

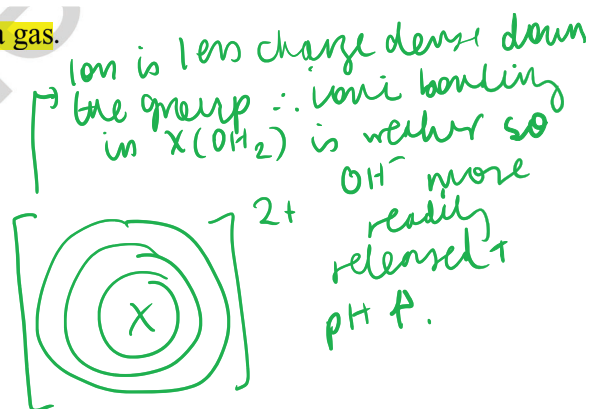
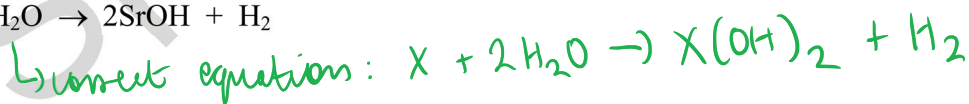
1. The **Group 2 elements** react with **water**, forming a **solution and a gas**.

Which **statement is correct**?

- A The reactivity of the elements decreases down Group 2.
- B The pH of the solution formed increases down Group 2.
- C The reaction is a neutralisation. (relox)
- D The equation for the reaction of strontium with water is:



Your answer

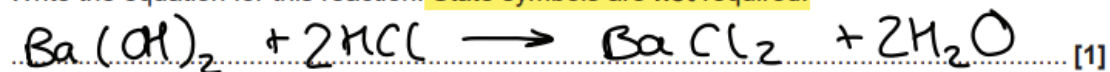


[1]

2. This question is about Group 2 and Group 17 (7).

- (a) Barium chloride can be prepared from barium hydroxide in a neutralisation reaction. strong acid + strong base

Write the equation for this reaction. State symbols are not required.



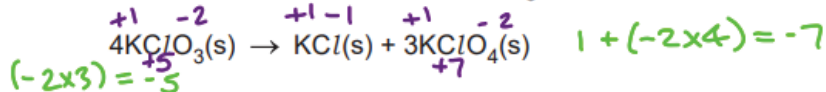
- (b) The reactivity of the Group 2 elements Mg–Ba increases down the group.

Explain why.

- Atomic radii size increases
- electron shielding increases
- nuclear attraction decreases
- ionisation energy decreases

[3]

- (c) On gently heating, the compound  $\text{KClO}_3$  reacts as shown in the equation.



This reaction is an example of disproportionation.

- (i) State what is meant by **disproportionation** and use oxidation numbers to show that disproportionation has taken place.

disproportionation: where oxidation and reduction of the same element occur simultaneously.

[3]

- (ii) What is the systematic name for  $\text{KClO}_4$ ?

potassium chlorate (VII) [1]

↑ chlorine has a +7 oxidation number

(d) Two changes are described below.

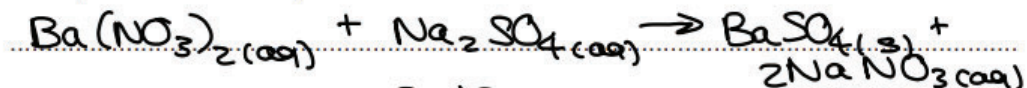
For each change,

- write an equation, including state symbols,
- state and explain how the entropy changes.

increases if  
more gaseous  
molecules  
produced

(i) The reaction of aqueous barium nitrate with aqueous sodium sulfate.

Full equation with state symbols



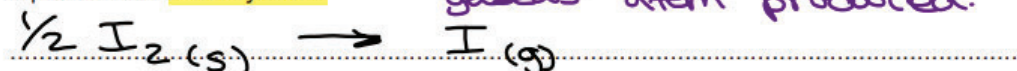
Explanation of entropy change ... entropy decreases

because  $\text{BaSO}_4(\text{s})$  has less disorder

[2]

(ii) The change that accompanies the standard enthalpy change of atomisation of iodine.

Equation with state symbols



IMPORTANT only one  
gaseous atom produced.

Explanation of entropy change ... entropy increases

because gas has more disorder

[2]

3. 3.528 g of a Group 2 metal, **M**, is reacted with an excess of chlorine. The reaction forms 9.775 g of a chloride.

What is metal **M**?

- A magnesium  
 B calcium  
 C strontium  
 D barium

Your answer

B



$M = \text{RFM of metal}$



$$\frac{9.775}{M + (35.5 \times 2)}$$

$$\frac{9.775}{M + (35.5 \times 2)} = \frac{3.528}{M}$$

$$9.775M = 3.528M + 246.96 \quad [1]$$

$$6.247M = 246.96 \rightarrow M = \frac{246.96}{6.247} = 39.5$$

4. Which statement is **not** correct for Group 2 hydroxides?

~~A~~  $\text{Mg}(\text{OH})_2$  can be used to treat indigestion. ✓

**B**  $\text{Ca}(\text{OH})_2$  is used in agriculture to neutralise alkaline soils. →  $\text{Ca}(\text{OH})_2$  is a base/alkaline so can't neutralise a base/

~~C~~ The anion in  $\text{Sr}(\text{OH})_2$  contains 10 electrons. ✓  
 $\text{OH}^-$  so 9 protons, 10 electrons

~~D~~  $\text{Ba}(\text{OH})_2$  is a product from the reaction of barium and water.  
 Oxygen = 8 protons and 8 electrons, Hydrogen = 1 proton and 1 electron alkali



Your answer

**B**

[1]

5. Which statement(s) for Group 2 elements is/are correct?

1 The 2nd ionisation energy of magnesium is greater than the 2nd ionisation energy of calcium. ✓

2 A strontium ion,  $\text{Sr}^{2+}$ , contains a total of 8 electrons in s orbitals.  
 $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$

3 The equation for the reaction of barium with water is:  
 $2\text{Ba} + 2\text{H}_2\text{O} \rightarrow 2\text{BaOH} + \text{H}_2$

Smaller so more nuclear attraction needs more energy

A 1, 2 and 3

B Only 1 and 2

C Only 2 and 3

D Only 1



Your answer

D

[1]