Marks

Question 26 (5 marks)

Water can be described as either 'hard' or 'soft'.

(a) Describe a test you have used to determine whether a given sample of water is 'hard' or 'soft'. **2**

We collected water from different areas. One from Sydney and one from Adelaide (teacher said). We put the a sample of each in 2 test-tubes (equal amounts) then added 1-2 drops of soap in. We then used stoppers to cover the test-tube tops and ~~shake~~ shook the water samples. The Sydney water gave a good lather, we could see the soap bubbles yet the adelaide water didn't ready give a good lather ∴ Sydney water is soft water & adelaide hard water.

(b) A sample of hard water contains 6×10^{-4} mol L^{-1} of magnesium carbonate. **3**

Calculate the mass, in mg, of magnesium carbonate in 150 mL of this sample.

Magnesium Carbonate [$MgCO_3$]

mm [$MgCO_3$] = 24.31 + 12.01 + 3(16) = 84.32

conc. [$MgCO_3$] = 6×10^{-4} mol / L

vol [$MgCO_3$] = 150mL = 0.15 L

$c = \frac{n}{V}$

$6 \times 10^{-4} = \frac{n}{0.15}$

$\therefore n = 9 \times 10^{-5}$

$n(MgCO_3) = \frac{m}{mm}$

$9 \times 10^{-5} = \frac{m}{84.32}$

$m = 7.5888 \times 10^{-3}$ g $\times$ 1000

$\therefore$ mass [$MgCO_3$] = 7.5888 mg