SNC1D
UNIT 2: CHEMISTRY
CHAPTER 5: UNDERSTANDING THE PROPERTIES OF ELEMENTS

5.4: TRENDS IN THE PERIODIC TABLE

Read pages 208 to 210. Fill in the blanks to complete the notes.

REACTIVITY & THE OUTERMOST ELECTRONS

- A _____ electron is an electron in the outermost occupied energy level of an atom.

- Many _____ of an element are determined by the number of valence electrons.

- Atoms within the same _____ in the periodic table have the same number of valence electrons. As a result elements in the same group _____ in a similar way.

- During a chemical reaction, two or more atoms form a _____ bond by _____, _____, or _____ valence electrons in order to have full _____ shells.

- Group 18 elements (the noble gases) are _____ because they have a full outer shell.

- Group 17 elements (the halogens) are the _____ non-metals because they need to ***gain only one electron*** to have a full outer shell.

- Group 1 elements (the alkali metals) are the most reactive metals because they need to _____ only one electron to have a full outer shell.

- Group 2 elements (alkaline earth metals) are less reactive than alkali metals because they need to lose _____electrons to have a full outer shell.

- Having a full outer energy level makes the noble gases more _____, so these elements _____ with other elements.

- In general, the closer an element is to a noble gas in the periodic table, _____.

- Which element is more reactive, sulfur or chlorine? Explain why.
  _____

REACTIVITY & ATOM SIZE

The size of an atom is determined by _____.

The larger the atom, the farther the valence electrons are from the nucleus.

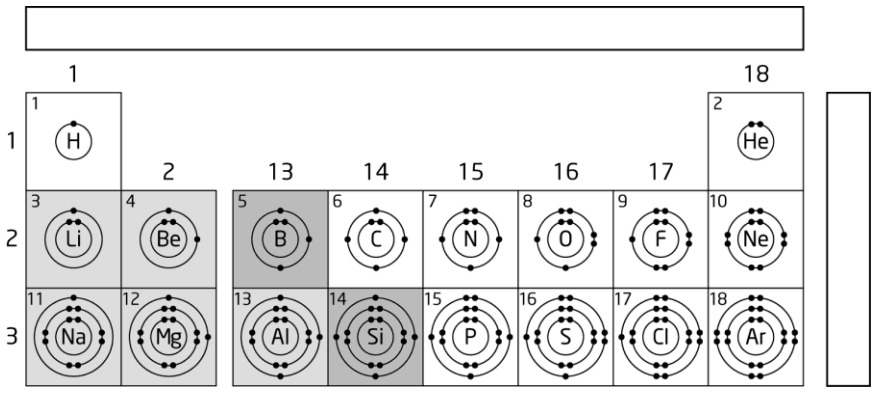
As you move ***DOWN A GROUP*** in the periodic table, the following occurs:

- The valence electrons occupy _____ energy levels.
- The pull of the protons on the valence electrons gets _____.
- METALS: As the size of the atom increases, it is _____ valence electrons.
- NON-METALS: As the size of the atom increases, it is _____ valence electrons.
- Consequently, as the size of the atom increases _____ become more reactive and _____ become less reactive.

As you go from ***LEFT TO RIGHT*** in a given period, the following occurs:

- The number of protons _____, resulting in more pull on the valence electrons.
- With a greater pull on the valence electrons, the size of the atom _____.
- It becomes harder for metals to lose electrons.
- It becomes easier for non-metals to gain electrons.
- In general, as the size of the atom _____, the element becomes _____ reactive.

Draw arrows in the two rectangles to indicate the trend in the size of the atom.



REACTIVITY TRENDS ON THE PERIODIC TABLE

- During a chemical reaction, two or more atoms form a chemical bond by **gaining**, **losing**, or **sharing** valence electrons in order to have **full outer shells,** called a **stable octet.**

- The closer an atom is to a **full valence shell**, the **more reactive** it is.

