

Structure and Properties of Matter: Instructional Segment (part 3 of 3)

Periodic Table	
This instructional segment looks at the patterns of elements on the Periodic Table	
Student Science Performance	
Grade 8 th Grade	Title: Periodic Table
Topic: Periodic Table	
Performance Expectation	
<p>S8P1. Obtain, evaluate, and communicate information about the structure and properties of matter. e. Develop models (e.g., atomic-level models, including drawings, and computer representations) by analyzing patterns within the periodic table that illustrate the structure, composition, and characteristics of atoms (protons, neutrons, and electrons) and simple molecules.</p>	
Lesson Performance Expectations:	
Develop models to look at patterns of elements on the Periodic Table.	
Additional notes on student supports	
<u>Engaging Learners</u>	<p>Student Science Performances</p> <p><i>Phenomenon- What Element Did You Eat for Breakfast? (Teacher shows one page of collage.)</i></p> <p style="text-align: center;"><u>What Did You Eat for Breakfast?</u></p> <p>Gathering Students will view the collage on elements of the periodic table entitled “What Element Did You Eat for Breakfast? Student view the various pictures of breakfast food and predict what element from the Periodic Table that might be in that food.</p> <p><i>(Teacher Hints)</i></p> <ol style="list-style-type: none"> 1. Teacher shows the second page of the collage and notes the elements and symbols that students would find on the Periodic Table such as Ca, K, Na, Mg, & Fe. 2. Teachers can search Google for an interactive website that shows actual samples of the elements of the Periodic Table or several songs such as “The Elements”, “Meet the Elements”, and “The New Periodic Table song” that shows the practical applications of the elements. <p>Reasoning Students discuss their own breakfast and what other elements from the Periodic Table that they may have consumed. Or, another engaging example is provided by the Mineral Education Coalition that engages students in determining the elements and minerals in their cell phones.</p> <p>Communicating Students describe and record their own breakfast and what other elements from the Periodic Table that they may have consumed.</p>
<u>Exploring</u>	Gathering

	<p>Students in pairs or teams of three use the following simulation from PhET to model atoms of elements: Build and Atom (Attribution: PhET Interactive Simulations, University of Colorado Boulder; https://phet.colorado.edu)</p> <p>Student directions: Using the Periodic Table Elements- Data Collection Students will use the simulation and directions to draw models, drawings, or graphic organizer that illustrates structure, composition and characteristics an atom of the element.</p> <p>Reasoning Students will discuss with partners any patterns noted from their models.</p> <p>Communicating Students will individually analyze and describe any patterns from their models.</p> <p>Students will provide a written explanation for patterns noted in different groups/columns of the periodic table.</p>
<u>Explaining</u>	<p>Communicating Students will provide a written explanation for patterns noted in different groups/columns of the periodic table.</p>
<u>Elaborating</u>	Using a blank Periodic Table (examples can be found online), students could develop their own labeling and coloring of the different aspects of the table such uses of each element, states such as solid, liquid, gas, group and families, increasing reactivity.
<u>Evaluation</u>	<p style="text-align: center;">Assessment of Student Learning</p> <ul style="list-style-type: none"> - Student development of model, drawings, or graphic organizer. - Students provide a written narrative that describes patterns noted from model development.
<i>SEP, CCC, & DCI Featured in Lesson</i>	Science Essentials
Science Practices	<ul style="list-style-type: none"> - Developing and using models - Analyzing and interpreting data - Constructing explanations (science) - Engaging in argument from evidence - Obtaining, evaluating, and communicating information
Crosscutting Concepts	Structure and Function Systems and System Models
Disciplinary Core Ideas	From A Framework for K-12 Science Education :
	<p>By the end of grade 8 PS1.A: STRUCTURE AND PROPERTIES OF MATTER</p>

- All substances are made from some 100 different types of atoms, which combine with one another in various ways.
- Atoms form molecules that range in size from two to thousands of atoms.
- Pure substances are made from a single type of atom or molecule
- Pure substances are made from a single type of atom or molecule
- Each pure substance has characteristic physical and chemical properties that can be used to identify it.
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- Liquids are constantly in contact with each other.
- Gases are widely spaced except in collisions.
- Solids are closely spaced atoms and vibrate in position.
- Changes of state occur with variations in temperature or pressure.

PS1.B: CHEMICAL REACTIONS

- Substances react chemically.
- In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.
- The total number of each type of atom is conserved and this mass does not change.
- Some chemical reactions release energy, others store energy.

PS3.D: ENERGY IN CHEMICAL PROCESSES AND EVERYDAY LIFE

- Plants and animals require an energy input from chemical reactions involving digestion and respiration.

Additional Supports for struggling learners:

The following supports are suggestions for this lesson and are not the only options to support students in the classroom. These supports target students that struggle with science material, this lesson or a previous lesson. These are generalized supports and do not take the place of IEP accommodations as required by each student’s Individualized Education Program.

General supports for the following categories:

<p><u>Reading:</u></p> <ol style="list-style-type: none"> 1. Provide reading support by reading aloud or doing partner reads 2. Have the teacher model what they are thinking when reading the text 3. Annotate the text with students so that they may refer to it as they work through the lab 	<p><u>Writing:</u></p> <ol style="list-style-type: none"> 1. The teacher can provide a sentence starter for the students. 2. The teacher can give students an audience to write to (i.e. Write a letter to your sibling explaining this topic). 3. The teacher can provide constructive feedback during the writing process to help students understand the expectations. 	<p><u>Math:</u></p> <ol style="list-style-type: none"> 1. Aid in analyzing patterns.
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Supports for this specific lesson if needed:

Performance expectations for instruction:

1. The teacher should provide information to students in various formats to reach as many students as possible.
2. The students should be given adequate time to complete each part of the lesson.
3. The students should be allowed to express their knowledge in various formats.
4. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material.

