

PhET Nuclear Fission Inquiry Lab

After using this simulation, you will be able to:

- *Describe how a neutron can give energy to a nucleus and cause it to fission.*
- *Explain the byproducts of a fission event.*
- *Explain how a chain reaction works, and describe the requirements for a sustained chain reaction large enough to make a bomb.*
- *Explain how a nuclear reactor works and how control rods can be used to slow down the reaction.*

Use the Nuclear Fission Inquiry Lab Nuclear Fission PhET simulation at <http://phet.colorado.edu/en/simulation/nuclear-fission> to answer the questions on this page

1. Use the tab called “Fission – One Nucleus” to answer these questions:
 - a. Try to figure out how you can make U-235 unstable
 - b. How do you know it’s unstable?
 - c. Describe what you would do to make U-235 unstable, both in terms of what you see and do in the simulation and what this represents, physically.
 - d. In your own words, what does “unstable” mean when used to describe Uranium?
2. Imagine that you have many U-235 atoms and you fire a neutron at one of them. What do you think will happen? Explain your prediction using words and drawings.
3. Explore the features of the “Chain Reaction” tab. If you wanted to explain nuclear chain reactions to someone, what would you tell them? Briefly, explain your ideas using appropriate vocabulary and drawings. Make certain that your answer explains why the reaction occurs AND what affects the speed of the reaction.

4. Why is U-235 a good isotope of Uranium for creating chain reactions?

5. Now, you want to make an atom bomb. Use an Internet search to determine which materials are used for nuclear bombs, and use these materials to try to make your bomb. (Remember, a bomb must be transportable – what do you need to do so that it is transportable?) What can you do to make the bomb explode?

6. While using the simulation, what observations have you made that makes nuclear reactions good for bombs?

7. What are at least three things that you need in order to make an effective bomb, and why?

8. Explore the features of the “Nuclear Reactor” tab. What is the purpose of the control rods within a nuclear reactor?