Welcome To Chemistry Class!

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In 9.2, you were supposed to note the fact that the first two solutions were clear.

In 9.3, indicate that the plate was cleaned and dried between trials.

Lily's 9.2

Jacob F.'s Brother Multitasking

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This is NOT the same as moles of solute divided by liters of solvent, even when the solute is solid and the solvent is liquid. Why?

The solute adds a small amount of volume to the solution.

In The Lab, This Requires a Volumetric Flask

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Lucasbosch

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Then you add solvent until the meniscus is at the mark.

You then put on the lid and turn the flask upside down and rightside up several times to finish mixing.

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You have 14.5 mL of a 3.45 M sugar water solution. How many moles of sugar do you have?

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So Of Course We Can Use This in Stoichiometry

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82	53
Pb	**I**
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When we have molarity and volume, then, we have moles.

In the demonstration last week, 250.0 mL of a 0.0097 M solution of $Pb(NO_3)_2$ were added to an excess of KI. How many g of PbI_2 were formed?

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This is important, because when we use chemical equations, we need to see what we know the moles of. Grams and a chemical formula will give us moles, but so will concentration and volume.

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We won't use this in stoichiometry, but we will use it in something else.

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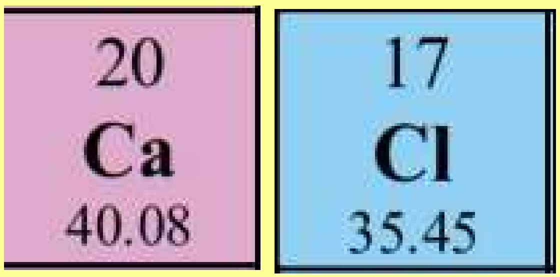

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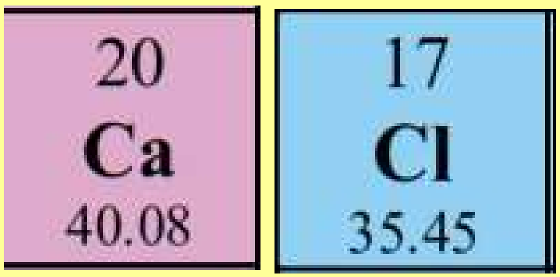

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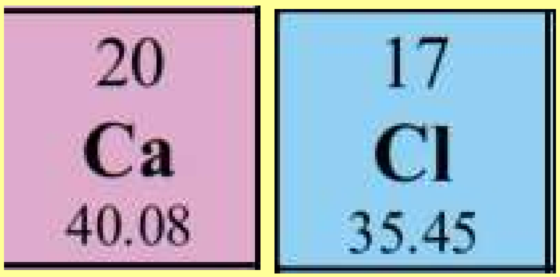

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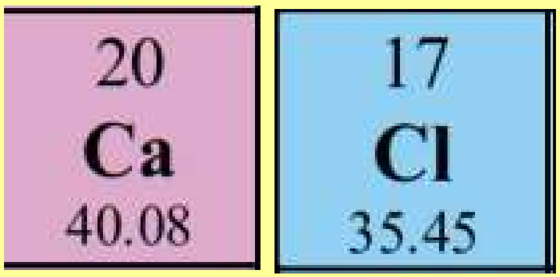

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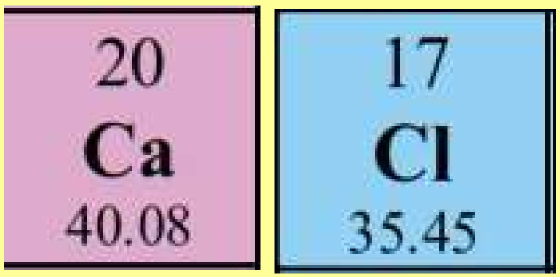

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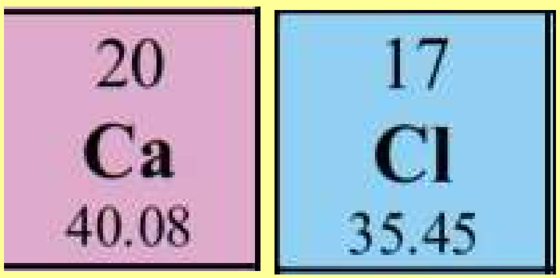

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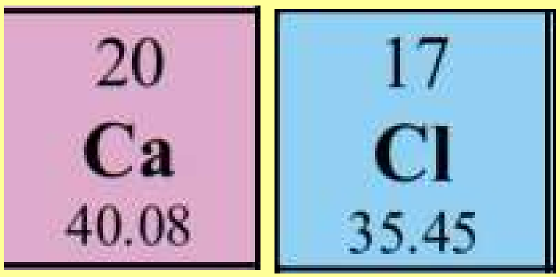

