>> What is the volume of 84.0 grams of N2 at STP? Okay. First thing we have to decide, or we have to talk about STP. STP stands for standard temperature and pressure and it's used by scientists so that we all have a standard for when we're talking about something. In other words, if I'm doing an experiment and somebody else wants to try to duplicate my experiment to get similar results, we really can't compare our results if we're using different temperatures or different pressures. And so if I were to do an experiment and I said it's at STP, that other person, the other scientist would say, "Oh, okay. I'm going to set my temperature at zero degrees C and I'm going to have my pressure at one atmosphere because those are what STP stands for. Standard temperature is zero degrees C. Standard pressure is one atmosphere. Okay. Another nice thing about STP is that if we were to take temperature of zero, pressure of one atmosphere, if we talk about one mol of gas, we can put those all together in the ideal gas law and calculate volume. Volume will be calculated to be 22.4 liters of a gas. And so we have now this thing called molar volume. When we talk STP, we're talking 22.4 liters per mol, okay, of any gas, it doesn't matter what the gas is. Okay. So this gives us another tool we can use now when we're working with stoichiometry. So let's go back and look and see what our question was. What is the volume? Okay. So we're looking for volume which means we're going to be using this right here because that gives us volume in liters, of 84 grams of N2 at STP. 84 grams tells us what? Well, it tells us we're starting with mass. If we look at what we have here, we're going to be working here with mols. That means we have to turn the grams into mols so that we can then use this to turn mols into liters. Okay. And why did I automatically start saying this? Because I saw this in the question, STP. Anytime you see STP, write this down because you're probably going to be using it. Okay. So let's look at our first step. We said let's turn grams into mols. Here's our molar mass of nitrogen, N2. The grams of nitrogen we're going to cancel. We've 84 divided by 28.02 gives us 3.00 mols of our nitrogen. Now we can use this. This is not just 22.4 liters per mol. As you can see, it's also a conversion factor. And so we can use this in our second step to convert mols to liters. What we do is we keep the liters on the top, have mols in the denominator. Mols of nitrogen now are going to cancel. We have 3 times 22.4, ending up with liters of nitrogen, and we end up with 67.2 liters of nitrogen. So that worked out very nicely. Now how is this going to help you in any of your future problems? Let's take a look at this. Remember, we said before that when you start with something in grams, you can turn it into mols by using the molar mass. So if we're starting with grams, we can turn it into mols using the molar mass of nitrogen which was 28.02. But what if we want to go a step further and find out, well, what is the volume? Well, here's where you use now the molar volume because they said it was at STP so we know we can use our molar volume of 22.4 liters per mol. This is also going to come in handy when we're doing stoichiometry. If you are working with gases and instead of being gases in grams, you're told, well, you're starting with, say, 2 liters of a gas, you're going to take that 2 liters and turn it into mols using your molar volume because they'll specify it's at STP. Once they do that, then you use your usual way of molar ratios and in solving for

the questions that they're asking. So STP, molar volume is going to be really helpful to you to use. Just remember this number here.