



NASA Spotlite Interactive Lesson

Evidence of Chemical Change

Grades 5-8

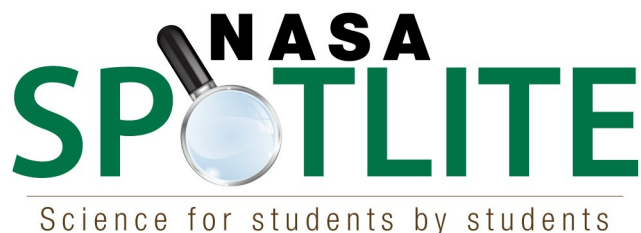


Image Credit: NASA/JPL-Caltech

Student Packet



NASA Spotlight Interactive Lesson



What are NASA Spotlights?

NASA Spotlights are 90-120 second student-produced video segments that address common science misconceptions.

NASA Spotlights are designed to increase scientific literacy in a standards-based classroom. By producing Spotlight videos, students gain production experience, as well as deepen their understanding of science content. Approved NASA Spotlights can be found at the NASA eClips website. <https://nasaclips.arc.nasa.gov>



A misconception is a view or opinion that is incorrect because it is based on faulty thinking or understanding.

This is an Interactive PDF. Features in this packet may include:

- fillable boxes
- quick checks
- multiple choice questions
- interactive GIFs (graphics interchange format)
- links to videos and online interactives

The hyperlinks included in this document open PDFs or webpages and may perform differently based on the device being used. Links may have to be cut and pasted into a web browser to open. PDFs and other documents may need to be downloaded to view.

Try using Adobe Acrobat Reader and Flash Player for optimal performance of all interactive features included in this guide.



Save



Remember to save your responses. Under "file" choose "save as." Type your name in front of the document name. Choose "save."

Pretest

NASA Spotlight Interactive Lesson: Evidence of Chemical Change

Read each question and select the best choice.

1. Which of these does NOT happen during a chemical change?
 1. The color of the substance changes.
 2. The substance has a new odor.
 3. The substance has a new shape.
 4. The substance has a new mass.
2. Which shows evidence that a chemical change has occurred?
 1. A piece of wood is cut into smaller pieces.
 2. A piece of paper is crumpled.
 3. A piece of metal is bent.
 4. A piece of paper is burned.
3. All of the following are evidence of a chemical change EXCEPT-
 1. A change in color.
 2. A change in temperature.
 3. A change in mass.
 4. A change in shape.
4. Which of the following observations is the best indicator that a new substance has been formed?
 1. A change in color.
 2. A change in temperature.
 3. A change in mass.
 4. A change in shape.
5. Which of the following examples shows that a chemical reaction has occurred?
 1. A piece of wood is cut into smaller pieces.
 2. A piece of paper is crumpled.
 3. A piece of metal is bent.
 4. A piece of paper is burned.
6. You write a note using invisible ink made from lemon juice that is clear when it dries on paper. The invisible ink turns brown when a burning candle is held under the paper. Once it is heated, the ink never becomes invisible again. What type of change is occurring when the paper is heated?
 1. A physical change.
 2. A chemical change.
 3. A change in color.
 4. A change in temperature.
7. Which of the following characteristics is shared by all chemical reactions?
 1. A change in color.
 2. A change in temperature.
 3. A change in mass.
 4. A change in shape.
8. Which of the following is an example that includes evidence of a chemical reaction?
 1. A piece of wood is cut into smaller pieces.
 2. A piece of paper is crumpled.
 3. A piece of metal is bent.
 4. A piece of paper is burned.
9. Which of the following is NOT an example of a chemical change?
 1. A piece of wood is cut into smaller pieces.
 2. A piece of paper is crumpled.
 3. A piece of metal is bent.
 4. A piece of paper is burned.

Engage

Today's Lesson

In today's lesson you will learn about the characteristics of chemical changes. The activities you will participate in will let you explore and develop an understanding of the chemical process of rusting and the factors that affect rusting. Using the interactive Frayer Models, you will learn key vocabulary that will help you explain why Mars is red.

What do you already know about the color of Mars?
What do you already know about chemical change and physical change?
What happens to metals during a chemical change?

True or False

Mars is red because of its temperature.

NASA Spotlight Video

Next you will watch this clip about Mars' surface. As you watch this video, identify a misconception about Mars.

NASA Spotlight: Evidence of Chemical Change



NASA eClips Website Link: TBD

NASA eClips YouTube link: <https://youtu.be/CVleZuNRxks>

Class Discussion

Use these questions to lead the class in a discussion.

