



This is a resource from CPALMS (www.cpalms.org) where all educators go for bright ideas!
Resource ID#: 125968

Primary Type: Lesson Plan

Pure Substances, Mixtures and Solutions, Oh My!

This lesson will assist students in distinguishing between pure substances and mixtures. Students will be able to identify elements and compounds as examples of pure substances. Students will also be able to distinguish between homogeneous (solutions) and heterogeneous mixtures.

Subject(s): Science

Grade Level(s): 8

Intended Audience: [Educators](#)

Suggested Technology: Document Camera, Computer for Presenter, LCD Projector

Instructional Time: 1 Hour(s) 30 Minute(s)

Keywords: pure substance, mixture, homogeneous mixture, heterogeneous mixture

Instructional Component Type(s): [Lesson Plan](#), [Assessment](#), [Presentation/Slideshow](#)

Resource Collection: FCR-STEMLearn Physical Sciences

ATTACHMENTS

[Presentation_Pure_Substances_Mixtures_and_Solutions_Oh_My.pptx](#)

[PureSubstancevsMixtureQuizandAnswerKey.docx](#)

LESSON CONTENT

Lesson Plan Template: General Lesson Plan

Learning Objectives: What should students know and be able to do as a result of this lesson?

Students will be able to distinguish between pure substances and mixtures, including solutions.

Prior Knowledge: What prior knowledge should students have for this lesson?

Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process. (SC.5.P.8.2)

Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. (SC.5.P.8.3)

Guiding Questions: What are the guiding questions for this lesson?

The guiding question for this lesson will be: "What is the difference between a pure substance and a mixture?" Possible student answers include, but are not limited to:

- A mixture is a combination and a pure substance is not.
- A pure substance (compounds) cannot be physically separated, but a mixture can.
- Mixtures are not chemically combined, but pure substances can be.
- A solution is an example of a mixture.
- There are two types of mixtures: heterogeneous mixtures and homogeneous mixtures.
- Elements and compounds are both examples of pure substances.

Teaching Phase: How will the teacher present the concept or skill to students?

The concept will be presented to the students through a PowerPoint presentation and a Lego demonstration.

Slides 8 - This slide will act like a signal to begin the Lego demonstration.

Step 1: Grab a single colored Lego.

- Explain to the students that this single colored Lego represents an element.
- This is an example of an element (pure substance).

Step 2: Grab four more of the same colored Legos.

- Explain to the students that this is an example of a pure substance because the Legos are uniform and cannot be physically separated.
- This is still an example of an element (pure substance).

Step 3: Grab three Legos of different colors than in step 1 and mix them together.

- Ask the students if this is still an example of a pure substance.
- Explain to the students that this has become a mixture because it is no longer uniform (two different colored Legos are now present) and it can be physically separated (into the two different color groups).
- This is an example of a mixture of elements.

Step 4: Create one compound by connecting two blue Legos and one white Lego.

- Explain to the students that this is an example of a compound and that compounds are also examples of pure substances.
- This is an example of a compound (pure substance).

Step 5: Create three more of the same compounds as in step 4 and mix them together.

- Ask the students if this is an example of a pure substance or a mixture.
- Explain to the students that since the compounds are uniform and cannot be separated into different compounds that it is still considered a pure substance.
- This is still an example of a compound (pure substance).

Step 6: Create two compounds by connecting two orange Legos and two green Legos together and mix them together with the compounds from step 5.

- Ask the students if this is an example of a pure substance or a mixture.
- Explain to the students that this has become a mixture because it is no longer uniform (two different patterned compounds are now present) and it can be physically separated (into the two different patterned groups).
- This is an example of a mixture of compounds.

Step 7: Combining the elements and compounds created in steps 1-6 together.

- Ask the students if this is an example of a pure substance or a mixture.
- Explain to the students that this is a mixture because it is not uniform (it has different types of elements and compounds) and it can be physically separated (into the different element and compound groups).

Step 8: Continue steps 1-7 to provide further examples of this abstract concept, until the students begin feeling comfortable with the concept. Then proceed to the next few slides to test their understanding.

Guided Practice: What activities or exercises will the students complete with teacher guidance?

Students will be presented information via a PowerPoint presentation and Lego demonstration and will complete practice questions.

Independent Practice: What activities or exercises will students complete to reinforce the concepts and skills developed in the lesson?

Students will make their own Lego models to create examples of pure substances and mixtures. This will occur after the teacher provides examples of each category during the Lego demonstration.

The students will use the Legos to make examples of the following:

- **Elements** -
 - For example: Utilizing 1 single colored Lego.
- **Compounds** -
 - For example: Connecting two Legos of a single color and one Lego of another color.
- **Mixtures of Elements** -
 - For example: Mixing multiple colored Legos (none of which are connected together)
- **Mixtures of Compounds** -
 - For example: Connecting two Legos of a single color and two Legos of another color. Then mix this creation together with the previously created compound.
- **Mixtures of Elements and Compounds** -
 - For example: Combine the elements and compounds created in the previous steps.

Closure: How will the teacher assist students in organizing the knowledge gained in the lesson?

Students will complete the "Summary Graphic Organizer" on slide 40-42 after the lesson is complete to organize the knowledge gained in the lesson.

- **Slide 40-41** - This provides the teacher and student a chance to see if they can distinguish between pure substances and mixtures.
- **Slide 42** - This slide gives the students a final chance to conduct a self-assessment on whether or not they feel that they understand the concept.

