Chapter 8 Practice Problems key

1. Identify the solute in each of the following solutions.
2. 2 g of sugar and 100 mL of water

The solute is sugar.

1. 60.0 mL of ethyl alcohol and 30.0 mL of methyl alcohol

The solute is methyl alcohol.

1. 55.0 mL of water and 1.50 g of NaCl

The solute is NaCl.

1. Air: 200 mL of O2 and 800 mL of N2

The solute is O2.

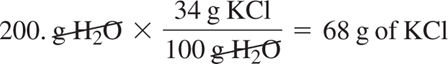
1. Indicate whether solutions of each of the following contain only ions, only molecules, or mostly molecules and a few ions:
2. Na2SO4, a strong electrolyte

An aqueous solution of Na2SO4 contains only the ions Na+ and SO42-.

1. CH3OH, a nonelectrolyte

A nonelectrolyte such as CH3OH produces only molecules when it dissolves in water.

1. At 20°C, the solubility of KCl is 34 g/100 g of water. In the laboratory, a student mixes 75 g of KCl with 200. g of water at a temperature of 20°C.
2. How much of the KCl will dissolve?



1. Is the solution saturated or unsaturated?

Because 75 g of KCl exceeds the amount (68 g) that can dissolve in 200. g of water, the KCl solution is saturated.

1. What is the mass, in grams, of any solid KCl on the bottom of the container?

If we add 75 g of KCl to 200. g of water and only 68 g of KCl can dissolve, there is 7 g (75 g – 68 g) of solid (undissolved) KCl on the bottom of the container.

1. A solution is prepared by mixing 15.0 g of Na2CO3 and 235 g of H2O. Calculate the mass percent (% m/m) of the solution.

Mass % (m/m) = 15.0 g Na2CO3 × 100% = 6.00% Na2CO3

250. g solution .

1. Write two conversion factors for each solution.
   1. 8.50% (m/m) NaOH

8.50 g NaOH and 100 g solution

100 g solution 8.50 g NaOH

* 1. 5.75% (v/v) ethanol

5.75 mL alcohol and 100 mL solution

100 mL solution 5.75 mL alcohol

* 1. 4.8% (m/v) HCl

4.8 g HCl and 100 mL HCl

100 mL solution 4.8 g HCl

1. How many grams of NaOH are needed to prepare 75.0 g of 14.0% (m/m) NaOH solution?

75.0 g solution × 14.0 g NaOH = 10.5 g of NaOH

100 g solution

1. What is the molarity of 0.500 L of NaOH solution if it contains 6.00 g of NaOH?

6.00 g NaOH × 1 mole NaOH = 0.150 mole of NaOH

40.0 g NaOH

M = moles solute = 0.150 mole NaOH = 0.300 M NaOH

L solution 0.500 L solution

1. What is the molarity of 0.225 L of a KNO3 solution containing 34.8 g of KNO3?

34.8 g KNO3 × 1 mole KNO3 = 0.344 mole of KNO3

101.1 g KNO3

M = moles solute = 0.344 mole of KNO3 = 1.53 M KNO3

L solution 0.225 L solution

1. How many milliliters of a 5.75% (v/v) ethanol solution can be prepared from 2.25 mL of ethanol?

2.25 mL ethanol × 100 mL solution = 39.1 mL of solution

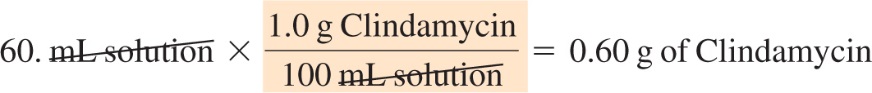
5.75 mL ethanol

1. How many grams of AlCl3 are needed to prepare 125 mL of a 0.150 M solution?

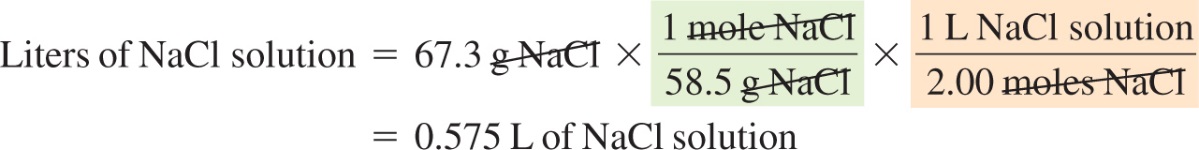
0.125 L × 0.150 mole AlCl3 × 133.5 g AlCl3 = 2.50 g of AlCl3

1 L 1 mole AlCl3

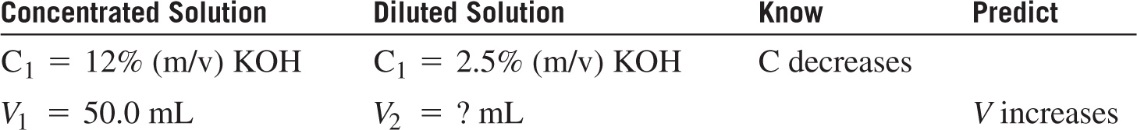
1. A topical antibiotic is 1.0% (m/v) Clindamycin. How many grams of Clindamycin are in 60. mL of the 1.0% (m/v) solution?

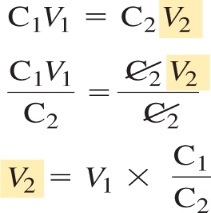


1. How many liters of a 2.00 M NaCl solution are needed to provide 67.3 g of NaCl?



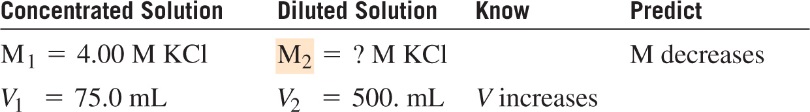
1. What volume (mL) of a 2.5% (m/v) KOH solution can be prepared by diluting 50.0 mL of a 12% (m/v) KOH solution?

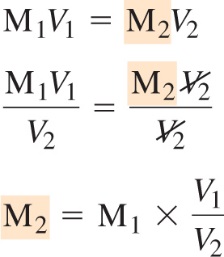


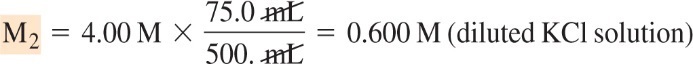




1. What is the molarity of a solution prepared when 75.0 mL of a 4.00 M KCl solution is diluted to a volume of 500. mL?







1. The normal concentration of calcium in blood is 5.0 mEq/L. How many milligrams of calcium are in 1.0 L of blood?

