Workshop: Concentrations

Conversion between concentrations

1. Convert the following concentrations into mg/ml
   a. 100 mg in 5 ml

   $$\frac{100}{5} = 20 \text{ mg/ml}$$

   b. 1000 mg in 20 ml

   $$\frac{1000}{20} = 50 \text{ mg/ml}$$

   c. 1 g in 100 ml

   $$\frac{1000}{100} = 10 \text{ mg/ml}$$

   d. 1 g in 200 ml

   $$\frac{1000}{200} = 5 \text{ mg/ml}$$

   e. 2 g in 500 ml

   $$\frac{2000}{500} = 4 \text{ mg/ml}$$

   f. 10 g in 1 l

   $$\frac{10000}{1000} = 10 \text{ mg/ml}$$

   Strongest = b, weakest = e

2. Convert the following concentrations into %w/v. %w/v means g/100 ml.

   $$\%w/v = \frac{\text{mass (g)}}{\text{volume (ml)}} \times 100$$

   a. 1 g in 100 ml

   $$\frac{1}{100} \times 100 = 1\% \, w/v$$

   b. 5 g in 100 ml

$$\frac{5}{100} \times 100 = 5\% \; w/v$$

c. 5 g in 1000 ml

$$\frac{5}{1000} \times 100 = \frac{5}{10} = 0.5 \; \% \; w/v$$

d. 5 g in 50 ml

$$\frac{5}{50} \times 100 = 5 \times 2 = 10\% \; w/v$$

e. 500 mg in 10 ml

$$\frac{0.5}{10} \times 100 = 0.5 \times 10 = 5\% \; w/v$$

f. 150 mg/ml

$$\frac{0.15}{1} \times 100 = 15\% \; w/v$$

B and E have the same strength.

3. Convert each of the following concentrations into the given unit.
   a. 250 mg/10 ml into mg/ml

   $$\frac{250}{10} = 25 \; mg/ml$$

   b. 250 mg/10 ml into %w/v

   $$\frac{0.25}{10} \times 100 = 2.5 \; \% \; w/v$$

   c. 40% w/v into mg/ml

   $$40 \; \% \frac{w}{v} = \frac{40g}{100ml} = \frac{40000 \; mg}{100 \; ml} = 400 \; mg/ml$$

   d. 2% w/v into mg/ml

   $$2 \; \% \frac{w}{v} = \frac{2g}{100ml} = \frac{2000 \; mg}{100 \; ml} = 20 \; mg/ml$$

4. Convert each of the following concentrations into %v/v. %v/v can be thought of as ml/100 ml (or l/100 l).
   a. 50 ml in 200 ml

$$\frac{50}{200} = \frac{25}{100} = 25 \% \ v/v$$

b. 2 ml in 50 ml

$$\frac{2}{50} = \frac{4}{100} = 4 \% \ v/v$$

c. 500 ml in 2 l

$$\frac{500}{2000} = \frac{250}{1000} = \frac{25}{100} = 25 \% \ v/v$$

d. 0.5 ml in 500 ml

$$\frac{0.5}{500} = \frac{0.1}{100} = 0.1 \% \ v/v$$

Ordering concentrations by strength

5. Order the following concentrations from weakest to strongest.
   A: 50 mg/ml
   B: 100 mg/10 ml

   $$\frac{100}{10} = 10 \ mg/ml$$

   C: 250 mg/100 ml

   $$\frac{250}{100} = 2.5 \ mg/ml$$

   D: 1 g/500 ml

   $$\frac{1000}{500} = 2 \ mg/ml$$

   D – C – B - A

6. Order the following concentrations from weakest to strongest.
   A: 5% w/v

   $$\frac{5 \ g}{100 \ ml} = \frac{5000 \ mg}{100 \ ml} = 50 \ mg/ml$$

   B: 2.5 g/100 ml

   $$\frac{2500}{100} = 25 \ mg/ml$$

   C: 5 g/10 ml

   $$\frac{5000}{10} = 500 \ mg/ml$$

D: 0.8 g/ml

$$\frac{800}{1} = 800 \ mg/ml$$

B – A – C – D

7. Order the following concentrations from weakest to strongest.

   A: 1% w/v

   $$\frac{1\ g}{100\ ml} = \frac{1000\ mg}{100\ ml} = 10\ mg/ml$$

   B: 100 mcg/ml

   $$\frac{0.1}{1} = 0.1\ mg/ml$$

   C: 1 mg/5 ml

   $$\frac{1}{5} = 0.2\ mg/ml$$

   D: 1 mg/ml

   B – C – D - A

Calculating dosage

8. A patient requires a drug dose of 200 mg. The drug comes in liquid form with a strength of 5 mg/ml. How many ml does the patient need?

   Need = 200 mg
   Have 5 mg In 1 ml

   $$\frac{N}{H} \times S = \frac{200\ mg}{5\ mg} \times 1\ ml = 40\ ml$$

9. A patient requires a drug dose of 500 mg. The drug comes in liquid form with a strength of 2 % w/v. How many ml does the patient need?

   Need = 500 mg
   Have 2 g in 100 ml

$$\frac{N}{H} \times S = \frac{500 \; mg}{2 \; g} \times 100 \; ml = \frac{500 \; mg}{2000 \; mg} \times 100 \; ml = 25 \; ml$$

10. A patient requires a drug dose of 2 g. The drug comes in liquid form with a strength of 800 mg/10 ml. How many ml does the patient need?

$$\frac{2 \; g}{800 \; mg} \times 10 \; ml = \frac{2000 \; mg}{800 \; mg} \times 10 \; ml = 25 \; ml$$

11. A patient is given a drug that comes in a strength of 0.4% w/v. The patient needs 20 mg of the drug, twice daily for 7 days. What is the total number of ml required for the treatment?

$$20 \; mg \times 2 \times 7 = 280 \; mg$$
$$\frac{280 \; mg}{0.4 \; g} \times 100 \; ml = \frac{280 \; mg}{400 \; mg} \times 100 \; ml = 70 \; ml$$

12. A particular drug comes in a strength of 10 % v/v. The patient needs an active dose of 5 ml per day for 5 days, followed by 10 days of 2.5 ml per day. What is the total ml needed to complete the treatment?

$$5 \times 5 + 2.5 \times 10 = 50 \; ml$$
$$\frac{50 \; ml}{10 \; ml} \times 100 \; ml = 500 \; ml$$