

>> Diane Jewell: You titrate 25.0 mL of HCl solution using 28.6 mL of .175 molar sodium hydroxide. What is the concentration of HCl? Now, HCl is hydrogen chloride, but once you put it into water, it becomes hydrochloric acid, okay? So it doesn't really have the acidic qualities until it's actually put into water. So we put it into water. We're calling it an HCl solution. The first thing you're going to want to do is write out your equation, giving you HCl plus sodium hydroxide, and you know it's a neutralization. That's what happens during a titration. So you're going to be forming water and salt, okay? So the salt is going to be made up of your cation here, and your anion there. So that's where you get the sodium chloride from. We've already balanced this one's before, but you'll also have to make sure that your equation is balanced. Now, this is a very special kind of a situation, a different – a situation or problem, in that we have a one-to-one ratio of acid to base. There's one hydrogen for every hydroxide. This makes our calculations much easier, because when we have this kind of a situation, we can use this equation. The molarity of the acid times the volume of the acid equals the molarity of the base times the volume of the base. So identifying each one of these variables – we don't know what the molarity of the acid is. That's what they want us to calculate. The volume of the acid was the 25 mL HCl. Molarity of the base was our .175, which is right here, molar sodium hydroxide, and the volume of the base was the 28.6 mL of the sodium hydroxide. So now, taking our equation, we can rearrange, isolating our molarity of acid by dividing both sides by the volume of the acid. We get molarity of the acid equals molarity of the base, times the volume of the base, divided by volume of the acid. Taking our numbers from there, plugging them in, this is what we get. You can see now – mL will cancel out. We'll be left with units of molarity – .175 times 28.6 divided by the 25 will give us the molarity of acid equal to .200 molar HCl. Remember, this only works with a one-to-one ratio. Don't forget to balance your equation.