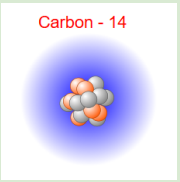
Nuclear Chemistry Unit Plan

NGSS DCI: **HS-PS1-8: Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.**

NGSS CCC: **Stability and Change, Energy and Matter**

Day 1	
Learning Target	By the end of the period, students will be able to compare and contrast a radioactive and nonradioactive sample of glass.
SEPS	Asking Questions and Defining Problems
First task: Create Unit title page	**P. 18 - Green Glass Phenomena Thought Catcher** **P. 19 - Title Page - Unit 2 - Nuclear**
Hook Phenomena	Examining Green Glass - track thoughts on p.18
Create Driving Questions	Think, Pair, Share to generate questions from phenomena observations → add questions to Questions Google Doc
Real-world scenario and anticipation guide	Radium Girls video on YouTube
Exit Ticket	What are the first three words that come to mind when you hear the word “nuclear”?
Day 2	
Learning Target	By the end of the period, students will be able to examine models to predict products of nuclear decay.
SEPS	Developing and Using Models
First Task	Navigate to assignment on Google Classroom
PhET Simulation	Build a Nucleus
Inquiry Guiding Document	Types of Radioactive Decay → submit completed doc on Google Classroom for credit
Exit Ticket	a) Draw the resulting nucleus after carbon-14 (shown below) undergoes **β**- decay. b) What is the same about the initial and final nuclei? What is different? 

Day 3	
Learning Target	By the end of the period, students will be able to write a balanced nuclear equation that illustrates the change in the nucleus.
SEPS	Developing and Using Models
First task: Create p.21	**P. 21 - Types of Radiation** (from Spread 2 - Nuclear Interactive Notebook)
Types of Decay Summary Notes	Define radiation, fill in flap reminding of format of nuclear symbols
	Types of radioactive decay foldable
Radioactive Decay Practice	chemquiz.net/nuc/
Exit Ticket	Complete the following nuclear equations with the missing nucleus or particle. a) $^{178}Au \rightarrow ? + {}^{0}_{+1}e$ b) $? \rightarrow {}^{224}Th + {}^{4}_{2}He$ c) $^{36}P \rightarrow {}^{36}S + ?$
Day 4	
Learning Target	By the end of the period, students will be able to differentiate between fission, fusion and nuclear decay.
SEPS	Constructing Explanations
First Task: Warm up question on board	Warm up: Write the nuclear equations that correspond to the processes described below. a) A sample of uranium-238 undergoes alpha decay. b) Nickel-63 is a radioactive isotope used in electron capture detectors (ECDs) to ionize particles for forensic gas chromatography. It undergoes radioactive decay, releasing beta particles, which then ionize the gas present in the detector.
Fission vs. Fusion Reading	Fission vs. Fusion Reading activity (from AACT: https://teachchemistry.org/classroom-resources/fission-vs-fusion-reading) → submit on Google Classroom
Nuclear Chemistry Card Sort	**p. 20**, **Nuclear Chemistry Card Sort** - partners, 3 circle Venn diagram (https://orise.orau.gov/k12/teachers/lesson-plans.html) → upload a photo on Google Classroom for credit
Exit Ticket	Would alpha decay be classified as fission? Justify your answer using the CER framework.
Day 5	
Learning Target	By the end of the period, students will be able to differentiate between fission, fusion and nuclear decay.
SEPS	Constructing Explanations
First Task	Open to p.20
Nuclear Chemistry Card Sort	Small Group discussions on card sort

Discussion	
Video	Watch this summary video: Fission vs. Fusion: What's the Difference?
Fill in notes	Use info from reading, card sort and video to fill in remainder of **p.21 - Types of Radiation**
Exit Ticket	**CFA** on radioactive decay, fission and fusion
Day 6	
Learning Target	By the end of the period, students will be able to model half-life calculations.
SEPS	Using Mathematics and Computational Thinking
First Task	Paste in p.22 - Modeling Radioactive Decay with M&Ms (from Spread 3 - Nuclear Interactive Notebook)
Nuclear Decay of M&Ms	Gather data and fill in guiding document on p.22 → upload a photo on Google Classroom for credit
Exit Ticket	Iodine-131 has a half life of 8 days. What percent of an Iodine-131 sample will remain after 3 weeks? Show your work in the form of a table.
Day 7	
Learning Target	By the end of the period, students will be able to calculate either the number of half-lives or amount remaining of a given amount of starting material, given the other factor.
SEPS	Using Mathematics and Computational Thinking
First Task	Make **p. 23 - Half Life** (from Spread 3 - Nuclear Interactive Notebook)
Half-life applications	Fill in p. 23 - Half Life as whole-class
Half-life practice	Use chemquiz.net/nuc/ to practice half-life calculations
Exit Ticket	**CFA** - half-life calculations
Day 8	
Learning Target	By the end of the period, students will be able to complete various models of nuclear decay.
SEPS	Developing and Using Models
First Task	Quizlet: Completing Nuclear Reactions (play as Match)
Review Puzzles	Work on Nuclear Review Puzzles (https://www.chemedx.org/activity/nuclear-review-puzzles-help-ai)
Exit Ticket	What questions do you have going into tomorrow's review day?
Day 9	
Learning Target	By the end of the period, students will be able to evaluate the connections between various models and topics in nuclear chemistry.
SEPS	Developing and Using Models, Using Mathematics and Computational Thinking

First Task	On **p. 24**, **concept map** - create a unit concept map with branches and sketches that show connections between various topics
Practice Test	**P. 25 - Nuclear Practice Test** - work on practice test, and put in into a pocket on p.25
Questions	Final Q&A
Exit Ticket	Upload a photo of your concept map to Google Classroom; I will post 3-5 examples for everyone to review
Day 10	
Learning Target	By the end of the period, students will be able to analyze and illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.
SEPS	Developing and Using Models, Using Mathematics and Computational Thinking
First Task	Pick up periodic table
Test	**CSA - Nuclear Chemistry**