High School Science Virtual Learning

Chemistry

Solutions

April 29th, 2020

Chemistry

Lesson: April 28th 2020

Objective/Learning Target:

The learner will be able to calculate molarity of solutions using the molarity equation and the dilution equation.

Bell Ringer

1. What are our two types of mixtures?

2. In what type of mixture are the substances evenly distributed throughout the mixture?

Bell Ringer Answers:

1. Heterogeneous and Homogeneous

2. Homogeneous

Lesson:

In chemistry a solution is a homogeneous mixture that is composed of two or more parts. Think about a pitcher of Kool-aid, it is made of water, sugar, and Kool-aid powder and when it is all mixed together it looks the same throughout.

The two categories of things that go into a solution are the solvent and the solute.

Lesson:

The solvent is the substance that does the dissolving.

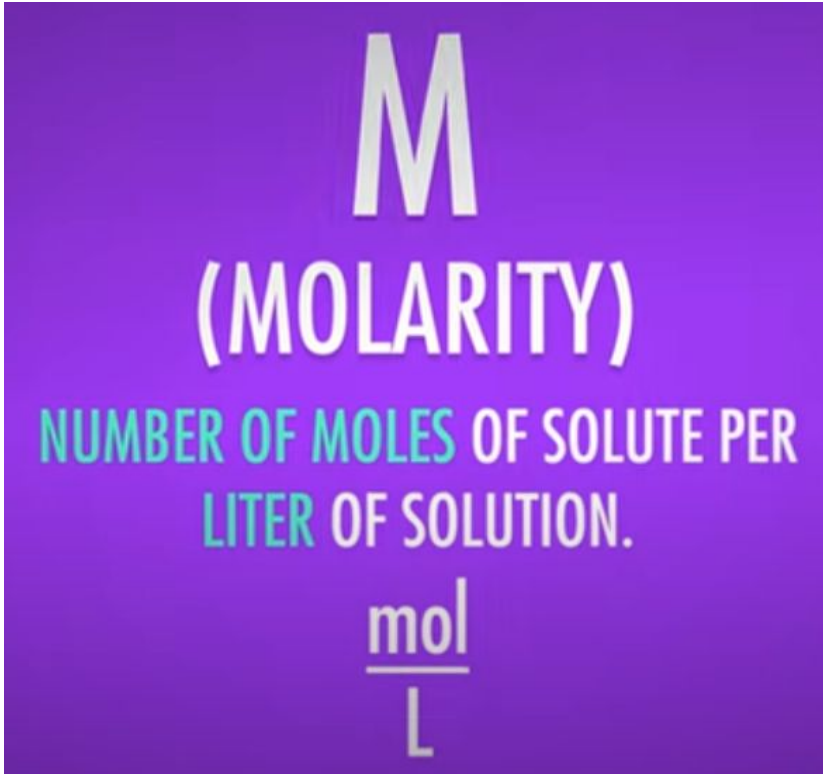
In our Kool-aid, water is the solvent, it dissolves the sugar and Kool-aid powder.

The solute is/are the substance(s) being dissolved.

In our Kool-aid, sugar and Kool-aid powder are the solutes because they are the substances being dissolved

Lesson:

When we are talking about a solution being dilute or concentrated, we are referencing how much solute is in the solvent. A common measurement for this is molarity.



Lesson:

Watch and take notes on this video about how things dissolve.

What Happens When Stuff Dissolves- Tyler DeWitt

Watch and take notes on this video about how to calculate molarity. Molarity Practice Problems- Tyler DeWitt

Practice

1. 1.0 moles of potassium fluoride is dissolved to make 0.10 L of solution.
2. 1.0 grams of potassium fluoride is dissolved to make 0.10 L of solution.
3. 1.0 grams of potassium fluoride is dissolved to make 0.10 mL of solution.
4. 952 grams of ammonium carbonate are dissolved to make 1750 mL of solution.
5. 9.82 grams of lead (IV) nitrate are dissolved to make 465 mL of solution.

Answers

1. $$Molarity = \frac{moles}{Liters} \rightarrow \frac{1.0\ mol\ KF}{0.10\ L} = 10.\ M$$

2. $$1.0\ g\ KF\ x\ \frac{1\ mol\ KF}{58.097\ g\ KF} = 0.017\ mol\ KF$$

$$\frac{0.017\ mol\ KF}{0.10\ L} = 0.17\ M$$

Answers cont.

3. $$0.10\ mL\ \frac{1\ L}{1000\ L} = 0.00010\ L$$

$$\frac{0.017\ mol\ KF}{0.00010\ L} = 170\ M$$

4. $$952\ g\ (NH_4)_2CO_3\ x\ \frac{1\ mol\ (NH_4)_2CO_3}{96.09\ g\ (NH_4)_2CO_3} = 9.91\ mol\ Al_2(CO_3)_3$$

$$1750\ mL\ \frac{1\ L}{1000\ L} = 1.75\ L$$

$$\frac{9.91\ mol\ (NH_4)_2CO_3}{1.75\ L} = 5.66\ M$$

Answers cont.

5. $$9.82\ g\ Pb(NO_3)_4\ x\ \frac{1\ mol\ Pb(NO_3)_4}{455.2196\ g\ Pb(NO_3)_4} = 0.0216\ M$$

$$465\ mL\ \frac{1\ L}{1000\ L} = 0.465\ L$$

$$\frac{0.0216\ mol\ Pb(NO_3)_4}{0.465\ L} = 0.0465\ M$$

Answers

More Practice

-Molarity Practice Quiz

Solve for the missing piece in these molarity problems

1. What is the molarity of 0.730 mol $Co(NO_3)_2$ dissolved in 0.439 L of water
2. 0.368 mol $K_2Cr_2O_7$ dissolved in what volume gives you a molarity of 0.424M?
3. If the solution has a volume of 0.353 L and a concentration of 1.042 M, how many moles of $CuSO_4$ are dissolved?

Use this tool from Phet to check your answers. Be sure the solution values box is checked.