

Homework #1

1. 5 nanoliters = 5×10^{-9} L
70 microliters = 7.0×10^{-5} L
88 milliliters = 8.8×10^{-2} L
10 deciliters = 1.0×10^0 L
7 kiloliters = 7×10^3 L

2. 6 mg = 6.0×10^{-3} g
21 mg = 2.1×10^{-2} g
303 ng = 3.03×10^{-7} g
10 kg = 1.0×10^4 g

3.

a $\frac{1 \cancel{\text{mole}}}{\cancel{\text{L}}} \text{ of Tris} \times \frac{121.4 \text{ g}}{\cancel{\text{mole}}} \times 0.5 \cancel{\text{L}} = 60.7 \text{ g of Tris}$

Dissolve 60.7 g of Tris in about 300 ml of H₂O. Once dissolved adjust the pH to 8.0, and then make up to 500 ml mark with H₂O in a graduated cylinder.

b $\frac{5 \cancel{\text{moles}}}{\cancel{\text{L}}} \text{ of NaCl} \times \frac{58.44 \text{ g}}{\cancel{\text{mole}}} \times 1 \cancel{\text{L}} = 292.2 \text{ g of NaCl}$

Dissolve 292.2 g of NaCl in about 0.7 L of H₂O. Once dissolved, dilute to 1 L with H₂O in a graduated cylinder.

c $\frac{100 \text{ mg}}{\cancel{\text{ml}}} \text{ of ampicillin} \times 10 \cancel{\text{ml}} = 1 \text{ g of ampicillin}$

Dissolve 1 g of ampicillin in about 5 ml of H₂O. Once dissolved, dilute to 10 ml with H₂O in a graduated cylinder.

d $\frac{1 \cancel{\text{mole}}}{\cancel{\text{L}}} \text{ of MgCl}_2 \times \frac{203.3 \text{ g}}{\cancel{\text{mole}}} \times 0.5 \cancel{\text{L}} = 101.65 \text{ g of MgCl}_2$

Dissolve 101.65 g of MgCl₂ in about 250 ml of H₂O. Once dissolved, dilute to 500 ml with H₂O in a graduated cylinder.

4. For dilutions, use the formula $C_1V_1=C_2V_2$.
This solution has 2 components:

Tris-dilute 1M to 10 mM $C_1V_1=C_2V_2$

$$1000 \text{ mM} \times V_1 = 10 \text{ mM} \times 100 \text{ ml}$$

$$V_1 = \frac{10 \text{ mM} \times 100 \text{ ml}}{1000 \text{ mM}}$$

$$= 1 \text{ ml of 1 M Tris}$$

EDTA-dilute 0.5 M to 1 mM $C_1V_1=C_2V_2$

$$500 \text{ mM} \times V_1 = 1 \text{ mM} \times 100 \text{ ml}$$

$$V_1 = \frac{1 \text{ mM} \times 100 \text{ ml}}{500 \text{ mM}}$$

$$= 0.2 \text{ ml or } 200 \text{ } \mu\text{L of 0.5 M EDTA}$$

Using a 100 ml graduated cylinder, add 1 ml of 1M Tris and 200 μL of 0.5 M EDTA. Add water to dilute to a final volume of 100 ml.