1. What do you already know about the color of Mars?
2. Recreate the demonstration. What were your results? Were they the same as those of Charlotte?

Explore

Explore Activities

Next, you will complete some activities to explore chemical change.

Review instructions and safety rules for each station. Record your observations.

Activity 1 - Observe what happens to sliced apples when exposed to air.

1. Slice a piece off an apple. Does slicing an apple change the apple into a different substance?
2. Leave the sliced apple's flesh exposed to air.
3. Make and record observations after 15 minutes.

Activity 2 - Test the effect of heat on dried lemon juice.

1. Squeeze the juice from half a lemon into a cup and add a few drops of water.
2. Dip a cotton swab or paintbrush into the lemon juice and water solution and write a word on a piece of white paper.
3. Let the paper dry. Can you read the word?
4. Hold the paper over a hot incandescent bulb.
5. Make and record observations.

Activity 3 - Test the effect water, air and vinegar have on steel wool.

1. Label 3 clear cups. On the first cup write water, on the second cup write the word vinegar, and on the third write air.
2. Add 50 mL of water to the water cup and 50 mL of vinegar to the vinegar cup.
3. Submerge a piece of steel wool into each cup.
4. Make and record observations after 20 minutes, and again after an hour, and the next day.

Activity 4 - Test the effect of combining baking soda and vinegar.

1. Put 3 tablespoons of baking soda into a round balloon that is not inflated.
2. Add 1/4 cup of vinegar into an empty water bottle.
3. Attach the balloon to the mouth of the plastic bottle, then lift the balloon upright so the baking soda falls into the water bottle.
4. Make and record observations.

Think-Pair-Share

1. How did the activities demonstrate chemical change?
2. Which of the activities would help to correct the misconception that Mars is red because it is hot? How does the demonstration debunk this misconception?

Wear safety goggles when completing the activities.
Vinegar and lemon juice can damage certain materials. Place materials on plastic trays.

Explain

Mars in a Minute: Is Mars Red Hot?

Watch this video to learn about the temperature on Mars.

Mars in a Minute: Is Mars Red Hot?



https://mars.nasa.gov/resources/20100/mars-in-a-minute-is-mars-red-hot/?utm_source=canva&utm_medium=iframely

Mars in a Minute: Is Mars Really Red?

Watch this video to learn about the color of Mars.

Mars in a Minute: Is Mars Really Red?



<https://mars.nasa.gov/resources/20029/mars-in-a-minute-is-mars-really-red/>

Resources

Frayer Model for Vocabulary Development

Use the graphic organizer to write definitions, characteristics, examples and non-examples for a vocabulary word. You can include drawings, graphics, and diagrams.

The graphic organizer is a central diamond shape with four quadrants. The top-left quadrant is labeled 'Definitions' and has a green border. The top-right quadrant is labeled 'Characteristics' and has a yellow border. The bottom-left quadrant is labeled 'Examples' and has a blue border. The bottom-right quadrant is labeled 'Non-examples' and has a red border. The central diamond is outlined in black.

Elaborate / Extend

NASA CONNECTION

Could rust form on Earth's Moon?

NASA's Lunar Reconnaissance Orbiter (LRO) found iron and titanium oxides under the surface of the Moon. The Moon's highlands have rocks with smaller amounts of metal-bearing minerals like those found on Earth.

The Moon's atmosphere is thin and weak. Unlike Earth's atmosphere, the atmosphere on the Moon does not provide any protection from the Sun's radiation or impacts from meteoroids.

