Lesson Question	Activity/Investigation	What did we learn from the activity/investigation?	How does it help us answer the essential question?
How does an airbag work?	Simulation Videos Initial Hypotheses List	We developed a hypothesis about how airbags work. The airbag is deployed as a reaction to a car accident. Something happens inside the bag to cause it to inflate, which protects the driver/passengers. Then the bag deflates once the driver/passenger hits it.	Developing initial hypotheses help us think about what variables may be involved in designing our own airbag.
How can we model how an airbag works?	Initial Model Gotta Have Checklist	We can use models to represent various scenarios over time, such as an airbag deploying after an accident. We can use a variety of symbols and drawings to make our models, and should include a zoomed in portion to represent unobservable processes.	In order to design our own airbag, we must have an idea of what the process looks like (initial model). The gotta have checklist helps us to think about what is essential to our model to help us explain the process.
What is the difference between a chemical and physical change?	Card Sort Gallery Walk	In a physical change, matter changes form but not chemical identity. In a chemical change, a chemical reaction occurs and new products are formed.	We know that a chemical reaction occurs within the airbag. Understanding the difference between a physical and chemical change allows us to think about what is being altered inside the airbag...for it to be a chemical reaction, the chemical identity has to change (new products are being formed)
Is matter conserved in a chemical reaction?	Closed vs. Open System Lab Investigation	In a chemical reaction, the mass of the reactants equals the mass of the products because matter can neither be created nor destroyed. (even if we can't see it--like when a gas is produced)	Even though we can't see what is going on inside the airbag, we know based on the Law of Conservation of Mass that the amount of reactants has to be equal to the amount of products in the reaction
What is a chemical reaction and how do we classify them?	Test Tube Demos Card Sort	A chemical reaction is a chemical change that occurs when two or more substances rearrange with each other to form a new substance with different properties. How to classify reactions into the 5 main types based on reactants and products. (combustion, single replacement, double replacement, synthesis, decomposition)	Defining a chemical reaction allows us to imagine what is happening on an unobservable level...these atoms are rearranged and form new substances with different properties inside the airbag. We are also able to classify our reaction as a decomposition reaction based on the reactants and products involved.

What is the significance of the coefficients in a balanced chemical equation?	PhET Balancing Chemical Equations Mole Ratio Practice	Chemical reactions can be represented by chemical equations. To satisfy mass conservation, chemical equations must be balanced (same number of each type of atom on the left side and the right side). (balancing chemical equations) The coefficients in a chemical equation specify the relative amounts in moles of each of the substances involved in the reaction. (mole ratios/conversions)	We are able to represent the chemical reaction on paper (in our initial models) now that we know how to use chemical equations and balance them correctly. We can then use the mole ratios to further represent how the reactants and products are related in the chemical reaction.
How can we modify or revise our initial models to better represent how an airbag works?	Model Revision Gallery Walk	We know that a decomposition reaction is occurring within the airbag, resulting in production of gas that inflates the bag. The atoms are rearranged to form products with different properties. We also know that based on the Law of Conservation of Mass, the amount of reactants equals the amount of products. Based on this law, we are able to balance the chemical equation representing our reaction, and we know the coefficients represent the mole ratios of substances involved.	Taking the time to revisit and revise initial models provides the opportunity to see how learning has changed over time.
What is stoichiometry and why is it important in chemistry ?	Sandwiches Stoichiometry Escape Room	Stoichiometry allows us to predict the amounts of product that will form in a chemical reaction based on the amounts of reactants that react. Similarly, it allows us to determine the amounts of reactants necessary to form a given amount of product.	In order to design our own airbags using actual reactants, we must know how to manipulate amounts of reactants/products to determine how much of something we need or will have in a specific reaction.
How can we determine the limiting and excess reactants in a chemical reaction?	Goody bags Stoichiometry of a Cookie Activity	Limiting reactant is the reactant that is completely consumed in the reaction and limits the amount of product. Excess reactant is any reactant that occurs in a quantity greater than is required to completely react with the limiting reactant.	For our airbag design, we need to know how our reactants are going to affect the inflation of the bag. What is going to limit how much gas is produced in our reaction?
How can we determine the theoretical, actual and percent yield using stoichiometric calculations?	Salt Recovery Lab	Theoretical Yield is the amount of product that can be made in a chemical reaction based on the amount of limiting reactant.	Knowing how to calculate the theoretical yield provides us with a reference for how much gas should be produced to inflate the bag. Therefore, if the amount of reactants needs to

		Actual yield is the amount of product actually produced by a chemical reaction. Percent yield is the percentage of the theoretical yield that was actually attained, which is calculated as the ratio of the actual yield to the theoretical yield.	change, we can calculate new theoretical yields before testing the design. We can also use the process of calculating actual yield to see if there are sources of error in our design.