Chem1311Ch3Ep2Transcript

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Hello, and welcome to the second episode of mass relationships in chemical reactions.

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Previously, in mass relationships in chemical reactions.

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We learn that I need better jokes.

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We also learned the definition of moles and that it applies to all elements.

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And we learn a problem-solving strategy for composition stoichiometry problems.

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In today's episode we will apply the same problem-solving strategy we used for elements.

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To both molecular and ionic compounds.

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We will also compare the equation-based method.

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To the multi-step dimensional analysis method your book favors.

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Once again.

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I want to remind you that for any stoichiometry problem, there are only three options for both the given quantity and the ask.

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Molar mass.

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Avogadro's number.

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Or moles for subscripts and coefficients.

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Similar to atomic mass, or atomic weight.

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The molecular mass is the sum of the atomic masses of the atoms making up the molecule.

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In this example.

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One sulfur and two oxygens.

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There's the one sulfur.

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And there's the two oxygens.

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For a molecular mass of 64.07 amu.

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A molar mass of 64.07 grams.

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Because the molecular mass in amu is equal to the molar mass in grams.

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This of course is true for any molecule and formula unit.

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So the formula mass of sodium chloride.

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Is the atomic mass of sodium.

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Plus the atomic mass of chlorine.

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Exactly the same as with molecular compounds.

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And the same relationship between formula mass and molar mass exists.

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So a little practice always helps solidify concepts.

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Pause the video.

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Write down your answer.

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And then come right back.

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Welcome back.

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For the first example, you will find sulfur in your periodic table.

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And oxygen times two also in your periodic table.

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For a total of 64.07 grams

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You will follow a similar procedure.

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For caffeine

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Carbon Times 8.

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Hydrogen times 10.

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Nitrogen times 4.

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Oxygen Times 2.

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And this for a grand total of.

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194.20 grams

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I don't know.

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If I should tell you this, but.

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I'm going to anyway.

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Those for you, whose middle name is danger.

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Ah, you live dangerously.

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You could get the answer without writing anything down.

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All you have to do is key each atomic mass times the subscript.

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Then, plus the next atomic mass times the subscript plus the next atomic mass times the subscript, and then hit enter at the end.

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And that will give you the same exact number.

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As long as you don't mistype anything.

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I feel like I.

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Just thought you how to gamble.

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I feel bad.

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Let's go ahead and solve another stoichiometry problem.

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This time, with a molecule involved.

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This problem is about methane.

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There's methane.

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The ask, which, as I mentioned before, always goes on top.

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Is “how many moles of methane?”

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Even though there is one mole of carbon and four moles of hydrogen, they make up one and only one mole of methane.

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The given quantity has units of grams.

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So the molar mass... so to the molar mass we go.

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Adding carbon times one plus hydrogen times 4.

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Now to solve the given quantity goes in the 1st frame.

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And our conversion factor goes in the second one.

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That way we can cancel grams of methane.

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And the final answer is 0.378 moles of methane to three significant digits.

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The next example has urea.

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The ask is atoms of hydrogen.

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Because it is atoms, we use Avogadro's number.

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Times 4 because there are four hydrogen atoms in this formula.

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The given has units of grams of urea.

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So we use the molar mass of urea from the periodic table.

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To solve, we enter the given quantity in the 1st frame.

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And the conversion factor in the 2nd frame.

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If you are not sure where the 2.4 088 * 10 to the 24 atoms of hydrogen came from, that is simply four times Avogadro's number.

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Notice that the given and the ask don't even need to be about the same substance.

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However, the units and the substance must still cancel.

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And this leads us to our final answer of 1.3 * 10 to the 24 atoms of hydrogen.

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Your textbook.

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Uses a more traditional approach in which they break the calculation into three separate steps in order to give the student a lot more opportunities to make a mistake.

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However, I don't like traditions for the sake of traditions if it doesn't make sense, let's change it.

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This next example is about Chalcopyrite.

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That's our chalcopyrite.

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The ask is grams of copper.

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So to the periodic table.

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The given quantity has units of grams of chalcopyrite.

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So once again, we go to the molar mass from the periodic table.

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And now we have our conversion factor.

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To solve, we place the given quantity in the 1st frame.

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And the conversion factor in the 2nd frame.

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To cancel grams of chalcopyrite.

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Then our final answer.

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Is 1.28 * 10 to the 3rd grams of copper.

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And that's all there is.

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There isn't any more.