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:

   ☐ $\Delta H_sol = -\Delta H_latt + \Delta H_hyd$

   ☐ $\Delta H_sol = \Delta H_latt + \Delta H_hyd$

   ☐ $\Delta H_sol = \Delta H_hyd \times \Delta H_latt$

   ☐ $\Delta H_sol = \Delta H_latt - \Delta H_hyd$

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 at which it melts

   ☐ adds electrons to the anion and breaks a bond

   ☐ makes the carbonate ion bigger and easier to break

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 with large anions

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

   ☐ has a higher charge density, so it decomposes more easily

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

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

   ☐ True ☐ False

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☐ 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:

   ☐ the bonding becomes more covalent and polar, so water cannot separate the ions

   ☐ the hydration energy becomes more exothermic down the group as the cations get larger

   ☐ the lattice energy falls much faster than the hydration energy, so dissolving becomes more endothermic

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

10. Where does strontium carbonate, $SrCO_3$, fit in the order of decomposition temperature?

    ☐ between $CaCO_3$ and $BaCO_3$

    ☐ below $MgCO_3$

    ☐ above $BaCO_3$

    ☐ between $MgCO_3$ and $CaCO_3$

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. **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. **between $CaCO_3$ and $BaCO_3$**

    Sr is between Ca and Ba in Group 2, so Sr^{2+} has an intermediate radius and charge density.

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