

>> What volume of hydrogen gas is produced at S.T.P. when 15.8-grams of zinc reacts. Here you see our equation. We're starting with two HCl's, hydrochloric acids. Its aqueous. And one mole of zinc as a solid forming to form zinc chloride. Which is aqueous. And then hydrogen gas. Now again notice that there's no coefficients in front of zinc. Zinc chloride and hydrogen gas. And so, we can if we want go ahead and write the 1s in there because whenever there's not a number coefficient it automatically is a coefficient 1. Now let's look back at what we have. It says what volume of hydrogen gas is produced. So, we're going to write liters with a question mark here at S.T.P. okay S.T.P. that tells us what? 22.4-liters per one mole. That's going to be something we're going to be using. When 15.8-grams of zinc, here is that reacts. All right. So, notice they don't even tell us anything about how much HCl we're starting with which means we don't have to worry about that. All we have to be concerned with is what they've given us. They've given us grams of zinc, we know what to do with this. Right. Grams can be converted to moles using molar mass. Once we get moles we can go from moles of one thing to moles of the second using our molar ratio. Now this is where we're starting something new again. Going from moles to liters remember that is where that S.T.P. information comes in. We're going to be using this as our conversion factor. So, let's go ahead and do our stoichiometry. We're starting with our zinc with our 15.8-grams of zinc. Molar mass of zinc is 65.41. We're going to go ahead and divide 15.8 divided by the 65.41 giving us .242 moles of zinc. The grams canceled out. Now we're right here we're going to go over to here using our molar ratio .242 moles of zinc and now our ratio is 1 mole of hydrogen for every 1 mole of zinc and so we have that right there, 242 times one divided by 1 is simply is the same value .242 moles of hydrogen. Okay again that canceled out. Sometimes when you get really kind of lazy and we figure it's just a 1 to 1 ratio let's leave it out. No. Let's not leave it out. We want to put that in there because otherwise we never show how we get from moles of zinc to moles of hydrogen. We need to put that in there as part of our problem solving. Okay. So, now we have moles of hydrogen. Okay. Going from moles of hydrogen to liters of hydrogen. We're going to be using our molar volume of 22.4-liters per mole. And this time we don't have to use the reciprocal by leaving it just in the form it's at we can just go ahead and cancel out moles of hydrogen leaving us with an answer in liters of hydrogen .242 times the 22.4 will give us 5.42-liters of hydrogen gas at S.T.P.