>> Diane Jewell: Dinitrogen tetroxide decomposes to nitrogen dioxide, and its equilibrium constant is 4.6 times 10 to the negative 3. If the equilibrium concentration of reactant is 0.20 molar, what is the equilibrium concentration of the product? Okay. We have the equation written here. Here's your dinitrogen tetroxide decomposing to two nitrogen dioxides, both in gas form. We're given this information, that at equilibrium there's 0.20 molar of the reactant, but we don't know how much of the product there is, and that is what we need to solve for. The other piece of information given to us is our equilibrium constant which is 4.6 times 10 to the negative 3rd power. So the first thing we want to do now is write our equilibrium constant expression. K sub C equals our product which is squared divided by our reactant. Okay? Now what we want to solve for is the product which means we want to isolate the concentration of nitrogen dioxide. So in our next step you can see that in order to get nitrogen dioxide by itself we want to get rid of dinitrogen tetroxide by multiplying both sides by dinitrogen textroxide. This allows a cancelation on this side, and we end up with this next equation here. We have our nitrogen dioxide squared equals the equilibrium constant times the concentration of dinitrogen tetroxide. Okay. We still don't have what we really want, though, because we don't want to know what the concentration of this squared is. We want to know what the concentration of that is without the square. So to get rid of the squared sign, we have to take the square root of this. And if we take the square root of the left side of our equation, we have to do the same thing over here. Taking the square root of this value also. The square root and the squared sign will cancel each other out now, and we end up with the concentration of nitrogen dioxide equals the square root of this. Now here what you've seen here is the – are the numbers that we can substitute in for this value, and also for this value. So we have 4.6 times 10 to the negative 3rd times our 0.20 all under the sign, the square root sign. When we multiply this together, we have 9.2 times 10 to the negative 4. Again, we're still taking the square root of this so once you take the square root of this number here, you get 0.030 molar, and that will be the concentration of nitrogen dioxide.