Concentration (ppm)

Solutions

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to the worksheet

$$ppm = \frac{mg}{kg} \quad or \quad \frac{mg}{L}$$

1) 50 mg of solute is dissolved in 2 kg of solution. What is the concentration in ppm?

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

$$C = \frac{50 \text{ mg}}{2 \text{ kg}}$$

$$C = 25 \text{ ppm}$$

2) 15 L of solution contains 120 mg of solute. What is the concentration in ppm?

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

$$C = \frac{120 \text{ mg}}{15 \text{ L}}$$

$$C = 8 \text{ ppm}$$

3) The concentration of a solute in 3 kg of solution is 21 ppm. Determine the mass of the solute.

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

$$\frac{21\ \text{mg}}{1\ \text{kg}} = \frac{x}{3\ \text{kg}}$$

$$x = 63\ \text{mg}$$

4) What mass of solute present in 0.5 L of solution would yield a concentration of 20 ppm?

$$ppm = \frac{mg}{kg} \quad or \quad \frac{mg}{L}$$

$$\frac{20\ \text{mg}}{1\ \text{L}} = \frac{x}{0.5\ \text{L}}$$

$$x = 10\ \text{mg}$$

5) The concentration of chlorine in a sample of tap water is 0.3 ppm. What amount of chlorine would there be in a 60 mL sample of this tap water?

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

60 mL = 0.06 L

$$\frac{0.3 \text{ mg}}{1 \text{ L}} = \frac{x}{0.06 \text{ L}}$$

$$x = 0.018 \text{ mg}$$

6) If the concentration of a solute is 60 ppm, what amount of solution would contain 30 mg of the solute?

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

$$\frac{60\ \text{mg}}{1\ \text{kg}} = \frac{30\ \text{mg}}{x}$$

$$(60)(x) = (1)(30)$$

$$60x = 30$$

$$x = 0.5\ \text{kg}$$

7) 0.15 g of potassium chloride, KCl, is dissolved in 500 mL of water. Determine the concentration of this solution …

(a) in g/L: $$C = \frac{0.15\ \text{g}}{0.5\ \text{L}} = 0.3\ \text{g/L}$$

(b) in % m/v: $$C = \frac{0.15\ \text{g}}{500\ \text{mL}} \times 100\% = 0.03\ \%$$

(c) in ppm: $$C = \frac{150\ \text{mg}}{0.5\ \text{L}} = 300\ \text{ppm}$$

8) If you eat a 3 oz. can (90 g) of tuna that contains 0.20 ppm Hg *(mercury)*, how much mercury did you ingest?

ppm = $\frac{mg}{kg}$ *or* $\frac{mg}{L}$

90 g = 0.09 kg

$$\frac{0.2 \text{ mg}}{1 \text{ kg}} = \frac{x}{0.09 \text{ kg}}$$

$$x = 0.018 \text{ mg}$$

9) A 30 000 litre saltwater swimming pool contains 38 kg of dissolved salt.

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

(a) Determine the concentration of salt, in ppm, in this swimming pool.

38 kg = 38 000 000 mg

$$C = \frac{38\,000\,000 \text{ mg}}{30\,000 \text{ L}} = 1267 \text{ ppm}$$

9) A 30 000 litre saltwater swimming pool contains 38 kg of dissolved salt.

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

(b) The salt concentration in a saltwater pool is recommended to be between 2600 ppm and 3500 ppm. How much more salt must be added to the pool water in the above example in order to obtain a salt concentration of 3200 ppm?

