CHEMISTRY		
HS-PS1-8 Matter and its Interactions		
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.		
Clarification Statement: Emphasis is on simple qualitative models, such as pictures or diagrams, and on the scale of energy released in nuclear processes relative to other kinds of transformations.		
Assessment Boundary: Assessment does not include quantitative calculation of energy released. Assessment is limited to alpha, beta, and gamma radioactive decays.		
Evidence Statements: HS-PS1-8		
Science & Engineering Practices	**Disciplinary Core Ideas**	**Cross-Cutting Concepts**
Developing and Using Models Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. Develop a model based on evidence to illustrate the relationships between systems or between components of a system.	**PS1.C: Nuclear Processes** Nuclear processes, including fusion, fission, and radioactive decays of unstable nuclei, involve release or absorption of energy. The total number of neutrons plus protons does not change in any nuclear process.	**Energy and Matter** In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved.
Connections to other DCIs in this grade-band: HS.PS3.A ; HS.PS3.B ; HS.PS3.C ; HS.PS3.D ; HS.ESS1.A ; HS.ESS1.C ; HS.ESS3.A ; HS.ESS3.C		
Articulation of DCIs across grade-bands: MS.PS1.A ; MS.PS1.B ; MS.ESS2.A		
NJSLS- ELA: N/A		
NJSLS- Math: MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3		

5E Model	
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.	
Engage Anticipatory Set	Alpha Decay https://phet.colorado.edu/en/simulation/legacy/alpha-decay Students will be observing the changes that happen to the Polonium atoms as they are exposed to radiation. 1) What happens to the mass number of each atom? 2) What is being added to each atom? What is being given off by each atom? 3) Does every atom react? Why or why not?
Exploration Student Inquiry	Nuclear Fission Inquiry Lab Worksheets: https://phet.colorado.edu/en/contributions/view/3335 Simulation: https://phet.colorado.edu/en/simulation/legacy/nuclear-fission Students will be covering a series of activities where they will be examining various applications of nuclear reactions and nuclear chain reactions.
Explanation Concepts and Practices	In these lessons Teachers Should: Introduce formal labels, definitions, and explanations for concepts, practices, skills or abilities. Students Should: Verbalize conceptual understandings and demonstrate scientific and engineering practices. Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas): PS1.C: Nuclear Processes

	Nuclear processes, including fusion, fission, and radioactive decays of unstable nuclei, involve release or absorption of energy. The total number of neutrons plus protons does not change in any nuclear process.
Elaboration Extension Activity	Feasibility of Nuclear Power https://www.youtube.com/watch?v=JMaEjEWL6PU http://www.world-nuclear.org/getmedia/ab488e1b-ba74-4a3e-8561-fb96297f37dc/world-electricity-production.png.aspx Students will be doing research and collecting data in an attempt to answer the question, "Is nuclear power worth the risk?"
Evaluation Assessment Tasks	Assessment Task A: Nuclear Fission Lab Responses and Model Drawings