Define: Exothermic = H positive or negative?

Answer Key

1. B) Exothermic - Negative H = exothermic, heat released.
2. B) Heat of reaction - H is the change in enthalpy = heat absorbed/released.
3. B) Positive (endothermic) - Boiling absorbs heat endothermic, $H > 0$.
4. B) Negative - Freezing releases heat exothermic, $H < 0$.
5. $H = 890$ kJ/mol (negative) Negative H = exothermic (releases heat) Answer: Yes, heat is released.
6. Energy absorbed = positive H $H = +6$ kJ/mol (endothermic) Answer: $H = +6$ kJ/mol
7. Reaction releases heat heat flows out Heat out = negative H Answer: Heat released = $H < 0$
8. A state function measuring the total heat content of a substance.
9. The heat absorbed (positive) or released (negative) during a reaction.
10. Negative ($H < 0$) - heat is released.

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