

Module 3: Elements and the Periodic Table

Directions

Click on the following website: www.ptable.com

You will interact with this periodic table to find the answers to the questions below.

Part 1: Atomic Numbers and Atomic Masses

Complete the following table, by finding the atomic numbers and atomic masses for each element:

Symbol	P	S	Cl	Ar	K	Ca
Atomic number	15					
Atomic Mass	30.974					

- Using the data in the table above, is the periodic table organized by increasing atomic mass? Explain.
- What property is the periodic table organized by?

Part 2: Groups and Periods:

Continue to work in this site: www.ptable.com

Make sure the "Wikipedia" tab is selected in order to answer the following questions:

	Write your answers here:
1. The vertical columns on the periodic table are called <i>groups</i> , how many groups are there on the periodic table?	
2. The horizontal rows on the periodic table are called <i>periods</i> , how many periods are there on the periodic table?	
3. Which element is located in group 10 and period 4	
4. Which element is located in group 15 and period 5	
5. Which element is located in group 2 and period 2	
6. Which element is located in group 18 and period 6	
7. Which element is located in group 1 and period 7	
8. Are most of the elements on the periodic table classified as a metal or a non-metal?	
9. Are the non-metal elements located on the left or right side of the periodic table? Is there any exception?	

Part 3: Families

Elements can also be classified by *family*, use the color coding at the top of the page to help identify the family names and their element members.

	Write your answers here:
1. How many elements belong to the Alkali Metal family? List the member elements by their symbol.	
2. Click on the group number for the Alkali Metals family at the top of the table. Answer the following about the Alkali metals:	
a. What are 3 similar properties of these elements?	
b. Where are these found naturally?	
c. What is a common substance that alkali metals react vigorously with?	
3. What type of element does the bright green color indicate? List the element symbols for the elements that are designated with bright green:	
4. Click on the group number for the Halogen family at the top of the table. Answer the following about the Halogen elements:	
a. How many elements belong to the Halogen family? List the member elements by their symbol.	
b. What does the name "halogen" mean?	
c. What type of molecule is formed when a halogen combines with hydrogen?	
5. Tungsten (W), Copper (Cu), and Iron (Fe) all belong to the same family, whose members are generally used as conductors of electricity. What family is this?	

Part 4; Atomic Radius Exploration

Write your answers here:

1. In your own words, define the term "radius."

2. Let's assume an atom is shaped like a sphere, what subatomic particles (protons, neutrons or electrons) would be found in the center? What subatomic particles would be found around the perimeter?

3. Keeping in mind your answers to questions 1 & 2, in your own words describe the meaning of "atomic radius"

Directions

Interact with the periodic table in the website, www.ptable.com , to find the answers to the questions below.

- Click the "Properties" tab at the top of the page.
- Next select "Radius" from the properties listed in the top center of the screen.
- Finally make sure "Calculated radius" is selected from the options on the right.

4. Complete the following data table:

Group 1 element	Calculated Radius Value (pm)
H	
Li	
Na	
K	
Rb	
Cs	

5. What trend in the data do you observe as you move from the top of the periodic table to the bottom within this group?

6. Does this periodic trend apply to any other

group? Briefly investigate the atomic radii values in another group to support your answer.																			
7. What ideas do you have about <i>the factors that actually contribute</i> to the atomic radius trend within a group? (Revisit your background questions to guide you).																			
<p>8. Complete the following data table:</p> <table border="1"> <tr> <td>Period 2 element</td> <td>Li</td> <td>Be</td> <td>B</td> <td>C</td> <td>N</td> <td>O</td> <td>F</td> <td>Ne</td> </tr> <tr> <td>Atomic Radius Value (pm)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Period 2 element	Li	Be	B	C	N	O	F	Ne	Atomic Radius Value (pm)								
Period 2 element	Li	Be	B	C	N	O	F	Ne											
Atomic Radius Value (pm)																			
9. What trend in the data do you observe as you move from the left of the periodic table to the right within this period?																			
10. Does this periodic trend apply to any other period? Briefly investigate the atomic radii values in another period to support your answer.																			
11. What ideas do you have about <i>the factors that actually contribute</i> to the atomic radius trend within a period? (Think about subatomic particles)																			
12. Hide the atomic radius values from yourself. Based on the trends you discovered, make a prediction, and place the following elements in order of increasing atomic radius (smallest to largest): Si, Ca, C, F, Cs																			
13. Check values on www.ptable.com Was your prediction from question #12 correct?																			
<p>Read the following descriptions of two important factors that affect the atomic radius of an atom, then answer the following questions:</p> <p>Electron Shielding Effect: This is due to inner electrons “shielding” the valence</p>																			

electrons from the positive pulling force of the nucleus. As an atom increases its number of electron shells, the shielding effect will increase in turn keeping the valence electrons distanced from the nucleus.

Effective Nuclear Charge: This is due to the number of protons in an atom, the more protons the stronger the pulling force of the nucleus will be on the electrons in the atom.

14. Revisit your answers for questions 4-7.
Using the vocabulary terms given above
make a statement about the atomic radius
trend within a group on the periodic table.
Use two specific elements as examples in
your response.

15. Revisit your answers for questions 8-11.
Using the vocabulary terms given above
make a statement about the atomic radius
trend within a period on the periodic table.
Use two specific elements as examples in
your response.

Part 5; Electronegativity

Interact with the periodic table in the website, www.ptable.com , to find the answers to the questions below.

- Select the “Properties” tab at the top.

- Scroll over an element to see its electronegativity (see image below). Fill in the table below with the electronegativity values for the atoms provided. An example is provided for you.

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Wikipedia Properties Orbitals Isotopes Compounds State at

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 H Hydrogen Gas	2 He Helium Gas	3 Li Lithium Solid	4 Be Beryllium Solid	5 B Boron Solid	6 C Carbon Solid [He] 2s ² 2p ²	7 N Nitrogen Gas	8 O Oxygen Gas	9 F Fluorine Gas	10 Ne Neon Gas	11 Na Sodium Solid	12 Mg Magnesium Solid	13 Al Aluminum Solid	14 Si Silicon Solid

Properties of Carbon:

- Series: Carbon
- State at 273 K: Solid
- Melting Point: 3823 K
- Boiling Point: 4100 K
- Electronegativity: 2.55
- Electron Affinity: 121.9 kJ/mol
- Valence: 4
- Ionization: 1086.5 kJ/mol
- Radius: 67 pm
- Hardness: Unknown
- Modulus: 33 GPa
- Density: 2260 kg/m³
- Conductivity: 140 W/mK
- Heat: 710 J/kgK
- Abundance: 0.50%
- Discovered: Unknown

1. Complete this table:

Element	Electronegativity
C	2.55
N	
P	
O	
S	
F	
Cl	
Br	

1. Which atom is the most electronegative? How can you tell?

2. In general, what happens to electronegativities as you move across the table to the right, (although there are a lot of exceptions).

3. In general, what happens to electronegativities as you move down the table (although there are a lot of exceptions).