

Question 26 (5 marks)

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

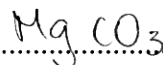
- (a) Describe a test you have used to determine whether a given sample of water is 'hard' or 'soft'. 2

'Hard' water contains Mg^{2+} & Ca^{2+} . By testing for these ions using precipitates & such, it can be determined if they are found in the water. If they are not found in the water, then the water must be 'soft'.

- (b) A sample of hard water contains $6 \times 10^{-4} \text{ mol L}^{-1}$ of magnesium carbonate. 3

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

$$n = cV$$



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

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

$$n = \frac{m}{M}$$

$$m = nM$$

$$= 9 \times 10^{-5} \times (3 \times 16 + 12 + 24.31)$$

$$= 7.5879 \times 10^{-3} \text{ g}$$

$$= 7.5879 \text{ mg}$$

$$= 7.59 \text{ mg} \quad (2 \text{ dp.})$$