

NAPLEX: Calculations Review

Pre-Assessment Questions:

1. If 500 mL of ferric chloride solution weighs 650 g, what is its specific gravity?
2. Concentrations may be expressed in “parts”, or ratio strength, when the active ingredient is highly diluted. What weight of triamcinolone should be used in compounding 45 g of a cream containing triamcinolone at a concentration of 1:2500?
3. What is the molarity concentration of a 0.9% (w/v) sodium chloride solution (GMW=58.5)? Remember molarity expresses the number of moles per liter.
4. How many mL of 95% (v/v) alcohol and how much water should be used in compounding the following prescription?

Rx	Boric Acid	1.0 g
	Alcohol 70%	30.0 mL
	Sig. Ear drops	
5. What weight of a 10% (w/w) colchicine trituration is required to prepare 30 doses of 0.25mg each of colchicine?
6. What is the pH of a buffer solution prepared with 0.05 M sodium borate and 0.005 M boric acid? The pKa value of boric acid is 9.24 at 25°C.
(Hint: $\text{pH} = \text{pKa} + \log(\text{salt}/\text{acid})$: This equation is not given on the NAPLEX)

Pre-Assessment Answers:

1. Specific gravity = Density of Substance (g/mL) / Density of H₂O (1g/mL)
 $X = (650 \text{ g}/500 \text{ mL}) / (1\text{g}/\text{mL}) = \mathbf{1.300}$
Good to remember: When density is measured as g/mL, it is equivalent to the Specific Gravity except specific gravity is reported without units.
2. Set up a proportion: $X \text{ g} / 45 \text{ g} = 1 \text{ g} / 2500 \text{ g}$
 $X = \mathbf{0.018 \text{ g triamcinolone}}$
3. 0.9% (w/v) is equal to 0.9 g NaCl / 100 mL solution
Covert grams to moles: $0.9 \text{ g} \times 1 \text{ mole} / 58.5 \text{ g} = 0.015 \text{ moles}$
Molarity = moles/1000mL
 $0.015 \text{ moles NaCl} / 100\text{mL solution} = X \text{ moles NaCl} / 1000 \text{ mL solution}$
 $X = 0.15 \text{ moles NaCl in } 1000 \text{ mL solution, thus the molarity} = \mathbf{0.15}$
4. You can set up an inverse proportion to solve this dilution:
$$\frac{95\%}{70\%} = \frac{30 \text{ mL}}{X \text{ mL}} \quad X = 22 \text{ mL}$$

So, use **22 mL of 95% (v/v) alcohol and enough water to make 30 mL.**
5. 10 mg of mixture = 1mg drug (colchicine)
$$\frac{X \text{ mg of trituration}}{10 \text{ mg of trituration}} = \frac{(30 \times 0.25 \text{ mg}) \text{ colchicine}}{1 \text{ mg colchicine}}$$

 $X = 10 \times (30 \times 0.25) = \mathbf{75 \text{ mg of colchicine trituration}}$
6. $\text{pH} = 9.24 + \log(0.05/0.005)$
 $= 9.24 + \log 10$
 $= 9.24 + 1$
 $= \mathbf{10.24}$