

## 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

Soap is used to see if a lather can form with the water. If the water is 'hard' then it is very hard to lather the soap, whereas if the soap is 'soft' a lather is easily produced.

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

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

$$\text{molarity} = \frac{\text{moles}}{\text{volume}}$$

$$\therefore 6 \times 10^{-4} = \frac{0.6 \text{ moles}}{1000 \text{ mL}} = \frac{0.09 \text{ moles}}{150 \text{ mL}}$$

$$\therefore 0.09 = \frac{\text{mass}}{24.31}$$

$$\therefore \text{mass} = 2.1879 \text{ g}$$

$$\therefore = 2187.9 \text{ mg}$$