$$\frac{3200\ \text{mg}}{1\ \text{L}} = \frac{x}{30\,000\ \text{L}}$$

$$x = 96\,000\,000\ \text{mg}$$

$$x = 96\ \text{kg}$$

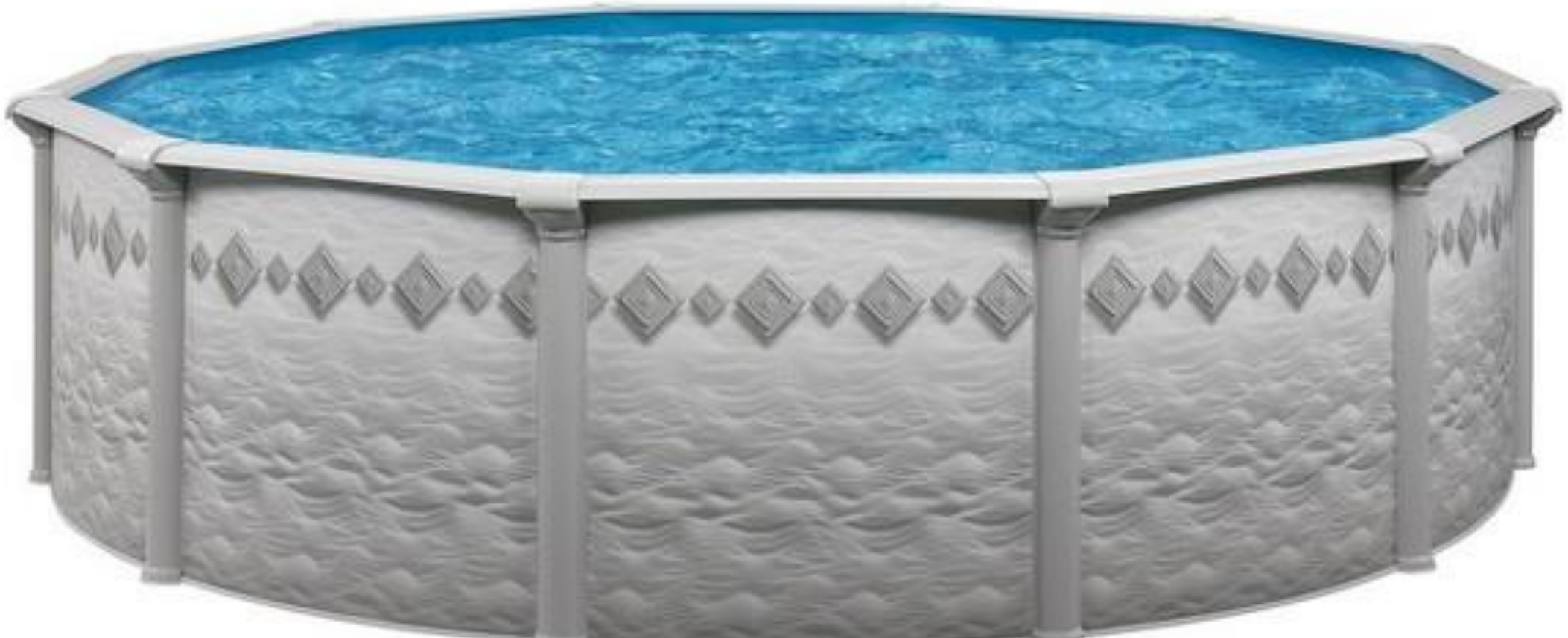
- Already have 38 kg of salt in the pool.
- Need to add … 58 kg of salt.

9) A 30 000 litre saltwater swimming pool contains 38 kg of dissolved salt.

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

- Need to add 58 kg of salt to the pool.

(c) The salt comes in 20 kg bags. How many bags of salt need to be purchased?

