

Chain Reactions



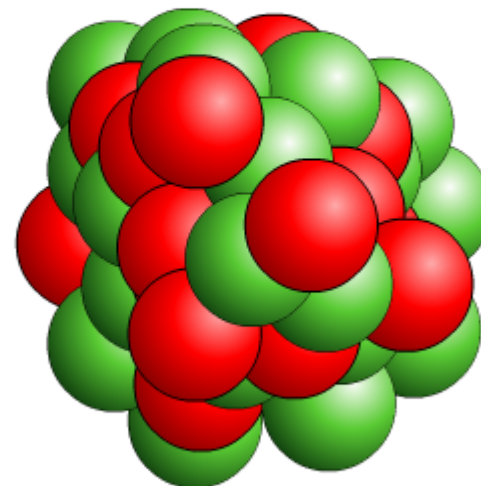


What is a chain reaction?

Nuclear fission produces daughter nuclei and neutrons.

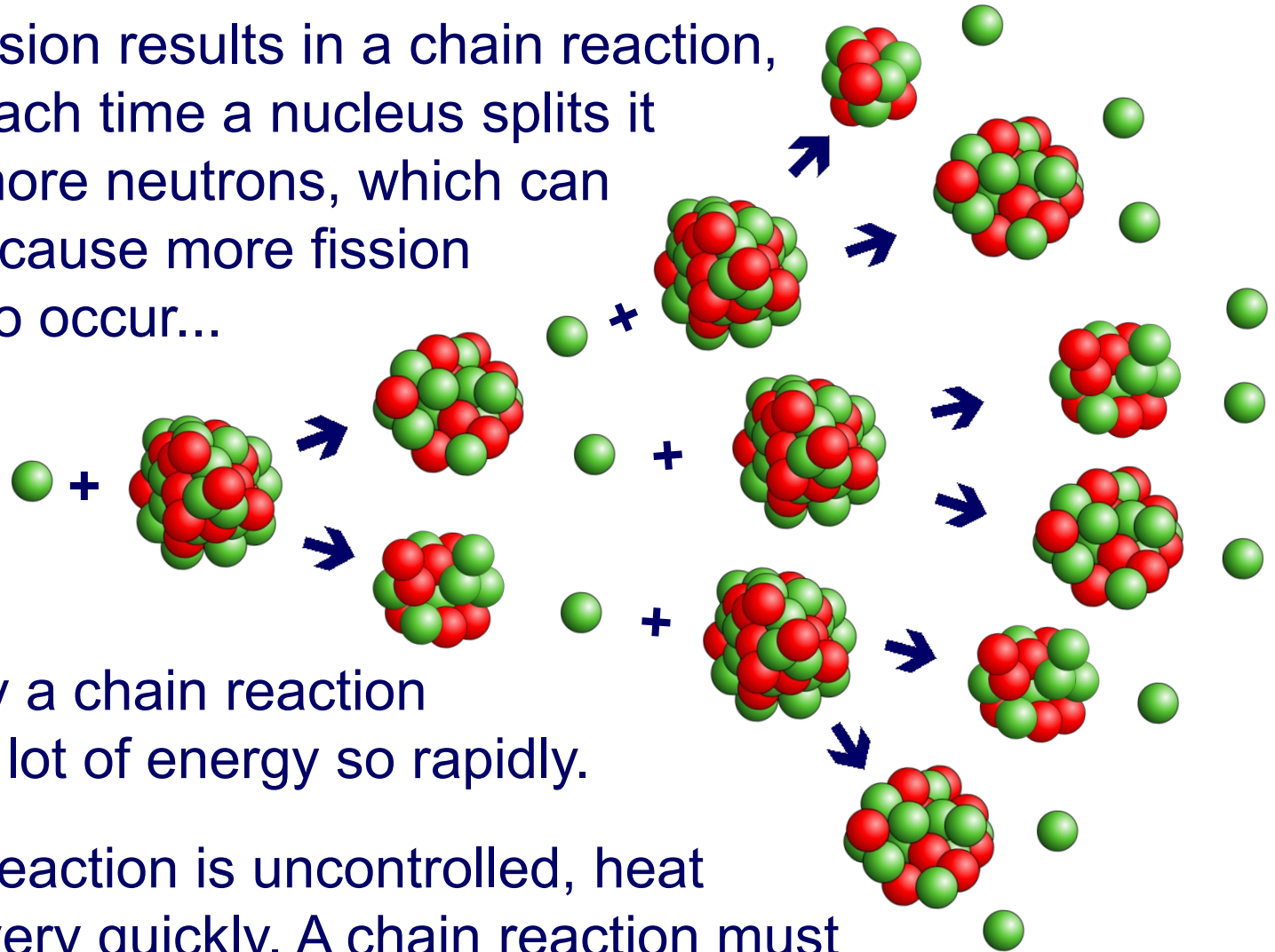
If these neutrons go on to split other nuclei, this sets up a **chain reaction**.

Click "**play**" to find out more about how a chain reaction works.



