

23. Chemical energetics

Starter Quiz · 课前小测

A-Level Chemistry

Name: _____ Score: _____

1. The lattice energy is:

- ☐ the (negative) energy change when one mole of solid lattice forms from gaseous ions
- ☐ always positive
- ☐ the energy to make gaseous atoms
- ☐ the energy to remove an electron

2. The enthalpy change of hydration is:

- ☐ exothermic — energy released when gaseous ions are surrounded by water
- ☐ always endothermic
- ☐ the energy to break the lattice
- ☐ zero

3. Entropy is a measure of:

- ☐ the number of ways the particles and their energy can be arranged (disorder)
- ☐ the energy released by a reaction
- ☐ the temperature
- ☐ the mass of a substance

4. The Gibbs free energy change is calculated as:

- ☐ $\Delta G = \Delta H - T\Delta S$
- ☐ $\Delta G = \Delta H + T\Delta S$
- ☐ $\Delta G = T\Delta S - \Delta H$
- ☐ $\Delta G = \Delta H \times \Delta S$

5. Going down Group 17, the first electron affinity becomes:

- ☐ less exothermic, because the larger atom attracts the electron less strongly
- ☐ more exothermic
- ☐ always positive
- ☐ unchanged

6. The enthalpy change when one mole of gaseous ions dissolves in water is the enthalpy of _____.

7. The enthalpy change when one mole of an ionic solid forms from gaseous ions is the _____ energy.

8. Enthalpy of solution can be found from lattice energy and hydration enthalpies using Hess's law.

☐ True ☐ False

9. Entropy increases when a solid melts or a gas is formed.

☐ True ☐ False

10. A reaction is feasible when the Gibbs free energy change ΔG is _____.

A-Level Chemistry**1. the (negative) energy change when one mole of solid lattice forms from gaseous ions**

Strong ionic bonds form, so lattice energy is exothermic (negative).

2. exothermic — energy released when gaseous ions are surrounded by water

Water molecules are attracted to the ions, releasing energy, so hydration is exothermic.

3. the number of ways the particles and their energy can be arranged (disorder)

More ways to arrange particles/energy means higher entropy (more disorder).

4. $\Delta G = \Delta H - T\Delta S$

$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$, with T in kelvin.

5. less exothermic, because the larger atom attracts the electron less strongly

A bigger atom pulls the incoming electron in less strongly, so EA is less exothermic.

6. hydration

More negative for smaller, more highly charged ions.

7. lattice

Born-Haber cycles use Hess's law to find it.

8. True

A Hess cycle links them.

9. True

More disorder means higher entropy.

10. negative

$\Delta G = \Delta H - T\Delta S$.