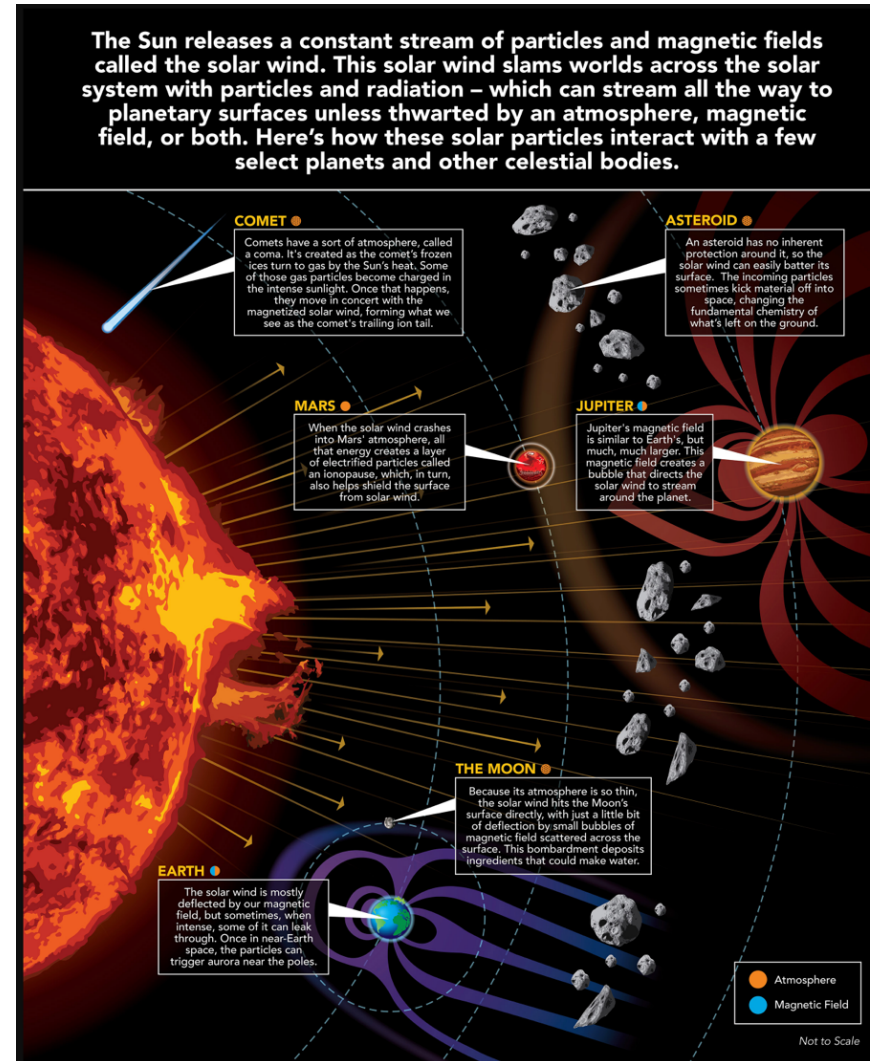
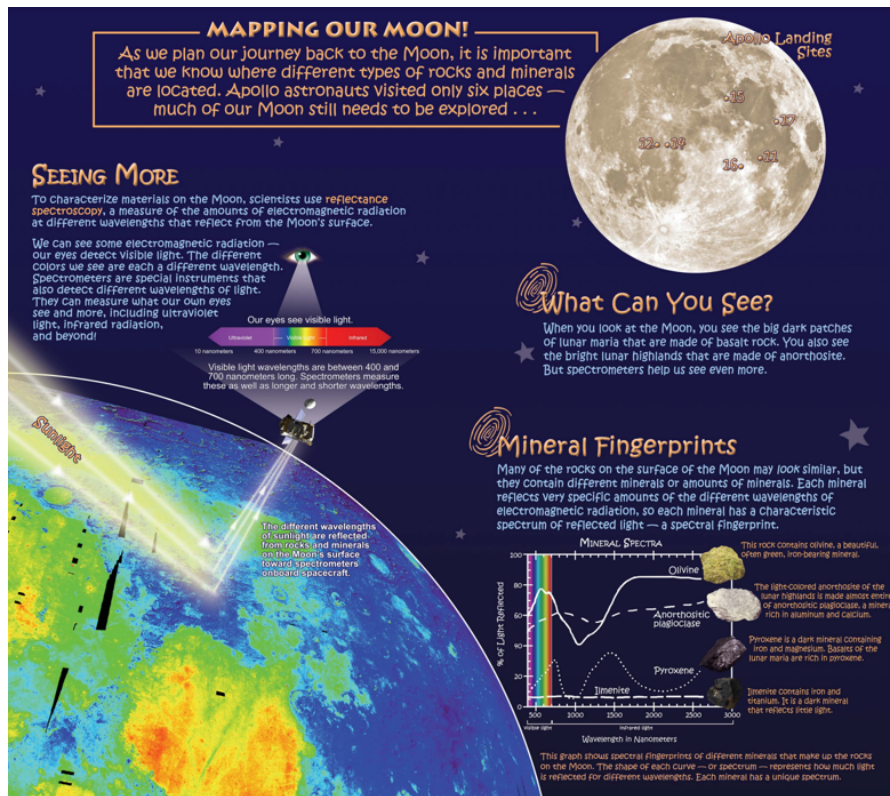


Figure 1 Link to Our Moon in a New Light poster -

<https://www.lpi.usra.edu/education/moonPosters/Poster2/poster-2-frontfull-508.pdf>

Figure 2 Image Credit: NASA's Goddard Space Flight Center/Mary Pat Hrybyk-Keith -

https://www.nasa.gov/sites/default/files/thumbnails/image/solar_w_ind_infographic_final.jpg

Use your knowledge about the chemical change process that forms rust on Mars to determine if it is possible for rust to form on the Moon.

