

## Molarity Practice Worksheet

*Find the molarity of the following solutions:*

- 1) 0.5 moles of sodium chloride is dissolved to make 0.05 liters of solution.
- 2) 0.5 grams of sodium chloride is dissolved to make 0.05 liters of solution.
- 3) 0.5 grams of sodium chloride is dissolved to make 0.05 mL of solution.
- 4) 734 grams of lithium sulfate are dissolved to make 2500 mL of solution.
- 5)  $6.7 \times 10^{-2}$  grams of  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_4$  are dissolved to make 3.5 mL of solution.
- 6) I have two solutions. In the first solution, 1.0 moles of sodium chloride is dissolved to make 1.0 liters of solution. In the second one, 1.0 moles of sodium chloride is added to 1.0 liters of water. Is the molarity of each solution the same? Explain your answer.

## Solutions to the Molarity Practice Worksheet

For the first five problems, you need to use the equation that says that the molarity of a solution is equal to the number of moles of solute divided by the number of liters of solution.

- 1) In this problem, simply solve using the molarity equation to find that the concentration of the solution is 10 M.
- 2) To use the molarity equation, you need to convert grams of sodium chloride to moles of sodium chloride before you can use the molarity equation. Because you have 0.0085 moles of NaCl in this solution, the total concentration is 0.17 M.
- 3) To use the molarity equation, you need to convert grams of NaCl to moles and mL of solution to liters. When you do this, the total concentration of the solution is 170.9 M. As it turns out, this isn't a realistic value for molarity, so you'd never see a solution with this concentration out in the real world. Why did I give it to you then? I did it because I wanted you to see that just by changing a few units, you can get very different final answers.
- 4) This is done in the same method that you'd solve #3. Because you have 6.68 moles of  $\text{Li}_2\text{SO}_4$  and 2.500 liters of water, the overall molarity of your solution is 2.67 M.
- 5) This problem is also solved in the same way as #3 and #4. Because you have  $1.51 \times 10^{-4}$  moles of  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_4$ , and 0.0035 L of water, the total concentration is  $4.32 \times 10^{-2}$  M, or 0.0432 M.
- 6) The equation for molarity states that the molarity of a solution is equal to the number of moles of solute divided by the number of liters of solution. In the first equation, the molarity will clearly be equal to 1.0 M, because there are 1.0 moles of NaCl and a solution volume of 1.0 L. In the second solution, the molarity will be different, because the solution volume will be greater than 1.0 liters. Why? If you already have 1.0 L of water and add 1.0 moles of salt to it, it will overflow, right? This is because the volume will be (roughly) equal to the volume of the water plus the volume of the salt, which will be greater than 1.0 L. It is for this reason that when you make a solution, you always dissolve the solute in only a little bit of water and then add water to make your final volume.