

2 Calcium is an element in Group II of the Periodic Table.

(a) Identify the element in Group II which has only five occupied electron shells.

..... [1]

(b) Name and describe the type of bonding found in elements in Group II.

name

description

.....

.....

..... [4]

(c) When a piece of calcium is added to some cold water containing universal indicator a reaction takes place.

(i) Give **three** observations when this reaction takes place.

1

2

3

[3]

(ii) Name the **two** products of this reaction.

..... and [2]

(d) Calcium burns in oxygen.

(i) State the colour of the flame.

..... [1]

(ii) Write the symbol equation for this reaction.

..... [2]

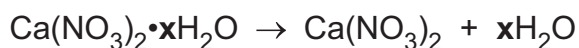
(e) Crystals of hydrated calcium nitrate contain water molecules.

The formula of hydrated calcium nitrate is $\text{Ca}(\text{NO}_3)_2 \cdot x\text{H}_2\text{O}$.
 x is a whole number.

(i) State the term given to the water molecules present in hydrated crystals.

..... [1]

(ii) When hydrated calcium nitrate is heated gently, the following reaction occurs.



A sample of hydrated calcium nitrate is heated gently. 3.28 g of $\text{Ca}(\text{NO}_3)_2$ forms and the mass of the crystals decreases by 1.44 g.

[M_r : $\text{Ca}(\text{NO}_3)_2$, 164; H_2O , 18]

Determine the value of x in $\text{Ca}(\text{NO}_3)_2 \cdot x\text{H}_2\text{O}$ using the following steps.

- Calculate the number of moles of $\text{Ca}(\text{NO}_3)_2$ that remain.

..... mol

- Calculate the number of moles of H_2O given off.

..... mol

- Determine the value of x .

$x =$
[3]

5 This question is about metallic compounds.

(a) Insoluble metal salts, such as lead(II) sulfate, are made by precipitation.

When aqueous lead(II) ions react with aqueous sulfate ions, a precipitate of lead(II) sulfate forms.

A sample of pure lead(II) sulfate can be obtained from the precipitate formed.

(i) Write an ionic equation for this precipitation reaction. Include state symbols.

..... [3]

(ii) State the name of an aqueous solution containing lead(II) ions.

..... [1]

(iii) State the name of an aqueous solution containing sulfate ions.

..... [1]

(iv) The lead(II) sulfate precipitate is separated from the rest of the reaction mixture by filtration. The impure lead(II) sulfate remains on the filter paper.

State the general term given to an insoluble substance that remains on the filter paper during filtration.

..... [1]

(v) Describe how the lead(II) sulfate is purified after filtration.

.....

..... [2]

(b) Copper is a transition element.

A list of properties of copper is shown.

- It has good electrical conductivity.
- It has variable oxidation states.
- It forms soluble salts.
- It forms coloured compounds.
- It forms basic oxides.
- It acts as a catalyst.

(i) Give **two** properties from the list that show how copper is similar to metals in Group I of the Periodic Table.

1

2 [2]

(ii) Give **two** properties from the list that show how copper is different from metals in Group I of the Periodic Table.

1

2 [2]

[Total: 12]