

Lesson Topic: Chemical Reactions: Arrangements of Atoms

Objective:

Students will be able to:

1. Demonstrate that atoms are rearranged during chemical reactions.

Time Required: 60 minutes

Materials Needed:

- Scrabble tiles or cards with letters from the alphabet listed.
- Baggies for letters
- Blocks/tiles with compounds and elements labeled (per group)
 - 4 labeled H₂
 - 4 labeled O₂
 - 4 labeled O
 - 4 labeled C

Teacher Preparation:

- Assign a Legends of Learning Instructional [Quick Play](#) playlist for the lesson.
 - Instructional - Middle School - Chemical Reactions: Arrangements of Atoms
- Assign a Legends of Learning Content Review [Quick Play](#) playlist for after the lesson.
 - Content Review - Middle School - Chemical Reactions: Arrangements of Atoms
- Prepare bags of scrabble tiles or letter cut-outs for engagement activity.
- Create various blocks/tiles with the following labels and put in baggies (1 baggie per partner)
 - 4 labeled H₂
 - 4 labeled O₂
 - 4 labeled O
 - 4 labeled C

Engage (10 minutes):

1. Give pairs of students scrabble tiles and ask them to make as many words as possible with the tiles in 3 minutes. They should list these words on a piece of paper. Treat this as a competition to engage students.
2. After determining the class championship team for this activity, ask students to think of the elements from the Periodic Table as letters that when rearranged, make completely different substances with unique properties (just as when students rearranged the letters, they made different words with unique meanings).

Explore (10 minutes):

1. Have your students [sign in to Legends of Learning](#). Instruct students to complete the Instructional playlist.
2. Assist students as needed during game play, pause playlist if you need to address content or questions to the entire class.

Explain (15 minutes):

1. Have students pair up and provide each pair with a baggie of labeled blocks/tiles.
2. While walking students through each of the below chemical reactions, have students model the reactants and products using the blocks provided. Explain each reaction so that students understand what they are modeling and write the chemical equation on the board.
 - a. Examples:
 - i. Formation of water: $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$
 - ii. Formation of carbon dioxide: $2 \text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$
 - iii. Hydrogen peroxide: $2 \text{H}_2\text{O}_2 \rightarrow 2 \text{H}_2\text{O} + \text{O}_2$
3. Ask students what they notice about each of these reactions?
 - a. Students should respond that the atoms are moving around but not leaving the reaction.
 - b. Some students may recognize that the number of atoms is not changing.

Elaborate (5 minutes):

1. Explain to students that the matter in chemical reactions is not created or destroyed, simply moved around. When the atoms move around and form new substances, a chemical reaction has occurred.

Evaluate (20 minutes):

1. Have your students [sign in to Legends of Learning](#). Instruct students to complete the Content Review playlist.
2. [Analyze student results](#) to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a [custom playlist](#) with an [instructional game](#) and pre and post [assessment](#).
- To use Legends for a quick formative assessment, create a 5-question [assessment](#) in a [playlist](#).
- To use Legends for a student-directed experience, create a [targeted freeplay](#) playlist.
- Encourage students to play on their own at home in [Legends of Learning: Awakening](#) for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.