

>> What is the product of the alpha decay of uranium 238? Okay, when you're given this kind of a problem, that's all the information you're going to be given. Everything from here on you have to do yourself. So you have to ask yourself, okay, let's see. Product of decay. What I want to do then is set up my equation. So I'm starting with uranium 238, and here we go. Uranium 238. Now I need to look on my periodic table. Find U. What is the atomic number? It's 92. So I put that in, okay. And then it says it's a decay. In a decay the, whatever's decaying is all by itself before the arrow. So now we put our arrow in. And then the next part it says it's an alpha decay. So we put our alpha particle. Remember, alpha particle is a helium nucleus. It has four particles in the nucleus and two of those are protons. So we have our helium 4, 2. Plus they're asking, what is the product? And so this is what we're trying to solve for. And we can set it up like this by giving, say an x and a y for the mass number and the atomic number, okay. So we've set up our equation, our decay equation. Now we have to solve it. Now it's just a matter of using algebra. So first thing we want to do is we want to find out what is x? We can go ahead and look at all the top numbers. We have 238. And so we've done this 238. Where it says there's an arrow, we're going to substitute an equal sign. And then we have 4 plus x. So we have 4 plus x. So 4 plus whatever this is going to be is going to add up to 238. So to get rid of the plus 4, we subtract 4 from both sides. That allows us now to cancel out 4 on this side. We have now 238 minus 4 is 234 equals x. So we can go ahead and write 234 as our top number, okay. That's the masses. Now let's look at the bottom numbers. The bottom numbers, we've referred to those as the charges. Because these are the protons, and protons are positively charged. We've got our 92 equals 2 plus y. And so we've written that down. 92 equals 2 plus y. We have to get rid of the plus 2 to isolate the y. So we subtract both sides by 2. We get 92 minus 2 is 90 equals y. So now we put the 90 here. So without looking here, we've got a 2, we have something that has an atomic number of the 90 and a mass number of 234. It's just now a matter of going to the periodic table, finding the number 90. And look to see what that element is. And that element happens to be thallium, Th. And so we put this down. This is our product. Any time you have an a question like this, don't just solve it. But you do want to set up your equations to show your work. And that's the answer we're looking for.