1. Reactivity increases down Group 2 because:

   ☐ the atoms get larger and lose their outer electrons more easily

   ☐ the atoms gain electrons more easily from other elements

   ☐ the nuclear charge falls, so electrons are lost more easily

   ☐ the atoms get smaller and hold their electrons less tightly

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, so its bonds are stronger

   ☐ the metal ion gets smaller, so it polarises the carbonate less

   ☐ the temperature needed falls, so the compound lasts longer

   ☐ 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



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☐ True ☐ False

8. 4.20 g of $MgCO_3$ ($M_r = 84$) is heated until it stops losing mass. What mass of MgO ($M_r = 40$) is left, in g?

   _____

9. 0.120 g of magnesium ($A_r = 24.0$) reacts with excess hydrochloric acid. What volume of hydrogen forms at room conditions, in $cm^3$? (24 000 $cm^3$ per mol)

   _____

10. Down Group 2:

    ☐ both decrease

    ☐ both increase

    ☐ hydroxide solubility increases, while sulfate solubility decreases

    ☐ hydroxide solubility decreases, sulfate increases

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: $CaCO_3 \rightarrow CaO + CO_2$.

3. **a hydroxide and hydrogen gas**

   e.g. $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$; 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. **2.0**

   $n = \dfrac{4.20}{84} = 0.0500$ mol, so $0.0500 \times 40 = 2.00$ g of MgO.

9. **120**

   $n = \dfrac{0.120}{24.0} = 0.00500$ mol of Mg gives 0.00500 mol of $H_2$; $0.00500 \times 24\,000 = 120$ cm$^3$.

10. **hydroxide solubility increases, while sulfate solubility decreases**

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



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