Goodness Gracious, Great Balls of Fire! - Research Project, Modified 5E

Chemical Reactions

Grade Level	9th – 11th Grade	**Time Frame**	125 minutes
Course	Chemistry, Physical Science	**Duration**	2-3 periods

Essential Question

What happens to atoms during chemical reactions?

Summary

This lesson is a basic introduction to setting up a chemical equation. This could be part of a unit for physical science and can be done as a refresher or opener in chemistry for chemical equations.

Snapshot

Engage

Students identify what they know about chemical reactions and watch a phenomenon on a reaction between a lit candle and water.

Explore

Students organize and decide reactants and products for various scenarios.

Explain

Students watch a video of the different types of reaction.

Extend

Students apply and demonstrate the different types of chemical reactions.

Evaluate

Students explain their understanding of matter flow in a reaction using the I Used to Think, But Now I Know strategy.

Standards

Oklahoma Academic Standards (Physical Science)

PS.PS1.7 : Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
PS.PS1.7.1: 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.

Attachments

- Bell Ringer & Exit Ticket Handout - Spanish.docx
- Bell Ringer & Exit Ticket Handout - Spanish.pdf
- Bell Ringer & Exit Ticket Handout.docx
- Bell Ringer & Exit Ticket Handout.pdf
- Chemical Equations Card Sort.docx
- Chemical Equations Card Sort.pdf
- Chemical Equations Chat Stations-Chemistry - Spanish.docx
- Chemical Equations Chat Stations-Chemistry - Spanish.pdf
- Chemical Equations Chat Stations-Chemistry.docx
- Chemical Equations Chat Stations-Chemistry.pdf
- Chemical Equations Chat Stations-Physical Science - Spanish.docx
- Chemical Equations Chat Stations-Physical Science - Spanish.pdf
- Chemical Equations Chat Stations-Physical Science.docx
- Chemical Equations Chat Stations-Physical Science.pdf
- Chemistry Chat Stations Cards - Spanish.docx
- Chemistry Chat Stations Cards - Spanish.pdf
- Chemistry Chat Stations Cards.docx
- Chemistry Chat Stations Cards.pdf
- Physical Science Chat Stations Cards - Spanish.docx
- Physical Science Chat Stations Cards - Spanish.pdf
- Physical Science Chat Stations Cards.docx
- Physical Science Chat Stations Cards.pdf
- RP 5E-Lesson Slides- Goodness Gracious, Great Balls of Fire! (2).pptx
- Types of Chemical Reactions Notes (Teacher)—Goodness Gracious, Great Balls of Fire.docx
- Types of Chemical Reactions Notes (Teacher)—Goodness Gracious, Great Balls of Fire.pdf
- Types of Chemical Reactions Notes - Spanish.docx
- Types of Chemical Reactions Notes - Spanish.pdf
- Types of Chemical Reactions Notes.docx
- Types of Chemical Reactions Notes.pdf

Materials

- Setup that allows videos and slideshows to be played for everyone to view
- Lesson Slides (attached)
- Bell Ringers & Exit Ticket handout (attached; one per student)
- Chemical Equations Card Sort (attached; one per group)
- Types of Chemical Reactions Notes (attached; one per student)
- Chemical Equations Chat Stations - Physical Science (attached; one per student)
- Chemical Equations Chat Stations - Chemistry (attached; one per student)
- 5 Molecular Model Kit

10 minutes

Engage

Teacher's Note: Setting up for the lesson

Before the lesson, print the attached **Chemical Equations Card Sort** and cut out the cards ahead of time for your groups. Printing the cards on heavier paper, such as card stock, and laminating them will ensure that they last longer than just this one lesson!

To assist with students staying on task you may consider using a countdown clock.

Use the attached **Lesson Slides** to follow along with the lesson. Begin with **slide 3.** Briefly, read aloud the essential question: *How are atoms conserved during a chemical reaction?* Then, move to **slide 4** and share the learning objectives with students to the extent you feel necessary.

Display **slide 5**. Start with the Bell Ringer strategy. Pass out the **Bell Ringer & Exit Ticket** handout. Ask students to write down three things they know about chemical reactions. After students have written their responses, place students with an Elbow Partner to share what they know and develop a group summary. Select one student from each group to share their summary. This is a good time to evaluate students' prior experience related to the topic

Have students save the handout to complete the Exit Ticket at the end of the lesson.

Teacher's Note

For the Bell Ringer, to boost students' confidence, remind them that they are simply writing whatever comes to mind when they hear the words *chemical reaction*, or just the word *chemical* or *reaction*. Inform students to remain quiet as everyone writes down their three points and assign elbow partners after all students have written their three points.

10 minutes

Explore

Scaffold students to remember the set up for a chemical reaction and write it on the board as they figure it out. Once students have given their final response, display **slide 6** to affirm where the reactants and products fall for an equation.

Organize students into groups of 3-4 and pass out the **Chemical Equations Card Sort cards**. Instruct students not to open their cards until after you've finished giving the instructions. Go to **slide 7**. Tell students that they will complete a Card Sort grouping the correct card and using them to create the correct equations for five scenarios. When they are finished, review the correct matches with the students by displaying slide **8-12**. First group to complete all 5 sets of the card sorts wins.

