

A-Level Chemistry

Name: _____ Score: _____

1. Reactivity increases down Group 2 because:
 - ☐ the atoms get larger and lose their outer electrons more easily
 - ☐ they gain electrons
 - ☐ the nuclear charge falls
 - ☐ the atoms get smaller
2. Heating a Group 2 carbonate produces:
 - ☐ the metal and oxygen
 - ☐ the hydroxide and hydrogen
 - ☐ the metal oxide and carbon dioxide
 - ☐ nitrogen dioxide only
3. A Group 2 metal reacting with water forms:
 - ☐ a hydroxide and hydrogen gas
 - ☐ a chloride and hydrogen
 - ☐ a carbonate
 - ☐ an oxide and oxygen
4. Thermal stability of the carbonates increases down Group 2 because:
 - ☐ the carbonate ion gets larger
 - ☐ the metal ion gets smaller
 - ☐ the temperature falls
 - ☐ a larger metal ion polarises the carbonate ion less, so it is harder to break apart
5. The oxides and hydroxides of Group 2 metals are:
 - ☐ basic
 - ☐ neutral
 - ☐ amphoteric
 - ☐ acidic
6. Group 2 carbonates become less thermally stable down the group.
 - ☐ True ☐ False

7. Group 2 metals form ions with a 2+ charge.

☐ True ☐ False

8. Down Group 2:

☐ both decrease

☐ both increase

☐ hydroxide solubility increases, while sulfate solubility decreases

☐ hydroxide solubility decreases, sulfate increases

9. A Group 2 carbonate reacting with a dilute acid produces:

☐ nitrogen dioxide

☐ a hydroxide and hydrogen

☐ a salt, water and carbon dioxide

☐ an oxide only

10. Heating a Group 2 nitrate produces:

☐ the metal and nitrogen

☐ the carbonate

☐ only the oxide

☐ the oxide, brown nitrogen dioxide and oxygen

A-Level Chemistry

1. the atoms get larger and lose their outer electrons more easily

Larger atoms hold their two outer electrons less tightly, so they are lost more readily.

2. the metal oxide and carbon dioxide

Thermal decomposition: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$.

3. a hydroxide and hydrogen gas

e.g. $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2$; the reaction gets faster down the group.

4. a larger metal ion polarises the carbonate ion less, so it is harder to break apart

A big cation distorts the carbonate ion less, so more energy (a higher temperature) is needed to decompose it.

5. basic

They are basic – they react with water and neutralise acids.

6. False

False. They become more stable down the group: larger cations have a lower charge density and polarise the carbonate ion less, so it needs a higher temperature to decompose.

7. True

They lose their two outer electrons.

8. hydroxide solubility increases, while sulfate solubility decreases

Hydroxides become more soluble (Ba(OH)_2 soluble); sulfates become less soluble (BaSO_4 insoluble).

9. a salt, water and carbon dioxide

e.g. $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$.

10. the oxide, brown nitrogen dioxide and oxygen

e.g. $2\text{Ca(NO}_3)_2 \rightarrow 2\text{CaO} + 4\text{NO}_2 + \text{O}_2$ (brown NO_2 gas is given off).