Mar 5th I pledge my honor that I have abided by the Stevens Honor System. Myali

1) Seawater.

Sodium Chloride = NaCl = 22.9898 + 35.4532 = 58.443 g/mol

$$\frac{2.700\text{ g NaCl}}{100\text{ mL solution}} \times \frac{1\text{ mol NaCl}}{58.443\text{ g NaCl}} \times \frac{100\text{ mL}}{0.1\text{ L}} = 0.462 \frac{\text{mol}}{\text{L}}\text{ NaCl}$$

= 0.462 M NaCl

2) Magnesium Chloride

$= MgCl_2 = 24.3051 + 2 \times 35.4532 = 95.2115$ g/mol

$$0.054\text{ M} = \frac{0.054\text{ mol MgCl}_2}{1\text{ L solution}} \times \frac{95.2115\text{ g MgCl}_2}{1\text{ mol MgCl}_2} \times \frac{1000\text{ mg}}{1\text{ g}} \times \frac{0.025\text{ L}}{25\text{ mL}}$$

$= 128.54$ mg MgCl / 25 mL solution

= 130 mg MgCl

3) Hydrochloric Acid =

HCl = 1.00795 + 35.4532 = 36.46115 g/mol

$$1.19\text{ g/mL} \times 0.37 = \frac{0.4403\text{ g HCl}}{1\text{ mL solution}} \times \frac{1\text{ mol HCl}}{36.46115\text{ g HCl}} \times \frac{1\text{ mL}}{0.001\text{ L}} = 12.07 \frac{\text{mol}}{\text{L}}\text{ HCl}$$

(37% HCl)

= 12.07 M HCl

4) 1.6 ppm = $\frac{1.6\text{ mg}}{1\text{ L}}$ F^-

F^- = 18.9984 g/mol

Volume = $\pi r^2 h$

$= \pi \left(\frac{4.50 \times 10^2}{2}\right)^2 (10)$

$= 506250\pi\text{ m}^3$

$$506250\pi\text{ m}^3 \times \frac{(100)^3\text{ cm}^3}{1\text{ m}^3} \times \frac{1\text{ mL}}{1\text{ cm}^3} \times \frac{1\text{ L}}{1000\text{ mL}} = \frac{1.59 \times 10^9\text{ L}}{1\text{ tank}}$$

$$\frac{1.6\text{ mg } F^-}{1\text{ L}} \times \frac{1.59 \times 10^9\text{ L}}{1\text{ tank}} \times \frac{1\text{ g}}{1000\text{ mg}} = 2.54 \times 10^6\text{ g } F^-$$

2.54 x 10^6 grams F^- should be added.

5. $A = \varepsilon b c$

$\varepsilon = 703\ M^{-1}cm^{-1}$

$b = 1.00\ cm$

$A = 0.687$

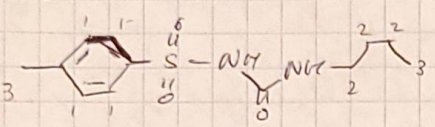
$0.687 = (703)(1.00)\,c$

$c = 9.77 \times 10^{-4}\ M$

(a) $\frac{9.77 \times 10^{-4}\ mol}{1\ L} \times \frac{2\ L}{2\ L} \times \frac{270.35\ g}{1\ mol} \times \frac{1000\ mg}{1\ g} =$ **528 mg tolbutamide**

(b) $\frac{528\ mg\ tolbutamide}{2.500\ g} \times \frac{2.500\ g}{2500\ mg} =$ **21.12% (w/w) tolbutamide**

(c) $A = \varepsilon b c$, None of these change, so absorption is the same, $0.687 = A$.



(d) $\frac{528\ mg}{1\ tablet} \times \frac{2\ tablets}{5.000\ L} \times \frac{1\ L}{1000\ mg} \times \frac{1\ mol}{270.35\ g} =$ **7.812×10^{-4} M tolbutamide**

H: 18 = 18 x 1.00795 = 18.1431
C: 12 = 12 x 12.0108 = 144.1296
S: 1 = 1 x 32.0655 = 32.0655
O: 3 = 3 x 15.9994 = 47.9982
N: 2 = 2 x 14.0067 = 28.0134

$= 270.35\ g/mol$

$A = \varepsilon b c$

$A = (703)(1.00)(7.812 \times 10^{-4})$

$A = 0.549$

6. Concentration of unknown = 94.38 mg/L

(See excel for calculations)