

Chemistry

Unit 3: Atoms, Elements, and Molecules

Workbook 2

Name: _____ Period: _____



Guiding Question:**Do Now:****Important Definitions
and Equations:****Notes:**

_____, we will see are highly important. They allow you (and we will see, scientists) to _____ trends and characteristics of _____ based on _____ when arranged in a specific way.

Since _____ can be observed, any missing or unidentified spots can be predicted using the _____ of what came before and comes after.

We will see this as we continue to investigate periodic trends.

Response:



Periodically Monstrous

Intro to Periodic Trends

Purpose: Organize the monster cards into a logical periodic table and use it to predict the properties of “undiscovered” monsters

Rules/Hints:

1. The table should be 4 cards long by 4 cards tall
2. There **MUST** be a RED 4-LEGGED MONSTER in the top right corner
3. All monsters in the same GROUP should have similar properties
4. All monsters in the same PERIOD should have similar properties
5. Something about the monsters should **increase by one** as you move from left to right across a PERIOD
6. Something about the monsters should **increase by one** as you move from top to bottom down a GROUP
7. When you think you have solved the puzzle, show your teacher and have them sign you off below

Teacher Sign-Off: _____

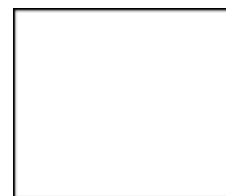
Analysis:

1. Which way do groups go on the periodic table? _____
2. Which way to periods go on the periodic table? _____
3. What 3 characteristics are the same for monsters in the same group?
 - a. _____
 - b. _____
 - c. _____
4. What 2 characteristics are the same for monsters in the same period?
 - a. _____
 - b. _____
5. What increases by one as you go down a group? _____
6. What increases by one as you go across a period? _____
7. Which look more similar: monsters in the same group or in the same period? Explain.

8. Your table has 2 missing monsters. Based on the patterns in your table, describe and draw the missing monsters below (use color!):

	Missing Monster #1	Missing Monster #2
Body Shape		
Color		
# of Eyes		
# of Legs		
Drawing		

9. When the periodic table was discovered, there were “blanks” or holes just like your 4 by 4 card table. What do you suspect was the reason there were blanks in the first periodic table?
10. Describe how your method for predicting the missing monsters could be similar to the first method of predicting missing elements.



Guiding Question:**Do Now:****Important Definitions
and Equations:****Notes:**

Similar to what you just did, scientists over the centuries took the elements of the Periodic Table and arranged them in _____ based on _____ and _____.

The Periodic Table we use today is not the first to exist.

We will see why it has persisted beyond previous versions in the future.

Response:



Yours, Periodically

Intro to Periodic Trends

Purpose: To create your own periodic table and investigate properties or periodicity in your own periodic table.

Materials: Plain white paper, coloring supplies, scissors, plastic sandwich bag.

Directions:

1. Fold your plain white sheet of paper in half, then half again along the long side and short side, creating 16 squares
2. Choose a theme for your periodic table: Periodic table of _____
 - CANNOT BE MONSTERS
3. Decide at least one thing for items in the same period to have in common: _____
4. Decide at least two things for items in the same group to have in common: _____
5. One thing should increase by one for items in the same period: _____
6. One thing should increase by one for items in the same group: _____
7. Reference point: What goes in the top right corner? _____
8. Draw your periodic table using the provided coloring supplies.
9. Now, cut out your periodic table and remove 2 squares. Put all but those two squares into the sandwich bag. They cannot be in the same period or group and cannot be your reference point. Trade with your partner and tell them the reference point.
10. Assemble your partner's periodic table and answer the questions that follow.
 - What characteristics are the same for items in your partner's periodic table that are in the same group?
 - What characteristics are the same for items in your partner's periodic table that are in the same period?
 - What increases by one as you go down a group? _____
 - What increases by one as you go across a period? _____

- Your table has 2 missing items. Based on the patterns in your table, describe and draw the missing items below (use color!):

	Missing Item #1	Missing Item #2
Decription		
Drawing		

- Show your drawings to your partner and compare to the two items they removed. Did you predict them correctly? Explain.



Guiding Question:**Do Now:****Important Definitions and Equations:****Notes:**

Mendeleev organized his periodic table based on the _____ of the elements, such as reactivity and atomic mass. You could have sorted the cards by:

- _____
- _____
- _____
- _____

Mendeleev's arrangement of the elements helped predict the existence and properties of as-yet-undiscovered elements.

