Extra Practice with Solution Concentrations (for Quiz 9)

1. What mass of a drug solution that is 1.5% morphine by mass should be administered to a patient who requires 190 mg of the drug?

2. Calculate the molarity of a solution prepared when 77.0 grams of lithium sulfate are put into the bottom of a volumetric flask and enough water is added to bring the total solution volume to 1000.0 mL.

3. What would be the molarity of the solution that results when 550.0 mL of 0.88 M lithium sulfate (aq) is mixed with 650.0 mL of water?

*** Dilution problem – NOT ON YOUR QUIZ 8 (Spr. 2011) ***

4. Calculate the concentration, in percent mass, of a solution that consists of a mixture of 1.6 g acetic acid (HC_2H_3O_2) in 45.0 mL of ethanol (C_2H_4O). The density of acetic acid is 1.05 g/mL and that of ethanol is 0.80 g/mL. Careful – you may or may not need to use all the given information in this problem!!)

5. Suppose you are running a reaction in the laboratory, and have determined that you need 11.7 grams of ammonium nitrate for your reaction. You are provided with a solution of 0.500 M ammonium nitrate. How much of this solution should you use? (Put your answer in whatever units are most convenient.)
Extra Practice with Solution Concentrations (for Quiz 9)

1. What mass of a drug solution that is 1.5% morphine by mass should be administered to a patient who requires 190 mg of the drug?

\[
190 \text{ mg \ morphine} \times \frac{0.001 \text{ g}}{1 \text{ mg}} \times \frac{100 \text{ g \ drug \ solution}}{1.5 \text{ g \ morphine}} = 13 \text{ g \ drug \ solution}
\]

2. Calculate the molarity of a solution prepared when 77.0 grams of lithium sulfate are put into the bottom of a volumetric flask and enough water is added to bring the total solution volume to 1000.0 mL.

\[
M = \frac{0.7003 \text{ mol Li}_2\text{SO}_4}{1000.0 \text{ mL} \times 0.001 \text{ L/mL}} = 0.700 \text{ M Li}_2\text{SO}_4
\]

3. What would be the molarity of the solution that results when 550.0 mL of 0.88 M lithium sulfate (aq) is mixed with 650.0 mL of water?

\[
M_2 = \frac{M_1V_1}{V_2} = \frac{0.88 \text{ M} \times 550.0 \text{ mL}}{1200.0 \text{ mL}} = 0.40 \text{ M}
\]

4. Calculate the concentration, in percent mass, of a solution that consists of a mixture of 1.6 g acetic acid (CH₃COOH) and 1.6 g ethanol (C₂H₅OH). The density of acetic acid is 1.05 g/mL and that of ethanol is 0.80 g/mL. Careful – you may or may not need to use all the given information in this problem!

\[
\text{Mass\%} = \frac{\text{g acetic acid}}{\text{g ethanol} + 1.6 \text{ g acetic acid}} \times 100 = 4.3 \%
\]

5. Suppose you are running a reaction in the laboratory, and have determined that you need 11.7 grams of ammonium nitrate for your reaction. You are provided with a solution of 0.500 M ammonium nitrate. How much of this solution should you use? (Put your answer in whatever units are most convenient.)

\[
11.7 \text{ g \ NH}_4\text{NO}_3 \times \frac{\text{1 mol \ NH}_4\text{NO}_3}{80.05 \text{ g \ NH}_4\text{NO}_3} \times \frac{\text{L \ soln}}{0.500 \text{ mol \ NH}_4\text{NO}_3} = 0.292 \text{ L solution}
\]