

Units 11 - Don't Have a Meltdown: Nuclear Chemistry

Content Area: **Science**
Course(s): **Chemistry Honors**
Time Period: **June**
Length: **6 weeks**
Status: **Published**

Transfer Skills

Einstein's famous equation $E=mc^2$ will be explored on the molecular level. Differentiate between stable and unstable nuclei and uses of both positive and negative.

Enduring Understandings

Radiation is in the world all around us.

There are beneficial and practical uses for radioisotopes.

Radiation is a spontaneous process.

Some forms of radiation are more dangerous than others.

The sun is a large nuclear reaction

Essential Questions

What is strong nuclear force and how does it affect nuclear stability?

What happens when an unstable nucleus decays?

What is radioactivity and how are nuclear reactions classified?

How does the nucleus change during nuclear reactions?

How does nuclear chemistry affect your life?

Content

Mass defect, binding energy, alpha, beta, positron, electron capture, transmutation, fission, fusion, half-life, parent nuclide, daughter nuclide

Skills

Use Einstein's relationship to calculate the energy change or the mass change of a reaction.

Describe and predict the different types of radioactive decay and their affect on the proton-neutron ratio of the nucleus

Complete and balance nuclear equations.

Explain how the term half-life relates to the stability of a nucleus.

Use the half life of a substance to predict the amount of the radioisotope present after a given period if time.

Explain the manufacture and significance of artificial radioactive nuclides.

Distinguish between fission, fusion, and chain reactions.

Resources

Standards

SCI.9-12.5.1.12.A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
SCI.9-12.5.1.12.A.2	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
SCI.9-12.5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
SCI.9-12.5.1.12.D.3	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
SCI.9-12.5.2.12.A.4	Explain how the properties of isotopes, including half-lives, decay modes, and nuclear resonances, lead to useful applications of isotopes.
SCI.9-12.5.2.12.B.3	Balance chemical equations by applying the law of conservation of mass.
SCI.9-12.5.2.12.D.3	Describe the products and potential applications of fission and fusion reactions.