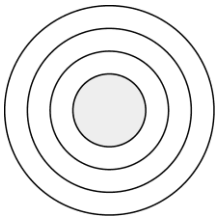
Movement on the Periodic Table	Reactivity of Metals	Reactivity of Non-Metals
As you go from **left to right** across a period	**decreases**	**increases**
As you go from **top to bottom** down a group	**increases**	**decrease**
Reason	The farther to the **left and down** the periodic table you go, the **easier** it is for metals to **give up** electrons.	The farther **right and up** the periodic table you go, the **easier** it is for **non-metals** to **accept or share** electrons.

5.4 REVIEW

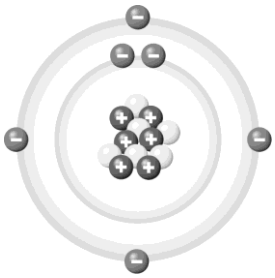
BLM 5-7

You will need to use Figure 5.15 (the Periodic Table) on page 197 of your textbook to answer some questions.

1. Draw a Bohr-Rutherford model of an atom with one valence electron. Give the names of at least 3 elements that have one valence electron in its atom.

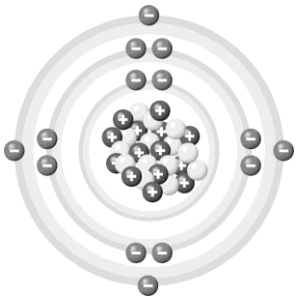


2. Examine the diagram.

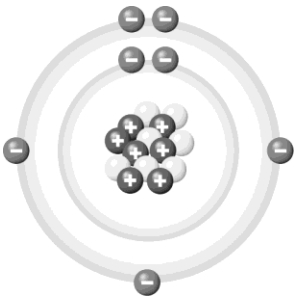


Which of the following elements will be one position to the right of the element above on the periodic table?

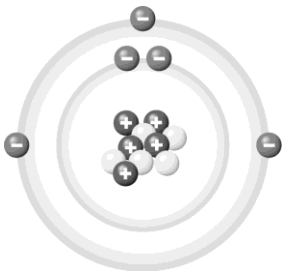
A.



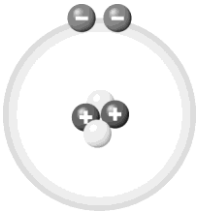
B.



C.



D.

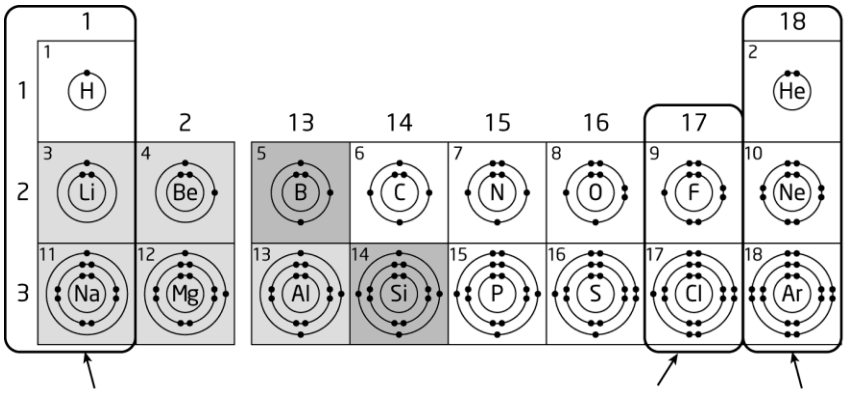


3. An atom of aluminum has _____ (more/fewer) valence electrons than an atom of phosphorus.

4. Circle all the elements with four valence electrons.

oxygen silicon chlorine helium phosphorus lithium

5. a. Here are the first eighteen elements in the periodic table.
Label the diagram using terms from the word bank.



