

A-Level Chemistry

Name: _____ Score: _____

1. In an exothermic reaction:
 - ☐ no energy changes
 - ☐ heat is taken in and ΔH is positive
 - ☐ the products are higher in energy
 - ☐ heat is given out, the products are lower in energy, and ΔH is negative
2. Which statement is correct?
 - ☐ breaking bonds takes energy in (endothermic); making bonds gives energy out (exothermic)
 - ☐ making bonds takes energy in
 - ☐ breaking bonds gives energy out
 - ☐ neither breaking nor making changes energy
3. Hess's law states that the total enthalpy change for a reaction:
 - ☐ is the same no matter which route is taken from reactants to products
 - ☐ is always positive
 - ☐ is always zero
 - ☐ depends on the route taken
4. The activation energy is:
 - ☐ the difference between products and reactants
 - ☐ always zero
 - ☐ the energy given out by the reaction
 - ☐ the least energy the particles need before they can react
5. Using bond energies, ΔH of reaction equals:
 - ☐ bonds made $\div$ bonds broken
 - ☐ bonds broken $\times$ bonds made
 - ☐ sum of bonds broken $-$ sum of bonds made
 - ☐ sum of bonds made $-$ sum of bonds broken
6. Hess's law works because energy is conserved.
 - ☐ True ☐ False

7. A reaction that releases heat to the surroundings has a negative value of _____.
- _____
8. Breaking bonds is exothermic and making bonds is endothermic.
- ☐ True ☐ False
9. The law stating that enthalpy change is independent of the route taken is _____ law.
- _____
10. The standard enthalpy change of combustion is for:
- ☐ one mole of compound forming from its elements
 - ☐ one mole of a substance burning completely in oxygen
 - ☐ the amounts in the equation
 - ☐ one mole of water from acid and alkali

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1. heat is given out, the products are lower in energy, and ΔH is negative

Exothermic reactions release heat; products sit below reactants, so ΔH is negative.

2. breaking bonds takes energy in (endothermic); making bonds gives energy out (exothermic)

Energy is needed to break bonds and released when bonds form; ΔH is the difference.

3. is the same no matter which route is taken from reactants to products

Because energy is conserved, the overall ΔH depends only on the start and end states, not the path.

4. the least energy the particles need before they can react

Activation energy is the height of the "hill" – the minimum energy needed to start the reaction.

5. sum of bonds broken – sum of bonds made

$\Delta H = \Sigma(\text{bonds broken}) - \Sigma(\text{bonds made})$; energy in to break minus energy out to make.

6. True

Conservation of energy means the total enthalpy change is fixed by the start and end states alone.

7. ΔH

Exothermic reactions have $\Delta H < 0$.

8. False

False. Breaking bonds needs energy (endothermic) and making bonds releases energy (exothermic). $\Delta H = \text{bonds broken} - \text{bonds made}$.

9. Hess's

Enthalpy is a state function.

10. one mole of a substance burning completely in oxygen

ΔH_c is per mole of substance burned completely; ΔH_f is formation from elements; ΔH_{neut} makes one mole of water.