

CHEMISTRY

HS-PS1-7 Matter and its Interactions

HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Clarification Statement: Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques.

Assessment Boundary: Assessment does not include complex chemical reactions.

Evidence Statements:HS-PS1-7

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Using Mathematics and Computational Thinking</p> <p>Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.</p> <p><u>Use mathematical representations of phenomena to support claims.</u></p>	<p>PS1.B: Chemical Reactions</p> <p><u>The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.</u></p>	<p>Energy and Matter</p> <p><u>The total amount of energy and matter in closed systems is conserved.</u></p> <p>Connections to Nature of Science</p> <p>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</p> <p>Science assumes the universe is a vast single system in which basic laws are consistent.</p>

Connections to other DCIs in this grade-band: HS.LS1.C ; HS.LS2.B ; HS.PS3.B

Articulation of DCIs across grade-bands: MS.PS1.A ; MS.PS1.B ; MS.LS1.C ; MS.LS2.B ; MS.ESS2.A

NJSLS- ELA: N/A

NJSLS- Math: MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3

5E Model

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<p>Engage Anticipatory Set</p>	<p><u>Balancing Chemical Equations - Use mathematics and visual representations to balance chemical equations.</u> https://phet.colorado.edu/en/simulation/legacy/balancing-chemical-equations http://phet.colorado.edu/en/simulation/balancing-chemical-equations</p> <p><u>Reactions and Rates - See that atoms are conserved in an equilibrium situation where there are unreacted particles.</u> https://phet.colorado.edu/en/simulation/legacy/reactions-and-rates</p> <p><u>Reactants, Products, and Leftovers</u> https://phet.colorado.edu/en/simulation/legacy/reactants-products-and-leftovers</p>
<p>Exploration Student Inquiry</p>	<p><u>Stoichiometry Lab</u> http://misterguch.brinkster.net/MLX039.doc</p> <p><u>Limiting Reactants Lab</u></p>

	http://my-ecoach.com/online/resources/3709/Stoichiometry_of_Smores_Lab1.pdf
Explanation Concepts and Practices	<p><u>In these lessons</u></p> <p>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.</p> <p><u>Topics to Be Discussed in Teacher Directed Lessons (Disciplinary Core Ideas):</u></p> <p>PS1.B: Chemical Reactions</p> <p>The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.</p> <p>PS1.B: Chemical Reactions</p> <p>The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.</p>
Elaboration Extension Activity	<p><u>Related Worksheets</u></p> <p>Limiting Reactants: http://chemwiki.ucdavis.edu/Worksheets/Worksheets%3A_General_Chemistry/Worksheet%3A_Limiting_Reagents_2</p> <p>Moles: http://chemwiki.ucdavis.edu/Worksheets/Worksheets%3A_General_Chemistry/Worksheet%3A_Moles</p> <p>General Science: http://chemwiki.ucdavis.edu/Worksheets/Worksheets%3A_General_Chemistry</p>
Evaluation Assessment Tasks	<p><u>Assessment Task A: Stoichiometry Lab Post Lab Questions</u> http://misterguch.brinkster.net/MLX039.doc</p> <p><u>Assessment Task B: Limiting Reactants Lab Analysis Questions</u> http://my-ecoach.com/online/resources/3709/Stoichiometry_of_Smores_Lab1.pdf</p>