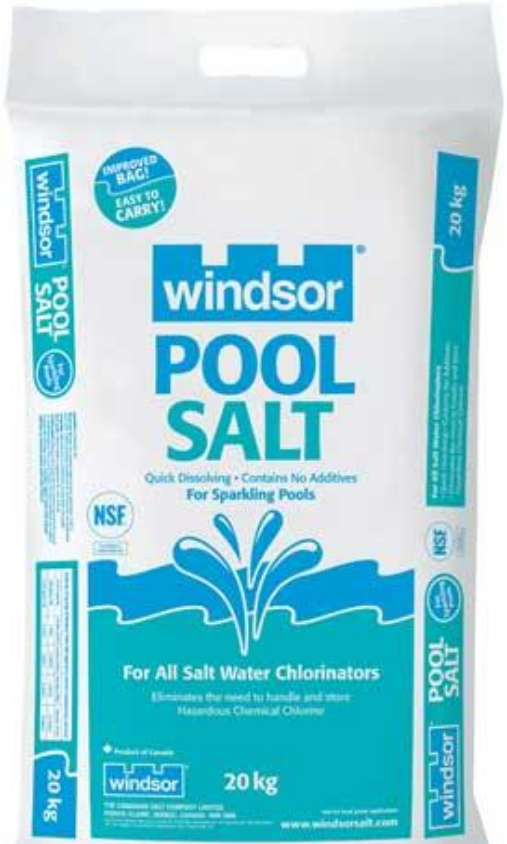


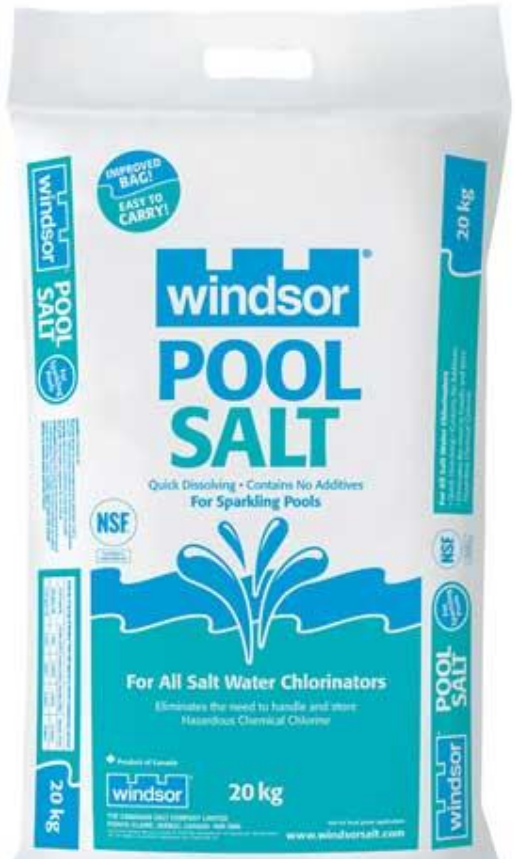
9) A 30 000 litre saltwater swimming pool contains 38 kg of dissolved salt.

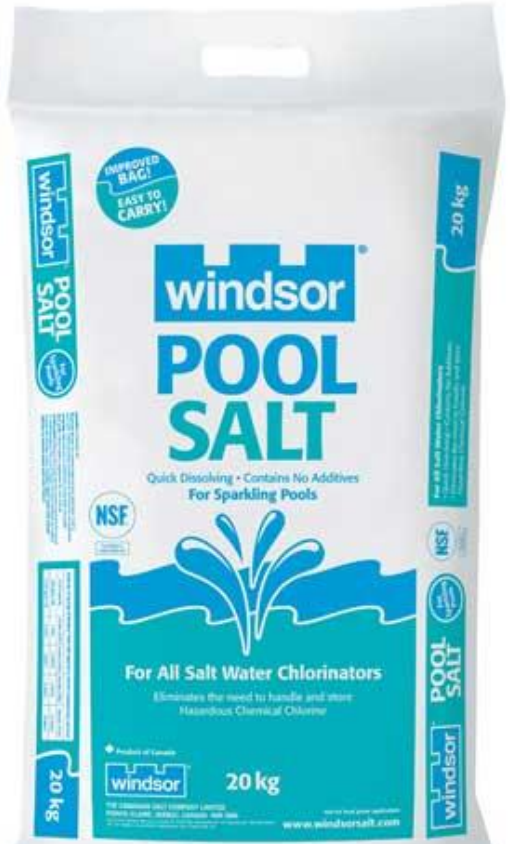
- Need to add 78 kg of salt to the pool.

$ppm = \frac{mg}{kg}$ or $\frac{mg}{L}$

(c) The salt comes in 20 kg bags. How many bags of salt need to be purchased?