Summative Assessment

A mini quiz will be issued next class assessing student ability to successfully distinguish between pure substances and mixtures. The mini quiz and answer key can be located in the attachments.

Formative Assessment

The teacher will use the PowerPoint presentation to conduct the formative assessment. The "Elements, Compounds and Mixtures" practice questions on slides 10-14 and the "Real Life Examples" practice questions on slide 16-27 will serve as formative assessments to check student understanding and gauge if further assistance is needed.

Feedback to Students

Student feedback will occur during the teaching phase and while monitoring student completion of the "Elements, Compounds and Mixtures" practice questions and the "Real Life Examples" practice questions.

ACCOMMODATIONS & RECOMMENDATIONS

Accommodations:

Review student IEPs to obtain appropriate individual accommodations corresponding to this lesson. However, general accommodations would include:

- Extended time; and
- Small groups/collaborative groups

Extensions:

A possible extension of this lesson would involve having students come up with their own explanation of the differences between pure substances and mixtures and examples of each.

Suggested Technology: Document Camera, Computer for Presenter, LCD Projector

Special Materials Needed:

Teaching Phase:

- Presentation - Pure Substances, Mixtures and Solutions - Oh My!

Lego Demonstration:

- Legos of Various Colors

Summative Assessment:

- Mini Quiz
- Answer Key

Further Recommendations:

Procedures:

Guided Question: The teacher will begin by asking the class to orally answer the following guided question: "What is the difference between a pure substance and mixtures?"

PowerPoint Presentation: The teacher will then begin the lesson using the prepared PowerPoint presentation:

- **Slides 1-7** - These slides are to be utilized during the teaching phase. They provide characteristics of pure substances, homogeneous mixtures, heterogeneous mixtures and solutions. This will provide students with background information needed to successfully understand the benchmark.

Lego Demonstration

- **Slides 8** - This slide will act like a signal to begin the Lego demonstration.
 - Step 1: Grab a single colored Lego.
 - Explain to the students that this single colored Lego represents an element.
 - This is an example of an element (pure substance).
 - Step 2: Grab four more of the same colored Legos.
 - Explain to the students that this is an example of a pure substance because the Legos are uniform and cannot be physically separated.
 - This is still an example of an element (pure substance).
 - Step 3: Grab three Legos of different colors than in step 1 and mix them together.
 - Ask the students if this is still an example of a pure substance.
 - Explain to the students that this has become a mixture because it is no longer uniform (two different colored Legos are now present) and it can be physically separated (into the two different color groups).
 - This is an example of a mixture of elements.
 - Step 4: Create one compound by connecting two blue Legos and one white Lego.
 - Explain to the students that this is an example of a compound and that compounds are also examples of pure substances.
 - This is an example of a compound (pure substance).
 - Step 5: Create three more of the same compounds as in step 4 and mix them together.
 - Ask the students if this is an example of a pure substance or a mixture.
 - Explain to the students that since the compounds are uniform and cannot be separated into different compounds that it is still considered a pure substance.
 - This is still an example of a compound (pure substance).
 - Step 6: Create two compounds by connecting two orange Legos and two green Legos and mix them together with the compounds from step 5.

- Ask the students if this is an example of a pure substance or a mixture.
 - Explain to the students that this has become a mixture because it is no longer uniform (two different patterned compounds are now present) and it can be physically separated (into the two different patterned groups).
 - This is an example of a mixture of compounds.
- Step 7: Combining the elements and compounds created in steps 1-6 together.
 - Ask the students if this is an example of a pure substance or a mixture.
 - Explain to the students that this is a mixture because it is not uniform (it has different types of elements and compounds) and it can be physically separated (into the different element and compound groups).
- Step 8: Continue steps 1-7 to provide further examples of this abstract concept, until the students begin feeling comfortable with the concept. Then proceed to the next few slides to test their understanding.

Elements, Compounds and Mixture Practice Questions

- Slides 9-14 - These slides will serve as a "wellness check" to see if the students understood the Lego demonstration.
- Slide 15 - This slide gives the students a chance to conduct a self-assessment on whether or not they feel that they understand the abstract concept.

Real Life Examples Practice Questions

- Slides 16-27 - These slides will be used as a formative assessments. The previous formative assessment assessed student understanding of the abstract concept of elements, compounds and mixtures. This formative assessment will assess if students are able to apply that abstract knowledge into real life examples.
- Slides 28-38 - These slides will be used to review the answers to the formative assessment. This will be a chance for the teacher to provide student feedback on why an answer is correct or incorrect.
- Slide 39 - This slide gives the students another chance to conduct a self-assessment on whether or not they feel that they understand the concept.

Summary Graphic Organizer

- Slide 40-41 - This provides the teacher and student a chance to see if they can distinguish between pure substances and mixtures.
- Slide 42 - This slide gives the students a final chance to conduct a self-assessment on whether or not they feel that they understand the concept.

SOURCE AND ACCESS INFORMATION

Contributed by: Sandy Leung

Name of Author/Source: Sandy Leung

District/Organization of Contributor(s): Broward

Access Privileges: Public

License: [CPALMS License - no distribution - non commercial](#)

Related Standards

| Name | Description |
|-----------------------------|--|
| SC.8.P.8.9: | Distinguish among mixtures (including solutions) and pure substances. Remarks/Examples: Pure substances include elements and compounds. Mixtures are classified as heterogeneous (mixtures) or homogeneous (solutions). Methods for separating mixtures include: distillation, chromatography, reverse osmosis, diffusion through semi-permeable membranes. |