Check-In: Which of these elements would be grouped together on the periodic table? Explain your thinking.

cadmium Cd	moderately soft, silvery, solid, metal	reacts very slowly with water	found in $\text{CdCl}_2(s)$
zinc Zn	moderately hard, silvery, solid, metal	reacts very slowly with water	found in $\text{ZnCl}_2(s)$
iodine I	purple, solid, nonmetal	reacts slowly with metals	found in $\text{ICl}(s)$
mercury Hg	silvery, liquid, metal	does not react with water	found in $\text{HgCl}_2(s)$

Response:

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Create a Table

Properties of the elements

Purpose

To create your own periodic table of the elements from the data given on element cards.

Materials

Create a table card deck

Instructions

1. Work in your groups with one set of cards.
2. Find Be, Mg, Ca, and Sr in the deck of cards and arrange them in a column the way Mendeleev did. These cards are all yellow. Look for similarities and differences in these cards. Find at least one pattern or trend and describe it to your group.
3. With your team, decide how to organize the rest of the cards into a table. Try to organize them in a way that produces as many patterns as possible.

Questions

1. What characteristics did you use to sort the cards?
2. What patterns appear in your arrangement? List at least four.
3. Where did you put H and He? What was your reasoning for their placement?
4. Did you notice any cards that didn't quite fit or that seemed out of order? Explain.
5. **Making Sense** - Below are four possible cards for the element germanium, Ge.
 - a. Where does germanium belong in the table?

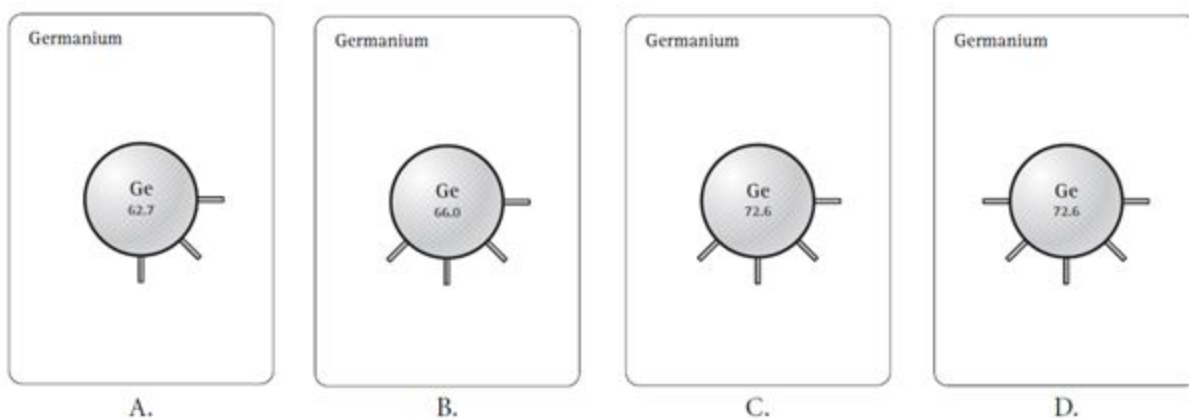
Beryllium	hard, dull gray solid metal
Be 9.0	
does not react with water	found in solid BeCl_2

Magnesium	moderately hard, silvery solid metal
Mg 24.3	
reacts only slightly with water	found in solid MgCl_2

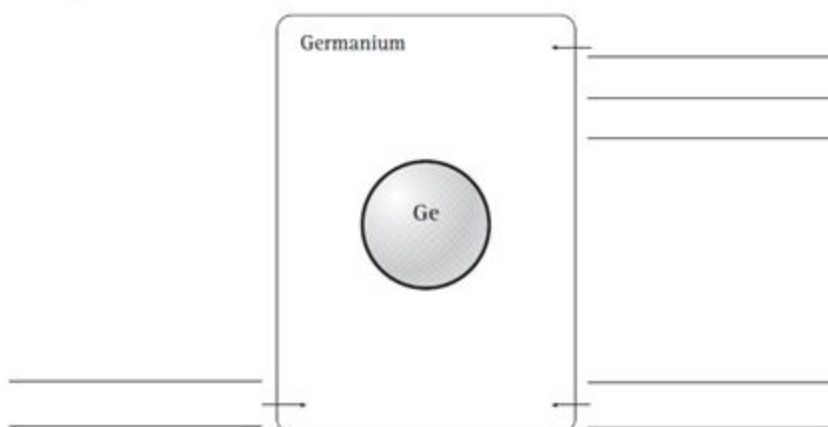
Calcium	moderately hard, silvery solid metal
Ca 40.1	
reacts with water	found in solid CaCl_2

Strontium	moderately soft, silvery white solid metal
Sr 87.6	
reacts vigorously with water	found in solid SrCl_2

- b. Which card seems most accurate to you? What is your reasoning?