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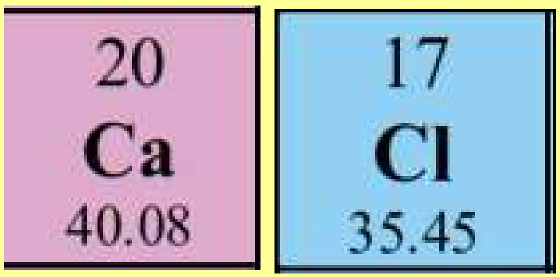

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NOTE: There is more going on than just freezing point depression.

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This is covalent and thus doesn't split up. So just 1.

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First, we need to find i. What is it?

In an ionic compound, we should recognize NO_3 as the polyatomic nitrate ion. Thus, there is one Al^{3+} and three nitrate ions, making i = 4.

For molality, we need moles and kg:

$$\frac{150.0\text{ g}}{1} \times \frac{1\text{ kg}}{1{,}000\text{ g}}$$

Freezing Point Depression

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Al
26.98

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13	7
Al	**N**
26.98	14.01

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Al	**N**	**O**
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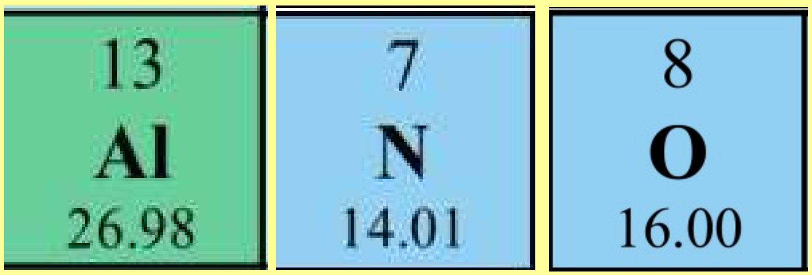

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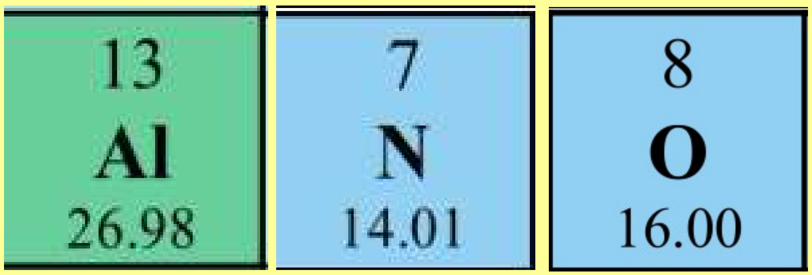

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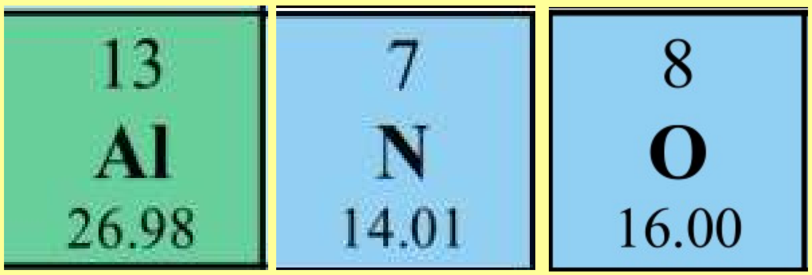

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Boiling Point Elevation

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Note that there is no negative sign, because boiling point is elevated.

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Note that there is no negative sign, because boiling point is elevated.

Why is freezing point depressed and boiling point elevated?

It's all about attraction. To freeze, the solvent molecules must form a crystal, but the solute molecules get in the way, because they want to stay close to the solvent molecules. For boiling point, the attraction makes it harder to get solvent molecules to leave.

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ΔT is not necessarily the answer. It is the difference between the new temperature and the original one. For water, boiling temperature is 100 °C, so once you get ΔT, you must add it to 100 °C (which is exact) to get the new boiling point.

Important Things to Remember for Both

You need to determine if the solute is covalent or ionic. If it is covalent, i = 1.

If it is ionic, you need to identify which ions and how many of each are in the compound. The value of i will be the total number of IONS (not atoms) in the molecule. For $CaSO_4$, i = 2, because there is one calcium ion and one sulfate ion.

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Similarly, the freezing point of alcohol is -114.1 °C (not exact). If you get ΔT = -2.2 C for an alcohol-based solution, the new freezing point is -116.3 °C.