Evaluate

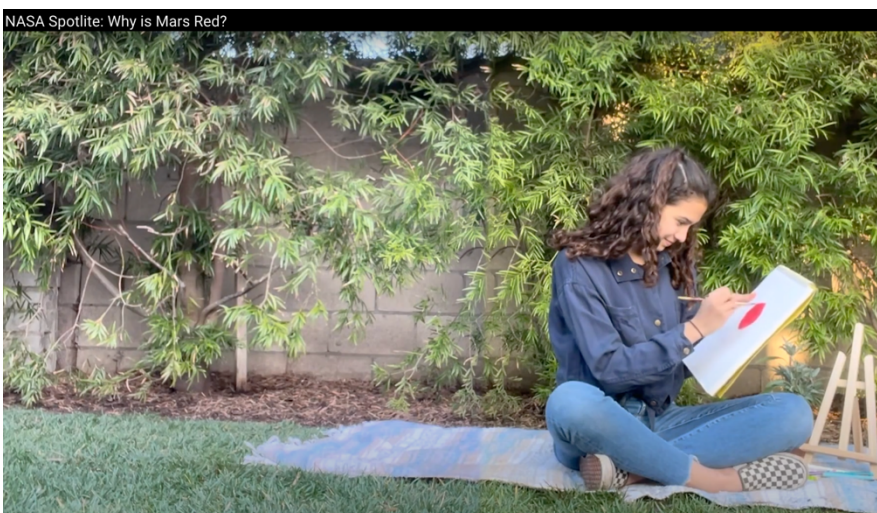
Identify Misconception

What is a common misconception people have about the color of Mars?

NASA Spotlight Video

Carefully re-watch the NASA Spotlight video about Mars. Create an illustration or multimedia presentation to show the rusting process.

NASA Spotlight: Why is Mars Red?



NASA eClips Website Link: TBD

NASA eClips YouTube link: <https://youtu.be/CVleZuNRxks>

Vocabulary Review

Using your new vocabulary words and illustrations, explain what happens to metals during a chemical change.

- rust
- chemical changes
- changed
- oxygen
- water
- reacts
- iron
- oxidation

_____ occur when one substance with a certain set of properties is _____ into a different substance with different properties. _____ is a new substance formed when _____ and _____ from the air react with _____. This process is called _____.

Resources

Vocabulary Words

chemical change

-a chemical reaction forms new products that may be identified by color, odor or temperature

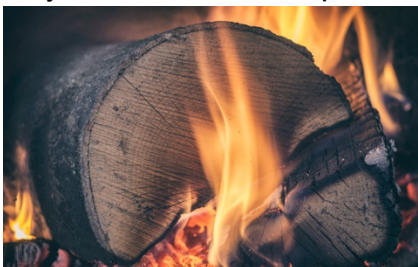


Image credit: Free Stock Photo

oxidation

-occurs when an atom, molecule, or ion loses one or more electrons in a chemical reaction



Image credit: canva.com

reaction

-process that leads to the chemical transformation of one set of chemical substances to another



Image credit: Nasky, Shutterstock.com

corrosion

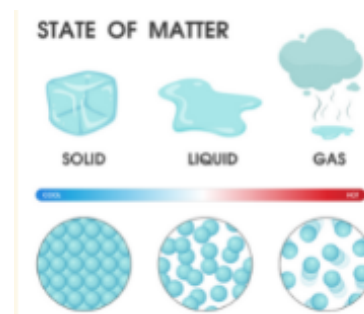
-breakdown of materials due to chemical reactions



Image credit: OSweetNature, Shutterstock.com

physical change

-matter changes form but not its chemical identity



rust

-rust forms when iron and oxygen react in the presence of water or moisture in the air



Image credit: OSweetNature, Shutterstock.com

Posttest

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 2. The substance has a new odor.
 3. The substance has a new shape.
 4. The substance has a new color.
2. Which shows evidence that a chemical change has occurred?
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Product Information

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