

Question 31 (6 marks)

- (a) A student collected a 250 mL sample of water from a local dam for analysis. The data collected are shown in the table.

Mass of filter paper	0.23 g
Mass of filter paper and solid	0.47 g
Mass of evaporating basin	43.53 g
Mass of basin and solid remaining	44.67 g

- (i) The water was filtered and the filtrate evaporated to dryness. 2

Calculate the percentage of the total dissolved solids in the dam sample.

$$\begin{aligned}
 & \text{mass of total dissolved solids} = (0.47 - 0.23) \times \dots \\
 & \text{mass of total dissolved solids} = 44.67 - 43.53 \\
 & \qquad \qquad \qquad = 1.14 \text{ g} \\
 & \therefore \text{percentage} = \frac{1.14}{250} \times 100 \\
 & \qquad \qquad \qquad = 0.456\%
 \end{aligned}$$

- (ii) It is suspected that the water in the dam has a high concentration of chloride ions. 2

Describe a chemical test that could be carried out on the water sample to determine the presence of chloride ions. Include an equation in your answer.

Chloride ions precipitate in the presence of lead ions therefore a sample water could be taken and a small amount of lead nitrate added to see if a white precipitate forms

$$\text{eg } \text{Pb(NO}_3)_2(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{PbCl}_2(\text{s}) + \text{NO}_3^-(\text{aq})$$

Also, Chloride ions don't react with Barium ions

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so Barium nitrate could be added and if no reaction (eg no precipitate) occurs then there is Cl^- ions



Question 31 (continued)

- (b) Name an ion other than chloride that commonly pollutes waterways, and identify its source and the effect of its presence on water quality.

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Phosphate ions commonly pollute waterways and come from runoff from agriculture, fertilisers, sewage, faecal waste, washing powders. It has a detrimental effect as if too much is in the waterway, eutrophication occurs which is the dramatic increase in algae which when it dies bacteria that break it down use up oxygen in the water decreasing the amount of dissolved oxygen available for aquatic life such as fish which need it to survive.