Short Performance Assessment: **MS-PS1-5**

Grade Level: **Middle School**

Adapted from SNAP[1]

Title	**The Exploding Hydrogen Bubble**		
Designed by	**Amy Flindt and Mark Smith**	Course(s)	**Middle School**

Performance Expectation	**MS-PS1-5**: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **Clarification Statement**: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms. **Assessment Boundary**: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.

Science and Engineering Practice	**Developing and Using Models** • Develop a model to describe unobservable mechanisms.
Disciplinary Core Ideas	**PS1.B: Chemical Reactions** • Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. • The total number of each type of atom is conserved, and thus the mass does not change.
Crosscutting Concept	**Energy and Matter** • Matter is conserved because atoms are conserved in physical and chemical processes.

Student Performance	1. Components of the model 2. Relationships 3. Connections

[1] The Short Performance Assessment (SPA) and the Assessment Rubric adapted from the Stanford NGSS Assessment Project http://snapgse.stanford.edu/

Name_____

Exploring hydrogen bubbles

Watch the first 20 seconds of the exploding hydrogen bubbles video. The system under investigation is the bubble filled with hydrogen gas, the flame, and the surrounding air in the room.

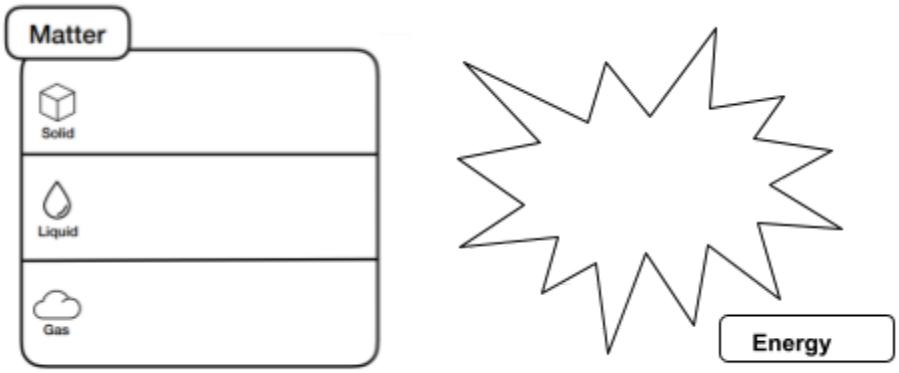
Molecules involved in the reaction are the following:

1. Identify molecules that make up the reactants and the products.

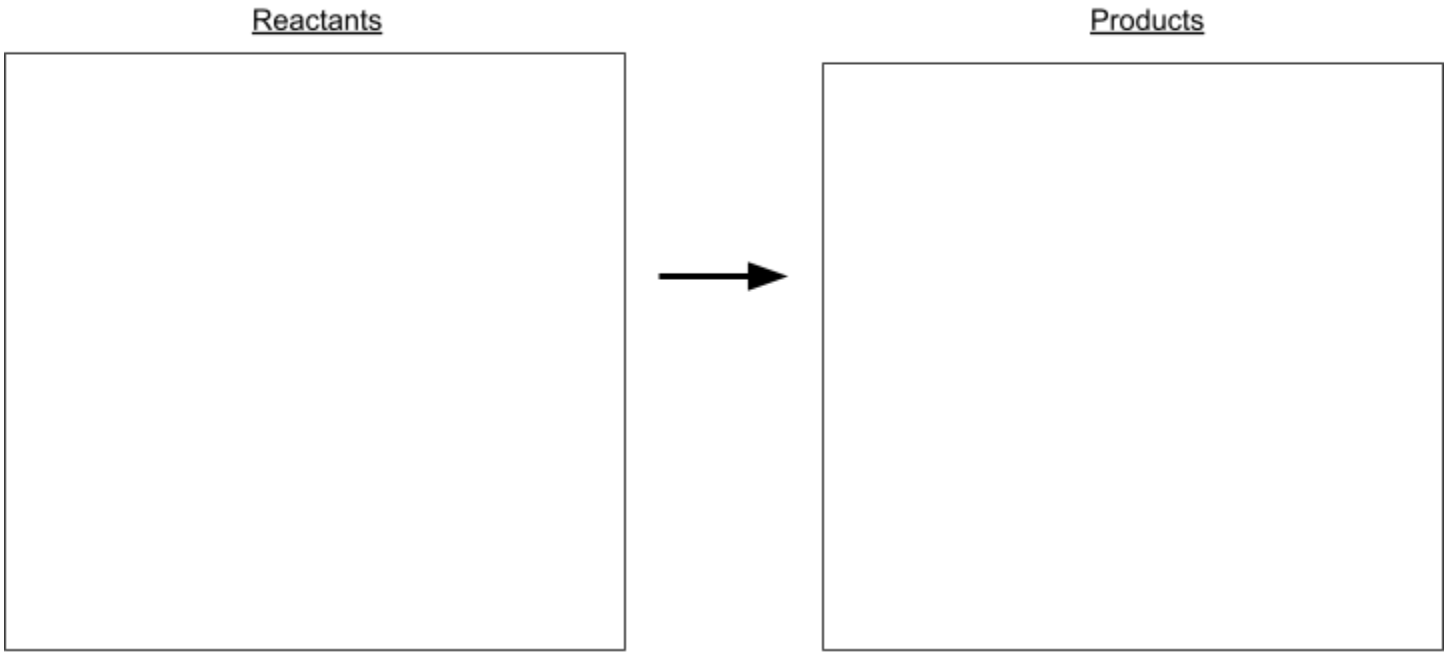
Reactant Molecule(s)	Product Molecule(s)

2. Matter is conserved in the system. What does this mean about the total mass of the atoms before the reaction and after the reaction?

3. List the matter and energy components that are in the system. Remember the system under investigation is the bubble filled with hydrogen gas, the flame, and the surrounding air in the room.



4. Develop a model to show that matter is conserved during this chemical reaction. Be sure to include all the components of an effective model.



5. Use the model to explain how the mass of the atoms compares before and after the reaction.

Assessment Rubric* - Question 1				
	Emerging	Developing	Approaching Proficiency	Excelling
Description of performance				
Sample student responses				

Assessment Rubric* - Question 2				
	Emerging	Developing	Approaching Proficiency	Excelling
Description of performance				
Sample student responses				

Insert additional Assessment Rubrics (if needed) here.