Teacher's Note: *Resist the Urge to Help*

Walk around the room and monitor students as they arrange the cards, but don't assist them with the Card Sort beyond sharing the basic instructions.

Transition to **slide 13-14** and have students use the QR code/link to complete the survey.

10 minutes

Explain

Move to **slide 16**, pass out the attached **Types of Chemical Reactions Notes handout** and have students take notes of the different types of reactions and examples. Invite students to watch Daisy Tarot's The 5 Different Types of Chemical Reactions video as they fill out their note catcher. When the video is over, give students 5 minutes to share their definition to one another in a group of 2-4. Finally call on a group to share out their definition for a reaction. The equation for single and double replacements are not mentioned in the video so have students double check that they have the equations from the video along with adding the two that are missing on **slide 17**.

Consider going over a few example problems provided on **slide 18**.

- Al2S3 -> 2Al + 3S (decomposition)
- C4H12 + 7O2->4CO2 +6H20 (combustion)
- 2NaOH + CuSO4-> Na2SO4 + CU(OH)2 (double replacement)

Have students use their fingers to show you which reaction they believe it is *1-synthesis*, *2-decomposition*, *3-combustion, 4-single replacement, 5-double replacement.* Quickly assess student responses and then call on one student to say which reaction and why they choose it.

15 minutes

Extend

Physical Science Option Prep work

Choose an example of each of the 5 types of reaction from **Physical Science Chat Station Cards**, CK-12 1.4 Types of Chemical Reactions, or any other resource you may have. Place only the name of the reaction and the reactants on the sheet with a corresponding answer to another example. Post each example in different locations on the wall around the room.

Physical Science Instructions: Display **slide 19**. Invite students to participate in the Chat Stations strategy. Move students into groups of 3-5, make copies and pass out the **Chemical Equations Chat Stations-Physical Science** handout. Assign each group a station to start their first example. Inform students to discuss within their group the correct type of reaction and add it to their handout along with writing down the equation. Inform students that they can try to figure out how to balance the equation for extra credit if they so choose. Students will use the product they come up with to determine the next station to go solve.

Chemistry Option Prep work

Choose an example of each of the 5 types of reaction from **Chemistry Chat Station Cards,** CK-12 1.4 Types of Chemical Reactions or any other resource you may have. Supply the correct number of atoms and bonds for each station from the **Molecular Model Kit**. Provide students with written reactant(s) for each station. You may consider making 2 sets of the 5 stations for larger class sizes.

Chemistry Instructions: Display **slide 20**. Invite students to participate in the Chat Stations strategy. Move students into groups of 4, make copies and pass out the **Chemical Equations Chat Stations-Chemistry** handout. Assign each group a station to start their first example. Inform students they will have 5 minutes at their station to discuss within their group the correct product for the reactant(s) they have and to use the molecular model kit to create a representation of the Lewis Dot structure of the product(s). Finally, have students write down the full equation and disassemble the molecular model's **products only** for the next group. Students can balance the equation on their handout for extra credit, if they wish. Once time is called, have students move to the next station.

Teacher's Note

You may consider going over the 1st station with students as you give them the instructions before releasing them and their group on their own.

As students rotate through the stations, walk around and facilitate discussions. Note areas of disagreement or key points and identify any misconceptions. When the time has run out, inform students to wrap up the practice problem they are on if they aren't finished yet and move to the exit ticket.

Chemistry Option

If you don't have the kit, then have students complete figuring out the product(s) and balance the equation at their stations.

5 minutes

Evaluate

Move to **slide 21.** Instruct students to return to their **Bell Ringer & Exit Ticket** from the beginning of the lesson. Have students complete the I Used to Think... But Now I Know activity comparing what they used to think about chemical reactions. Instruct them to include their opinion on the Essential Questions posed at the beginning: *What happens to atoms during chemical reactions?*

Transition to **slide 22-23** and have students use the QR code/link to complete the survey.

Resources

- Flexbooks 2.0. (2022, Aug 8). CK-12 CBSE Chemistry class. https://flexbooks.ck12.org/cbook/cbse-chemistry-class-10/section/1.4/primary/lesson/combination-reactions/
- K20 Center. (2020, Sept 16). Bell ringers and exit tickets. Strategies. https://learn.k20center.ou.edu/strategy/125
- K20 Center. (2020, Sept 16). Card sort. Strategies. https://learn.k20center.ou.edu/strategy/147
- K20 Center. (2021, April 14). Chat Stations. Strategies. https://learn.k20center.ou.edu/strategy/944
- K20 Center. (2020, Sept 16). Elbow partners. Strategies. https://learn.k20center.ou.edu/strategy/116
- K20 Center. (2020, Sept 16). I used to think . . . but now I know. Strategies. https://learn.k20center.ou.edu/strategy/137
- Tarot, Daisy. (2017, June 8). *The 5 Different Types of Chemical Reactions*. [Video] *YouTube*. https://www.youtube.com/watch?v=92XUa76AZ6c&t=2s