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.

$m_{(solid)}$ filtered $= 0.47 - 0.23 = 0.24\,g$.

mass of evaporated solid $= 44.67 - 43.53 = 1.14\,g$.

$\frac{1.14}{0.24} \times 100 = \frac{1.14}{250} \times 100 = 0.456\%$.

(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.

Add $AgNO_3$ to the sample of water to form white $AgNO_{3(aq)}$ precipitate.

$Ag^{3+}_{(aq)} + 3Cl^-_{(aq)} \rightarrow AgCl_{3(aq)}$.

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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. 2

Lead ions also pollute water ways. It is sourced from old paint from buildings, leaded petrol, extracting lead from ores and food/water from lead glazed pottery. Lead ions in waterways is toxic as a heavy metal and will

End of Question 31

Phosphate ions also pollute waterways. It is sourced from fertiliser run off or detergents. Its presence in waterways will increase the growth of algae blooms thus leading to eutrophication which blocks out light from penetrating the water, thus killing plants as they cannot photosynthesise. The decomposition of plants depletes oxygen levels of water thus reducing water quality.