- c. Copy your selection from part b. What would you add to the three empty corners to complete the card?



6. The element cesium, Cs, is located just below rubidium, Rb, on the modern periodic table. Create an element card for cesium.



Guiding Question:**Do Now:****Important Definitions and Equations:****Notes:**

On the periodic table, there are metals, non-metals and semi-metals (or metalloids)

- ❖ _____ are on the left (and middle) side of the periodic table
- ❖ _____ are on the right side of the periodic table
- ❖ _____ are in between metals and non-metals and have properties of both.
- Group 1A – _____
- Group 2A – _____
- Middle block – _____
- Group 7A – _____
- Group 8A – _____
- Semi-Metals – _____
- Other Non-metals – _____
- _____ (@ Room Temperature) – Noble Gases, Fluorine, Chlorine, Hydrogen
- _____ (@ Room Temperature) – Bromine, Mercury
- _____ (@ Room Temperature) – Everything Else

Response:

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Mapping the Periodic Table

Identifying and Classifying Groups on the Periodic Table

Purpose

To identify and classify groups on the periodic table using keys for future reference

Materials

- Periodic table handout
- Coloring supplies - colored pencils in variety of colors (9 suggested); red, blue and black markers
- Reference Materials (1 textbook per group/partner is sufficient; computer access per group suggested)

Directions

Using the questions and guidelines below, answer the questions and label/color your periodic table(s) as directed. Use a key to make identification more efficient.

Interactive Periodic Table: <https://ptable.com/>



Questions

1. Group 1A elements are considered the most reactive elements. Using your reference material, what is the name of these elements?

On your periodic table, color them RED with a color pencil and label them with a key

2. Group 2A elements are pretty reactive, but they don't explode like Group 1A elements. Using your reference material, what is the name of these elements?

On your periodic table, color them ORANGE with a color pencil and label them with a key

3. The block in the middle (from Sc through Zn and down) has a general name, what is it? Are there any other elements that belong to this group? Record the name of these elements and others that belong in this group below.

On your periodic table, color them YELLOW with a color pencil and label them with a key

4. All the elements listed before are considered metals. There are also some called non-metals. However, there are some that don't fit quite into either category -- semi-metals or metalloids are their name. Record their names below.

Using your reference materials, you will notice a black, bold stair step line starting between aluminum and boron and going down. Using a black marker, trace this line on your periodic table.

Color the elements you listed in #4 GREEN with a color pencil and label them with a key

5. There are some non-metals that do not react with anything and are located in group 8A. What are these called?

On your periodic table, color them PINK with a color pencil and label them with a key

6. Group 7A elements are some of the more reactive non-metals on the periodic table. What are they called?

On your periodic table, color them PURPLE with a color pencil and label them with a key

7. There are other elements that we have not colored. These are other non-metals (group 7A and 8A are also known as non-metals). List these elements below.

On your periodic table, color them BLUE with a color pencil and label them with a key

8. Below the main body of the periodic table are two more rows. They are periods 6 (top row) and 7 (bottom row). Using your reference materials, identify their names and record them below.

Using a color pencil not used yet, color period 6 and label the period with a "6" and label it with a key. Do the same for period 7 but a new color pencil.

9. Most elements on the periodic table are solids at room temperature. However, there are some elements that are gases and others that are liquids at room temperature. Using your reference materials, list them below.

Liquids:

Gases:

On your periodic table, OUTLINE gases with a RED marker and liquids with a BLUE marker.

- Take your periodic table to your teacher to be signed/stamped off for the activity



Guiding Question:**Do Now:****Important Definitions and Equations:****Notes:**

There are horizontal patterns on the table (from left to right):

- _____: The number increases as you go across.
- _____: the radius of the circle decreases as you go across the rows.
- _____: the number of valence electrons increases by one as you go across the table, then this pattern repeats in the next row.
- _____: formula for the compound in the lower right corner increases by one chlorine from column one to column three. Then the chemical formula or the compound decreases by one hydrogen (from four to zero) over the next five columns.

