

>> Diane Jewell: You use 25.8 grams of lithium hydroxide and form 58.002 grams of lithium bicarbonate. What is the percent yield? And now, you're given this equation of lithium hydroxide plus carbon dioxide going to lithium bicarbonate, and it is a balanced equation. Now, if you put your information in, you're starting with 25.8 grams of your starting material. So, you'll want to turn that into moles, so that you can calculate moles of your product, and ultimately, the grams of your product. What would this then give you? Well, this would then give you your theoretical yield. Theoretical yield is the amount that you expect to make of a product if everything goes perfectly. In other words, you don't make any mistakes. You don't spill anything. You don't leave even a grain of anything on your spatula. Everything completely gets scraped out of containers. If you're boiling something, there's no little spurts of boiling material coming out. In other words, it really doesn't happen, okay, because you can't get 100% of what you're expecting, but anyways, if you were to, this is what we're calculating here is the theoretical yield if you could get 100%. So, what do we know? Well, they said you actually got 58.002 grams. That is our actual yield, okay? And we know then that will we calculate this, this is going to be higher than 58.002, because your actual yield will always be lower than what you calculate. They also ask what's the percent yield? Well, percent yield is actual yield divided by theoretical yield, and then times 100. So, what do we have to do here? Well, we have the actual yield. We have to find the theoretical yield, and we have what we need here to calculate it. So, what I'm going to do is I'm going to show you how to string your three steps together in one great, big step, okay? You're starting with your 25.8 grams of lithium hydroxide, and you turned it into moles using the molar mass. Well, you take the reciprocal of the molar mass that allows you to cancel out your grams of lithium hydroxide. So, 25.8 divided by the 23.949 will give you moles of lithium hydroxide. So, right now, you're there. We're not going to come up with an answer yet, because we're going to do our next step, okay? Now it's molar ratio or our molar ratio. We have one mole of product for every one mole of reactant, so, one mole of lithium bicarbonate for every one mole of lithium hydroxide. Okay, again, we can cancel out now moles of lithium hydroxide, and now, if we do these two steps, this one with the division and then times 1/1, we end up with moles of lithium bicarbonate, but we still have the third step, and the third step uses the molar mass of lithium bicarbonate. So, you'll see what we have. We have moles. We want to get rid of moles. So, we're going to have moles on the bottom here for our molar mass, 67.959 grams of lithium bicarbonate per mole of lithium bicarbonate. Now we're going to cancel moles, and look what we've got. Instead of making three steps, we've taken the three steps and put it all into one. So, on your calculator, you would say 25.8 times 67.959. You'll notice everything else is just ones. Then divided by 23.949, and again, these are just ones. And when you do that, you get an answer of 73.4. The only thing that wasn't canceled is your grams. So, this is your 73.4 grams of your lithium bicarbonate. That is your theoretical yield. So, going back now to this equation. Percent yield equals actual yield, which is your 58.002 divided by the theoretical yield, which is your 73.4, and then times 100 gives you 79.0% yield.