10) Seawater contains 3.9×10^{-6} ppm of dissolved gold (Au).
What volume of seawater would contain 1.0 g of gold?

ppm = $\frac{mg}{kg}$ *or* $\frac{mg}{L}$

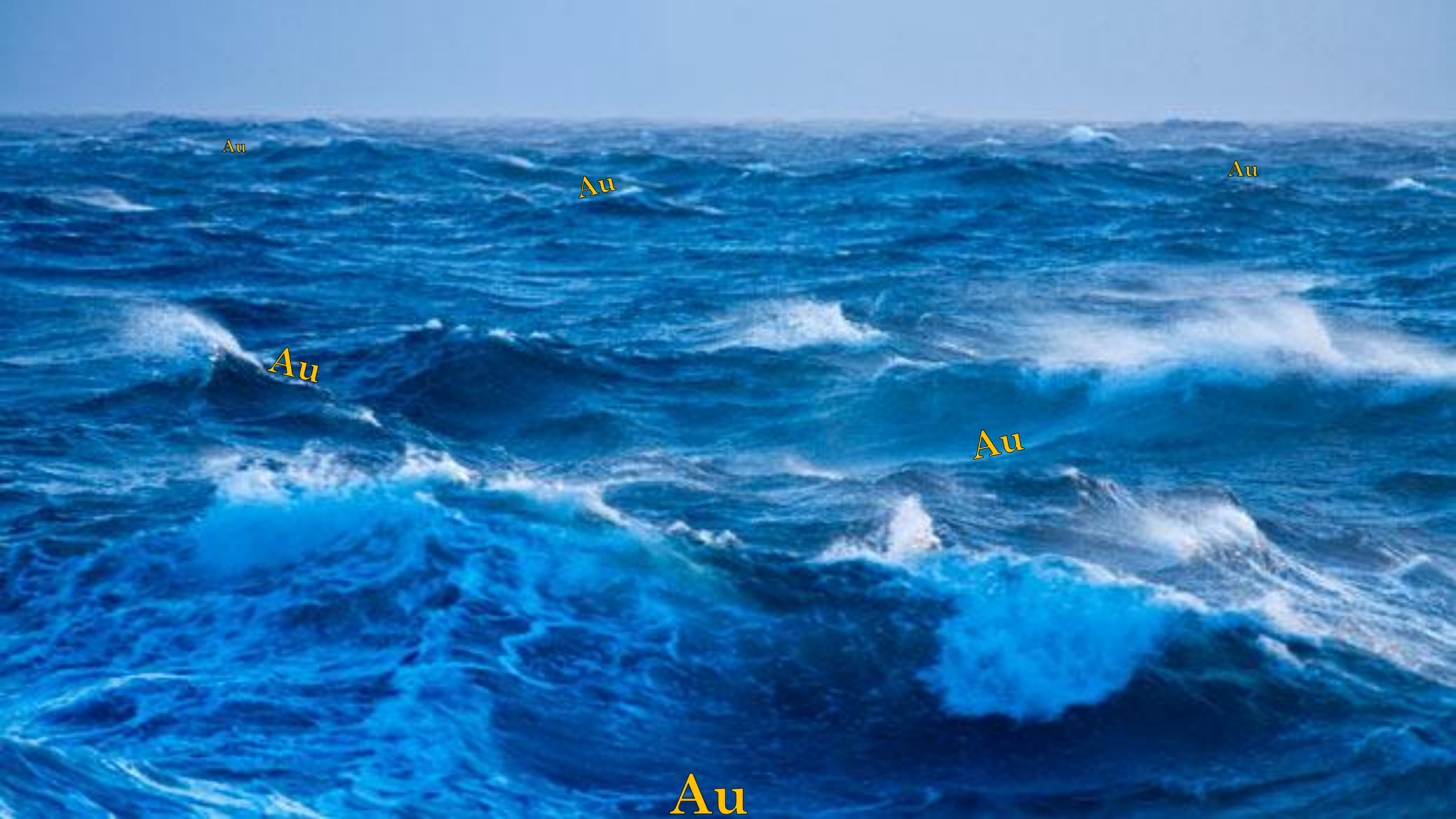
1 g = 1000 mg

$$\frac{3.9 \times 10^{-6}\ \text{mg}}{1\ \text{L}} = \frac{1000\ \text{mg}}{x} \quad \textit{or} \quad \frac{0.0000039\ \text{mg}}{1\ \text{L}} = \frac{1000\ \text{mg}}{x}$$

$$3.9 \times 10^{-6}\, x = 1000 \qquad 0.0000039\, x = 1000$$

$$x = 256\,410\,256\ \text{L}$$

Approximately 256 million litres of seawater.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