>> Chemistry, Diane Jewell: Here you see some polyatomic ions. These are the ions that I want you to memorize. Now, if you look at them, you're going to notice there is 5, 9 12 – there's 15 polyatomic ions here that you need to memorize by name and by sight. Okay, that's a lot to do and it can be confusing with all these charges on it. So there's a little bit easier way that I want to show you to memorize these and I think this is going to really help you. You want to memorize these here – the -ates – nitrate, sulfate, carbonate, phosphate, chlorate. Memorize what they look like, okay? That'll be five of them that you have to memorize, okay? Then, if you memorize these, memorize this rule. What happens if you have the same ion but with 1 less oxygen? You'd have NO2 minus – same ion, but 1 less oxygen. You'd have SO2 minus – same one, 1 less oxygen – oops, nope. We don't have that one, that one's carbonite. 4 phosphate with 1 less oxygen, PO 3 3 minus. Same with this one. Chlorate with 1 less oxygen, Cl O2 minus, okay? If you recognize these, then when you see these you should look at those and go, hmm. I don't know what it is, but that looks like sulfate except it's missing 1 oxygen. Oh, I remember the rule. If you take in oxygen off of sulfate, it ends up changing the ending to -ite. So this thing that I don't know, now I know what it is because it's 1 oxygen less than sulfate, it's sulfite. This one is 1 oxygen less than nitrate, it's nitrite – 1 oxygen less than phosphate, phosphite – chlorite. See what I'm saying? So these are your -ates. Memorize the -ates. Then know if one of those -ates are missing 1 oxygen, change that -ate ending to -ite and it will make it easier for you. You won't have to memorize these 4, you just have to realize, oh, that looks almost like something I know, all right? And then you'll remember to change it to the -ite ending, okay? So that will actually prevent you from having to memorize these 4. Now, let's take a look at going from -ate to something else over here. Instead of removing the oxygen – now we're not going to be looking at this anymore, okay? We're just looking at this. If we take our -ates (our nitrate, our sulfate, etc.) and add an H plus to it, now what do we have? Well, if we start with sulfate and add an H plus, you end up with HSO4. Now your charge is going to be just 1 less because minus 2 plus the 1 from this gives you a minus 1 charge. So it does increase your charge by 1, okay? HSO4 minus. Adding the H plus to carbonate, HCO3 minus. Adding the H plus to phosphate, HPO3 2 minus, okay? What are these called? They're called hydrogen – whatever they are – hydrogen sulfate, hydrogen carbonate, hydrogen phosphate, okay? You can call them that. That's pretty easy, right? Because you recognize this is a sulfate. You recognize this is a carbonate. You recognize – nope – you recognize – sorry, that's supposed to be a 4. You recognize this is a phosphate, okay? Just putting those hydrogens on the beginning of it – hydrogen sulfate, hydrogen carbonate, hydrogen phosphate. A second way you can name these is with the bi – bisulfate, bicarbonate. Usually, you don't hear biphosphate, but you do hear bicarbonate and, you know, that's one of our usual household products, sodium bicarbonate, okay? That's the bicarbonate right here. Lastly – and so using this system, we're going back. We're only memorizing 5 of the polyatomic ions and 2 rules – that's all – 5 and 2 rules. And the other 3 are these three here. You just have to know them. OH is a hydroxide and this is a

base. CN is cyanide – that's poison, okay? We want to know that so that when we're working with in lab, you know to wear your gloves – cyanide is poison – CN minus. This is the only one we're working with of the polyatomic ions that's positively charged. Did you notice they're all negatively charged? This is the only positive charged ion. This is ammonium. If we had NH3, that would be ammonia. By putting that H plus on, ammonium. So if you had something like this, NH4Cl, ammonium chloride. And by the way, you know how we have that rule where we say an ionic compound is made from a metal and a nonmetal? There's only one exception and this is it. Any time the metal is replaced with the ammonium ion, it's still an ionic compound because that's why it's called a polyatomic ion. So even though you're not seeing any metals in this, this is an ionic compound because NH4 is the polyatomic ion, ammonium.