

>> Write the half reactions and identify the oxidation and reduction steps for this equation. We have silver bromide. This is a decomposition so it's going to silver and bromine. What we want to do, first step of course is to assign oxidation state. This is a compound which means they'll both have a specific oxidation state that probably won't be zero. Bromine is a halogen. It's a 7A element group element. And so remember we said Group 7A usually has the negative one charge. So we're going to go ahead and assign a negative one to bromine. Now if you look at it we have silver and bromine as a one-to-one ratio because we see no subscripts, which means the subscripts are one. So there's a one-to-one ratio. If this is a negative one charge this one has to have a positive one charge to balance out the charges and have them equal zero when they're added together. So this will be a positive one. Now coming to the other side here look what we have. We have silver all by itself. Silver all by itself is going to have a zero oxidation state. Basically what that's saying is it's not sharing any of its electrons with anybody and so it's got that zero oxidation state because it keeps all of its electrons. Bromine, bromine is Br₂. Anytime you have a diatom, diatom would be Br₂, F₂, H₂, O₂, N₂, Cl₂. All those elements that form diatoms, their oxidation state will always be zero, OK? Because they're sharing their electrons equally. There's no polarity in there. So this is going to be a zero state. this will be a zero state. And each one of these will have a charge. So let's go ahead and look at the half reactions we've written. The silver went from a plus one to a zero. So here's the plus one on this side, the arrow, and the zero here. Question is where do we put the electron? You know it's easy for you. It's easy for me to look at this and say oh that looks good. But when we have to actually choose which side of the arrow to put the electron on, we have to give it a little thought. So if I put an electron over here that's like putting a negative one charge. OK, plus one and negative one equals zero. OK, so on this side we have a zero. When we add them together. On this side we have a zero. Zero equals zero. This is called a charge balance. We have to have a charge balance by putting the electron over here we have a charge balance. If I had put the electron here then on this side of the equation we would have a plus one. On this side of the equation with the electron over here we would have had zero plus negative one gives us a negative one on this side. Plus one does not equal negative one. So if we were to put that electron on the wrong side, the charges won't balance and it kind of tells us, oops we made a mistake put it on the other side. So wherever we have the more positive number that's where the electron is going to go on that side. OK, so this is our first one. This is a gain of an electron because we don't have the electron here yet, but here comes that electron. Now we have the extra electron here. Gain of electron is reduction. OK, here's our second one. Bromine goes from a negative one to a zero. So negative one, zero. You can see why we put the electron over here because this side we have a negative one balance of charge. On this side we have a zero and a negative one, which would give us negative one also. Now we have a balance of charges. Negative one equals negative one. With the electron on the wrong side we would have had a whole bunch of negative charges over here and a zero over here. It would have never balanced out. OK, so again we can see where that

negative charge is. If you think about it in another way, bromine has an extra negative charge over here. Here it's gotten rid of that negative charge. How? By throwing out an electron, OK? So that's another way of looking at it. Here we have a loss of electron. The electron was there. Now it's been lost from this element. Loss of electron is oxidation, LEO. And so this is your oxidation step. To go one step further if you were asked, just looking at this reaction what is being reduced? Well, if you need to know what's being reduced look at your reduction step and then go back and see what is the reactant in my reduction step? It's silver plus one. Therefore silver plus one is being reduced. What is being oxidized? Look for the oxidation step. Go back to the beginning, find the reactant, bromine negative one, bromide is what's being oxidized because it's the only thing over here in the oxidation step. OK, and so that would be how to answer those two questions also.