There are vertical patterns on the table (from top to bottom):

- _____: the number on the cards increases as you go down.
- _____: The elements in each vertical column are color-coded the same.
- _____: As you go down a column, the shading becomes darker if the reactivity increases or lighter if the reactivity decreases.
- _____: The elements within each column have the same number of valence electrons.
- _____: The radius increases as you go down a column.
- _____: the softness of the metals increases as you down

Response:

12 Breaking the Code

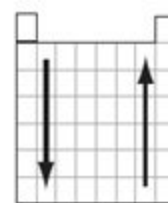
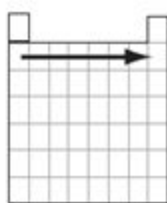
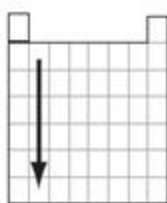
The Periodic Table

Purpose

To identify many of the patterns in the periodic table of the elements.

Materials

- Create a Table card deck
 - Handout – Periodic Table
1. Sort the cards. Make a list of all the patterns and trends you can find, going horizontally (from left to right) on the card sort.
 2. Make a list of all the patterns and trends you can find, going vertically (from top to bottom).
 3. The arrows in these diagrams represent increases. Which trend or pattern does each diagram describe?



4. Where are the metals located on the periodic table? The nonmetals?
5. Is calcium, Ca, a metal or a nonmetal? Explain your thinking.
6. The elements inserted into the card sort from Mendeleev's table are called transition elements. Do you expect these elements to be solids, liquids, or gases at room temperature? Explain.
7. Where are most of the gases located on the periodic table?

8. Is thallium, Tl, a solid, liquid, or gas? Explain.
9. In what areas of the periodic table do you find the most highly reactive elements? How do you know?
10. How would you expect cesium, Cs, to react with water? Explain your reasoning.
11. What element has an average atomic mass of 137.3? If there were a card for this element, what would it probably say in the lower left corner?
12. Place these elements in order from most reactive to least reactive:
- rubidium, Rb neon, Ne silicon, Si calcium, Ca
13. For each compound listed, specify how many different metals, metals and nonmetals, or nonmetals were combined.
- NaCl, sodium chloride (table salt)
 - CH₄O₂, acetic acid (vinegar)
 - CuZn, copper zinc alloy (bronze)
14. **Making Sense** The elements copper and gold are both relatively nonreactive. It is easy to bend and shape both metals. Both are used to make coins and jewelry. Is the similarity in their properties consistent with their locations on the periodic table? Explain why or why not.
15. **Go Beyond** Create a card for the element Pb.



Guiding Question:

Do Now:

**Important Definitions
and Equations:**

Notes:

Response:

13**Trending Periodically**
Periodic Table Practice

1. Find iodine on the periodic table
 - a. What is iodine's atomic number, average atomic mass, period, and group?
 - b. What state of matter is iodine in at room temperature?
 - c. Is iodine a metal, nonmetal, or metalloid? How can you tell?
 - d. Do you expect iodine to be reactive? Explain.
2. Which element would make the best coin: phosphorus, silver, potassium, or xenon? Why?
3. Name two elements that have properties similar to those of beryllium and have average atomic masses higher than 130.
4. Which of the following elements are solids (circle all correct answers)?
 - a. Fluorine
 - b. Titanium
 - c. Lead
 - d. Oxygen
 - e. Potassium
 - f. Silicon
5. Which of the following elements are nonmetals (circle all correct answers)?
 - a. Bromine
 - b. Carbon
 - c. Boron
 - d. Thallium
 - e. Phosphorus
 - f. Aluminum

6. Can you make jewelry out of each of the elements below? Explain your thinking for each.
 - a. Copper
 - b. Neon
 - c. Sodium
 - d. Platinum
7. A filament in a light bulb needs to be able to conduct electricity. Which of the following elements would be useful as a light bulb filament? Tungsten, sulfur, or bromine.
8. What happens to the atomic number and the atomic mass as you move from left to right across a row?
9. What happens to the atomic number and the atomic mass as you move from top to bottom down a column?
10. Name three elements in the lanthanide series
11. Name three elements in the actinide series

