

**GCSE Chemistry B (Twenty First Century Science)**  
**J258/02** Depth in chemistry (Foundation Tier)

**Question Set 21**

1

Alex collects some samples of minerals from a spoil heap near an old mine.

Alex tests two samples of minerals, **A** and **B**, to identify the ions that they contain.

- (a) He carries out flame tests on each sample and compares his results (**Table 1.1**) to a reference book of flame colours for some metal ions (**Table 1.2**).

**Alex's results**

Mineral	Flame colour
<b>A</b>	green
<b>B</b>	orange-red

**Table 1.1**

**Reference book**

Metal ion	Flame colour
<b>copper</b>	blue-green
<b>calcium</b>	orange-red
<b>iron</b>	varies with temperature blue/green/yellow/orange
<b>zinc</b>	green

**Table 1.2**

Use information from **Table 1.1** and **Table 1.2** to explain why Alex cannot be certain which ions are in the samples.

[3]

- (b) Alex makes a solution of a sample of each mineral in water and does some further tests.

The tests he carries out, and his results, are shown in **Table 1.3**.

Mineral	Test	Result
<b>A</b>	Add dilute sodium hydroxide.	blue precipitate
	Add dilute hydrochloric acid.	fizzes, gas given off turns lime water milky
	Add dilute silver nitrate.	white precipitate
<b>B</b>	Add dilute sodium hydroxide.	white precipitate does not dissolve in excess
	Add dilute hydrochloric acid.	no change
	Add dilute silver nitrate.	white precipitate

**Table 1.3**

- (i) Alex thinks that mineral **A** contains two negative ions. How can you tell from the results that Alex is right?

[1]

(ii) Identify the ions in mineral **A** and mineral **B**.

Choose words from this list.

**copper   calcium   iron   zinc   carbonate   chloride   sulfate**

Ions in mineral A	Ions in mineral B
.....	.....
.....	.....
.....	

[3]

(c) Alex also has an emission spectroscopy machine to analyse samples of minerals.

Give **one** advantage of using an emission spectroscopy machine, rather than flame tests or chemical tests, to identify samples.

[1]

**Total Marks for Question Set 21: 8**

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