>> How many grams of potassium chloride will form when 18.65 liters of chlorine gas at STP reacts with excess potassium? Okay, that is the problem we're looking at right now. And here is an equation that goes with that problem. We have 2 moles of potassium solid reacting with 1 mole of chlorine gas to yield 2 moles of potassium chloride solid. We're given the information that we have 18.65 liters of chlorine, so I've written that underneath the chlorine. We've also given the information that we're starting with excess potassium. And so I've written an X and an S under potassium, just to indicate that we have excess potassium. Now, in a problem like this, we have to figure out which one of those reactants are going to be limiting. But with this one, we're given kind of like a gift, because once it says excess, it means we don't have to worry about which one is limiting, the other one is limiting. This one is going to run out first. And so this is the one we need to use in order to find out how much potassium chloride is going to be formed. So we're starting with 18.65 moles, I'm sorry, 18.65 liters. We usually start with grams. So this is something different for us. But remember what I said, whenever you see STP in your instructions, the first thing you want to do is write this down, 22.4 liters per 1 mole. That's a conversion factor that when we're working with STP, you may be asked to use. In this case, we will be needing this because if we are using chlorine to determine how much potassium chloride we're going to make, we need to be able to convert liters of chlorine into moles of chlorine. And so we're going to be using 22.4 liters per mole in order to convert from liters to moles. Once we find out how many moles we have of our beginning substance that's limiting, we can use our molar ratio to calculate the moles of our product. Remember, our limiting, our molar ratio is the ratio of potassium chloride, which is 2, to chlorine, which is 1. It's a 2-to-1 ratio. Once we have this now, the moles of KCl, we can turn that into grams of KCl using the molar mass of potassium chloride. Okay, so let's go ahead and set this up. We have 18.65 liters of chlorine gas. Now we're going to use our conversion factor based on STP. We're going to take this and we're going to flip it over and use the reciprocal. By doing so, we can cancel out liters of chlorine, and we'll–once we work this, our units are going to be moles of chlorine. So we have 18.65 divided by 22.4, and we end up with .8326 moles of chlorine. So we're right here in our plan. Our next step, remember, is to use molar ratios. So second step, starting with the 8, .8362 moles of chlorine, we want to multiply that by the molar ratio. We have 2 moles of potassium chloride, which is here, for every 1 mole of chlorine, which is the one that we can write right there, okay? .8326 times your 2 gives us 1.665 moles of product. Okay, we're almost there. We're at this point right here. We need to do our last step to go from moles to grams using molar mass. So here is our third step now. We're starting with our 1.665 moles of KCl. We're going to multiply it by the molar mass of potassium chloride, which is 74.6 grams per mole. Again, we're going to go ahead and cancel out those. We end up with grams in our answer. And by multiplying 1.665 times the 74.6, we get 124.2 grams of potassium chloride.