

A-Level Chemistry

Name: _____ Score: _____

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

- ☐ decreases
- ☐ increases
- ☐ stays the same
- ☐ becomes zero

2. The enthalpy of solution is given by:

- ☐ $\Delta H_{\text{sol}} = -\Delta H_{\text{latt}} + \Delta H_{\text{hyd}}$
- ☐ $\Delta H_{\text{sol}} = \Delta H_{\text{latt}} + \Delta H_{\text{hyd}}$
- ☐ $\Delta H_{\text{sol}} = \Delta H_{\text{hyd}} \times \Delta H_{\text{latt}}$
- ☐ $\Delta H_{\text{sol}} = \Delta H_{\text{latt}} - \Delta H_{\text{hyd}}$

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

- ☐ polarises (distorts) the carbonate ion, weakening a bond inside it
- ☐ lowers the temperature
- ☐ adds electrons to the anion
- ☐ makes the carbonate ion bigger

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

- ☐ the hydration energy increases
- ☐ they stop dissolving
- ☐ the lattice energy stays constant
- ☐ the small OH^- means the lattice energy falls a lot down the group

5. A larger cation lower in the group:

- ☐ cannot form compounds
- ☐ polarises the anion more
- ☐ has a higher charge density
- ☐ polarises the anion less, so the compound is more stable

6. Group 2 hydroxides become less soluble down the group.

- ☐ True ☐ False

7. A more thermally stable carbonate needs a higher temperature to decompose.
- ☐ True ☐ False
8. Group 2 carbonates become less stable to heat going down the group.
- ☐ True ☐ False
9. Group 2 sulfates become LESS soluble down the group because:
- ☐ they become more polar
- ☐ the hydration energy rises
- ☐ the lattice energy falls a lot
- ☐ the large SO_4^{2-} keeps the lattice energy almost constant, so the fall in hydration energy dominates
10. A solid dissolves easily when the hydration energy:
- ☐ is much smaller than the lattice energy
- ☐ is positive
- ☐ roughly matches or beats the lattice energy
- ☐ is zero

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1. **increases**

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

2. **$\Delta H_{\text{sol}} = -\Delta H_{\text{latt}} + \Delta H_{\text{hyd}}$**

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. **False**

False. Group 2 hydroxides become more soluble down the group, while the sulfates become less soluble.

7. **True**

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

8. **False**

False. They become more stable down the group, because larger cations distort the carbonate ion less.

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.