27. Group 2

Starter Quiz · 课前小测

A-Level Chemistry Name: _____ Score: _____

1. Going down Group 2, the thermal stability of the nitrates and carbonates:

   ☐ increases

   ☐ decreases

   ☐ stays the same

   ☐ becomes zero

2. The enthalpy of solution is given by:

   ☐ $\Delta H\_sol = -\Delta H\_latt + \Delta H\_hyd$

   ☐ $\Delta H\_sol = \Delta H\_latt + \Delta H\_hyd$

   ☐ $\Delta H\_sol = \Delta H\_latt - \Delta H\_hyd$

   ☐ $\Delta H\_sol = \Delta H\_hyd \times \Delta H\_latt$

3. A small cation makes a carbonate decompose more easily because it:

   ☐ polarises (distorts) the carbonate ion, weakening a bond inside it

   ☐ makes the carbonate ion bigger

   ☐ adds electrons to the anion

   ☐ lowers the temperature

4. Group 2 hydroxides become MORE soluble down the group because:

   ☐ the small OH^- means the lattice energy falls a lot down the group

   ☐ the lattice energy stays constant

   ☐ the hydration energy increases

   ☐ they stop dissolving

5. A larger cation lower in the group:

   ☐ polarises the anion less, so the compound is more stable

   ☐ polarises the anion more

   ☐ has a higher charge density

   ☐ cannot form compounds

6. A more thermally stable carbonate needs a higher temperature to decompose.

   ☐ True ☐ False

7. Group 2 carbonates become more stable to heat going down the group.

   ☐ True ☐ False

8. Group 2 hydroxides become more soluble down the group.

   ☐ True ☐ False

9. Group 2 sulfates become LESS soluble down the group because:

   ☐ the large SO_4^{2-} keeps the lattice energy almost constant, so the fall in hydration energy dominates

   ☐ the lattice energy falls a lot

   ☐ the hydration energy rises

   ☐ they become more polar

10. A solid dissolves easily when the hydration energy:

    ☐ roughly matches or beats the lattice energy

    ☐ is much smaller than the lattice energy

    ☐ is zero

    ☐ is positive

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Answers · 答案

A-Level Chemistry

1. **increases**

   A larger cation polarises the anion less, so the compound is harder to decompose — more stable down the group.

2. **$\Delta H\_sol = -\Delta H\_latt + \Delta H\_hyd$**

   You reverse the lattice energy (to break the lattice) and add the hydration enthalpy.

3. **polarises (distorts) the carbonate ion, weakening a bond inside it**

   High charge density distorts the anion, weakening it so it breaks down at a lower temperature.

4. **the small OH^- means the lattice energy falls a lot down the group**

   With the small OH^- ion, the lattice energy drops sharply down the group, outweighing the hydration fall.

5. **polarises the anion less, so the compound is more stable**

   Bigger cation = lower charge density = less polarisation = more thermally stable.

6. **True**

   Greater stability means more energy is needed to break it down.

7. **True**

   Larger cations distort the carbonate ion less.

8. **True**

   While the sulfates become less soluble.

9. **the large SO_4^{2-} keeps the lattice energy almost constant, so the fall in hydration energy dominates**

   The big sulfate ion makes the lattice energy nearly constant, so the decreasing hydration energy controls the trend.

10. **roughly matches or beats the lattice energy**

    If hydration releases about as much (or more) energy than is needed to break the lattice, dissolving is favourable.