Engage:

1. Struggling students may benefit from help choosing a food to research.
2. The teacher can refer to part 2 of this lesson to help students remember how they are researching food and looking at the atoms that make up food.
3. This lesson contains some information in the teachers note available in this section that teachers can use to show students the material in multiple formats.
4. Having students do research on their phones can be beneficial. However, it may benefit some students to have a computer available with the website up as well. Some students may not have phones, or they may benefit from having bigger text.
5. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. These formats could include writing, drawing or designing a play.

Exploring:

1. The teachers should use intentional grouping to get students into small groups. Best practice is to use data to drive the grouping of students.
2. The teacher should be sure to give the data collection sheet that goes along with this PhET lab. (Attribution: PhET Interactive Simulations, University of Colorado Boulder; <https://phet.colorado.edu>)
3. The teacher should repeat directions as needed.
4. Students may need additional time to construct their models.
5. The teacher should have guidelines and rules for discussion. This will ensure that all students feel safe and are able to participate in the discussion.
6. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. These formats could include writing, drawing or designing a play.

Explaining:

1. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. These formats could include writing, drawing or designing a play.

Elaborating:

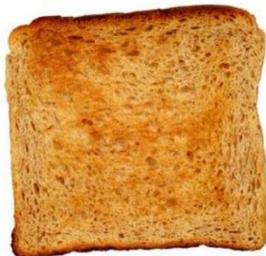
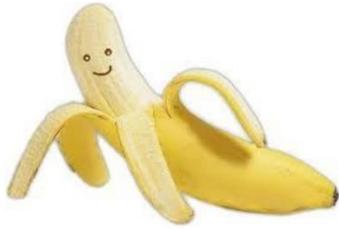
1. The teacher can have students brainstorm ways that they can label the periodic table and make a list on the board. This will give struggling students assistance and cut down on anxiety when looking at a blank periodic table.

Evaluating:

1. Students should be allowed to express their knowledge in various ways. This could include writing, drawing a cartoon, designing a play or making a power point.

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What Element Did You Eat for Breakfast?




Nutrition Facts		protein plus	
Serving Size 1/4 Cup (29g) (oz.)		Serving Size 1/4 Cup (29g) (oz.)	
Servings Per Container About 13		Servings Per Container About 13	
Amount Per Serving		Amount Per Serving	
Calories	100	Calories	142
Calories from Fat	30	Calories from Fat	30
Total Fat 3g*	5%	Total Fat 3g*	5%
Saturated Fat 0.5g	1%	Saturated Fat 0.5g	1%
Trans Fat 0g	0%	Trans Fat 0g	0%
Cholesterol 0mg	0%	Cholesterol 0mg	0%
Sodium 110mg	9%	Sodium 110mg	18%
Potassium 300mg	9%	Potassium 300mg	18%
Total Carbohydrate 14g	8%	Total Carbohydrate 14g	7%
Dietary Fiber 5g	10%	Dietary Fiber 5g	20%
Sugars 4g	8%	Sugars 4g	8%
Other Carbohydrate 7g	14%	Other Carbohydrate 7g	14%
Protein 10g	20%	Protein 10g	20%
Vitamin A	25%	Vitamin A	25%
Vitamin C	25%	Vitamin C	25%
Calcium	25%	Calcium	25%
Vitamin E	25%	Vitamin E	25%
Iron	25%	Iron	25%
Folate	25%	Folate	25%
Niacin	25%	Niacin	25%
Thiamin	25%	Thiamin	25%
Vitamin B6	25%	Vitamin B6	25%
Vitamin B12	25%	Vitamin B12	25%
Vitamin K	25%	Vitamin K	25%
Vitamin D	25%	Vitamin D	25%

What Element Did You Eat for Breakfast?



Potassium, Sodium, Magnesium, Iron



Calcium, Iron, Potassium



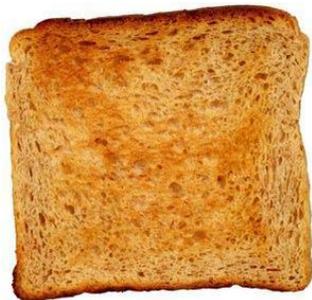
Potassium, Sodium, Calcium, Magnesium, Iron



Calcium, Iodine, Phosphorus, Potassium



Potassium, Sodium, Calcium, Magnesium, Iron



Potassium, Sodium, Calcium, Magnesium, Iron

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Periodic Table Elements- Data Collection

Directions:

1. With a partner, use the following simulation: [Build an Atom](#)
(Attribution: PhET Interactive Simulations, University of Colorado Boulder; <https://phet.colorado.edu>)
2. Students will also need a textbook Periodic Table or a web based such as [The Photographic Periodic Table](#) which depicts actual samples.
3. Choose two elements from each of the following groups/columns on the Periodic Table to develop models that illustrate patterns.
 - a. Alkali Metals (Column 1)
 - b. Alkaline Earth Metals (Column 2)
 - c. Transition Metals (Columns 3-12)
 - d. Other Metals (Columns 13,14, 15)
 - e. Metalloids (Columns 13, 14, 15, 16)
 - f. Non-Metals (Columns 1, 14,15,16)
 - g. Halogens (Column 17)
 - h. Noble Gases (Column 18)
4. Use the simulation to draw models, drawings, or graphic organizer that shows an atom of the element. Include:
 - a. Identify the element and its position on the periodic table.
 - b. Draw a model of the atom
 - c. Include mass, protons, neutrons, and electrons.
5. Individually, analyze and describe patterns from your models.

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