What is a chain reaction?

Nuclear fission results in a chain reaction, because each time a nucleus splits it releases more neutrons, which can go on and cause more fission reactions to occur... and so on.



This is why a chain reaction releases a lot of energy so rapidly.

If a chain reaction is uncontrolled, heat builds up very quickly. A chain reaction must be controlled to maintain a steady output of heat.



What are the stages of a chain reaction?

What is the order of stages in an uncontrolled chain reaction?

- 1 These multiple nuclei split, each releasing neutrons.
- 2 Released neutrons are absorbed by other nuclei.
- 3 A nucleus absorbs a neutron.
- 4 More neutrons are released than are absorbed.
- 5 Nucleus splits into two daughter nuclei releasing neutrons.



solve



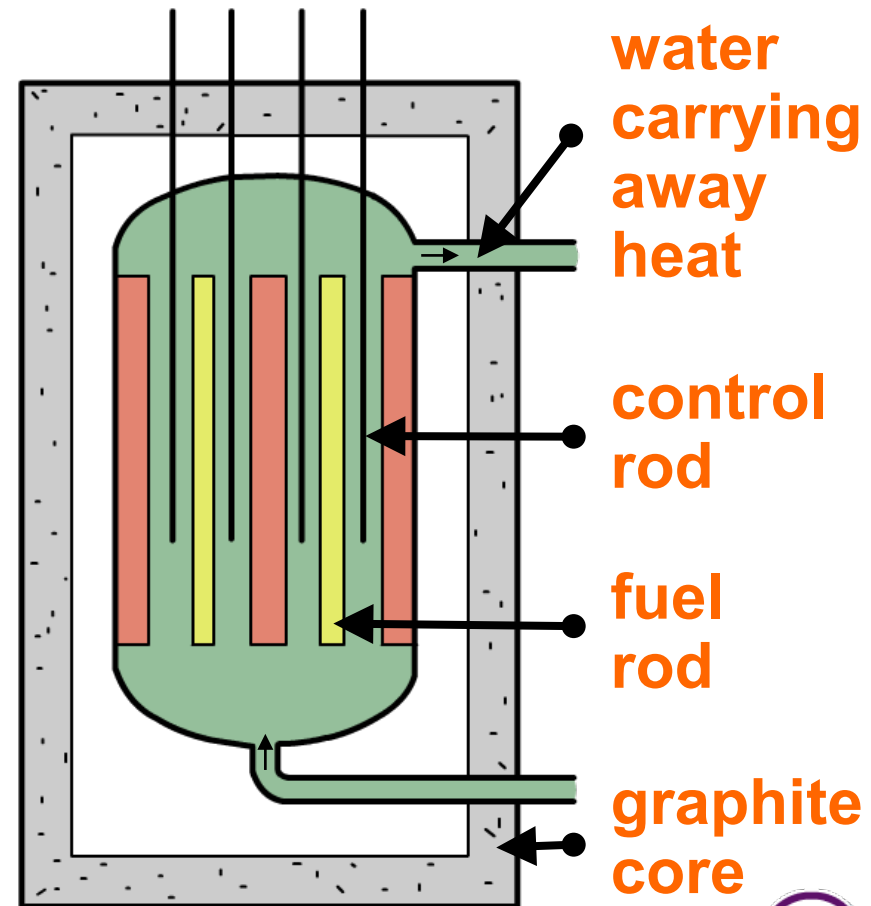
How are neutrons controlled?

For nuclear fission to start in a reactor, a uranium-235 atom must absorb a **low speed** neutron. **High speed** neutrons are not as readily absorbed by uranium nuclei.

However, high speed neutrons are released during fission.

The reactor's **graphite core** slows down the released neutrons so the chain reaction can keep going.

Control rods made of boron absorb excess neutrons to prevent chain reactions getting out of control.



Why must chain reactions be controlled?



Chain reactions can generate a lot of heat and can be extremely dangerous if they are not properly controlled.

This is what happened in 1983 in the world's worst nuclear power accident at Chernobyl, Ukraine.

Most of the control rods had been removed from a reactor during a test.

The chain reactions were uncontrolled and generated too much heat.

The reactor overheated and caused a steam explosion, which blew the building apart and released a lot of radiation into the environment.



Ria Novosti/ Science Photo Library



How do nuclear weapons work?

Nuclear bombs use uncontrolled chain reactions.

For such a chain reaction to occur, there must be a certain amount of uranium atoms. This is called the **critical mass**.

A nuclear weapon works by forcing together two masses of uranium-235 to create a critical mass.

This results in uncontrolled chain reactions releasing huge amounts of energy.



A 4 ton uranium bomb similar to one used during World War II on Hiroshima, has the same power as 20,000 tons of high explosive.



What does each term about chain reactions mean?

control rod

Boron rod used to absorb neutrons.

graphite core

Neutrons from one fission reaction cause more fission reactions to occur.

fuel rod

It slows down released neutrons to keep fission going.

chain reaction

Tubes made from enriched uranium.



solve

