

STEM IN THE LAB

innovate. explore. discover.



OUR MISSION

INL's K-12 STEM Program works to inspire Idaho's future STEM workforce, impact students, teachers and families by integrating best practices in STEM education, and empower employees to become STEM mentors to transform K-12 STEM into a driver for innovation.

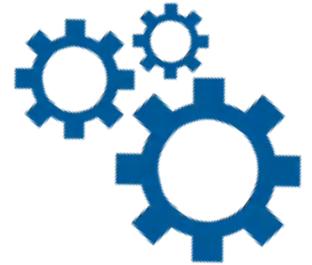
STEM IN ACTION

HALF LIFE OF M&M'S

There are several types of fuels that we use every day.

The gasoline fuel we use in our cars is one example.

The fuel we use for our cars has to be pumped out of the ground and refined from crude oil. Then it can be stored in tanks for us to use. Another type of fuel is nuclear fuel. To use this fuel, Uranium 238 is mined and processed to make U-235 pellets. These pellets are stacked into fuel cells and are put into a nuclear reactor's core. When these uranium atoms absorb a neutron, they split giving off tremendous amounts of energy along with more neutrons. The fuel is generally "used up" after 1.5 to 3 years, and it has to be stored or reprocessed. The amount of time it takes a radioactive isotope to decay into a stable isotope is different for each isotope. This time is called "half life". The half-life of an isotope is the time on average that it takes for half of the atoms in a sample to decay. As an isotope decays, it can transform through a number of elements until they end up as a stable isotope. In this activity, candy will be used to demonstrate the process of "half life". Spill a cup of M & Ms onto a clean surface. Removed all the candy that are face up (with the M showing). Continue this process until all the candy has decayed.



TRY THIS AT HOME

Graph the results of your experiment, what patterns do you notice?

Ask other people to perform the experiment, compare their results to yours.

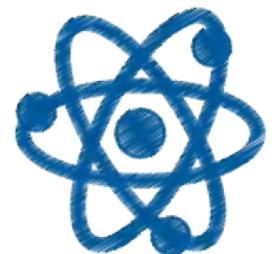
What other items could you use to demonstrate half lives?

GUIDING QUESTIONS

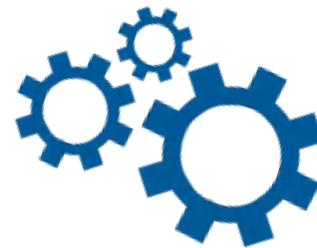
- *What happens to the total number of candies with each trial?*
- *Does the number of candies started with affect the outcome?*

MATERIALS

- *Cup of M & M candy*
- *Clean surface*



PROCEDURES



1. Count the number of M & Ms in your cup.
2. Dump out cup of M & M candy onto a clean surface
3. Remove all the candies that are face up (with the M showing)- these have “decayed”
4. Make a data table and record the number of decayed candies (table should have 3 columns- shake, decayed M & Ms, remaining M & Ms-see below)
5. Place decayed M & Ms to the side and put the rest of the candy back in the cup.
6. Repeat steps 1-4 again until all the candy is gone.

SHAKE	DECAYED M & MS	REMAINING M & MS
1		
2		
3		

CAREERS IN STEM

BUILDING STEM SKILLS

Nuclear Engineers, at INL, apply the principles of nuclear physics to design, construct, and operate systems such as nuclear power plants that involve radiation and nuclear reactions. Nuclear Technicians assist physicists, engineers, and other professional in nuclear research and nuclear production. Research and testing performed at this facility is developing technologies that support the advancement of nuclear fuels and materials that power new generation reactors all over the world. The projects they work on help make better nuclear fuels for safer and more efficient nuclear power plants. Their work also contributes to a smarter fuel cycle, from mining to disposing of nuclear waste.

STUDENTS + PARENTS + EDUCATORS

For information on grants, training and student opportunities; curriculum ideas and resources, please visit us at: stem.inl.gov.

RESOURCES

- <https://public.inl.gov/STEMHelpWanted/Brochure/index.aspx?page=16>
- <https://study.com/academy/lesson/nuclear-fuels-definition-characteristics-examples.html>
- <https://teachnuclear.ca/all-things-nuclear/radiation/radioactive-decay/half-life/>
- <https://www.need.org/files/curriculum/guides/EnergyFromUranium.pdf>