Noble Gases
Alkali Metals
Halogens

_____ _____ _____

b. Use the word from the word bank to fill in the blanks. You can use a word more than once.

noble gases	alkali metals	halogens
full valence shell	stability	

_____ are the most reactive metals and the _____ are the most reactive non-metals because the _____ and _____ want to have a _____ by gaining, losing, or sharing electrons. _____ are not reactive because they already have a _____, so they already have chemical _____.

6. Fill in the blanks.
Atomic size _____ (increases/decreases) down a group and across a period, from _____ (right/left) to _____ (right/left).

7. In each pair of elements, circle which element has the larger atom.
   a) hydrogen, lithium
   b) boron, nitrogen
   c) aluminum, helium
   d) chlorine, sodium
   e) phosphorus, fluorine

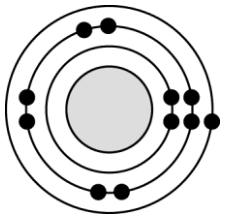
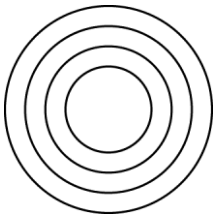
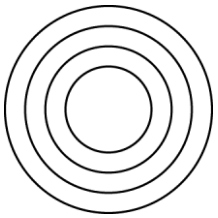
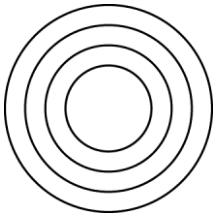
8. Which set of elements is listed in order of increasing reactivity?
    a) beryllium, magnesium, barium, potassium
    b) calcium, magnesium, sodium, cesium
    c) hydrogen, sodium, magnesium, calcium
    d) beryllium, lithium, sodium, potassium

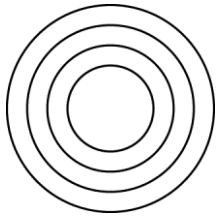
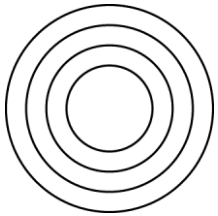
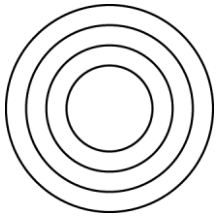
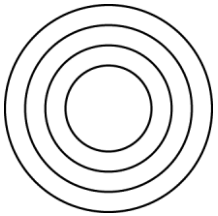
9. Describe the reactivity of the elements with the size of their atoms as you move...
    a) down a group.
    b) from left to right along a period.

10. Circle the letter that completes the sentence. Potassium is more reactive than sodium because...
    a) it has fewer valence electrons than sodium.
    b) it has more valence electrons than sodium.
    c) its valence electron is farther away from its nucleus than sodium's valence electron is from its nucleus.
    d) its valence electron is closer to its nucleus than sodium's valence electron is to its nucleus.

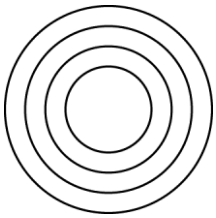
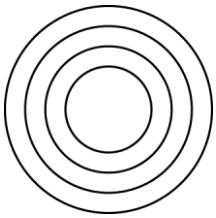
REVIEW CH. 5 | Row 3 Elements

Complete the table for row three of the periodic table of elements.
The first column is done for you.

	Group 1	Group 2	Group 13	Group 14
B-R Diagram				
Name, Number, Symbol	Sodium 11 Na			
Physical Properties	Shiny			
Chemical Properties	Reacts with water			
Where found	salt, either in sea water or underground			
How used	We eat it. Used to make sodium hydroxide			

	Group 15	Group 16	Group 17	Group 18
B-R Diagram				
Name, Number, Symbol				
Physical Properties				
Chemical Properties				
Where found				
How used				

Complete the table for rows 1 to 3 of group 18 of the periodic table of elements.
The first column is done for you.

	B-R Diagram	Name, Number, Symbol	Physical Properties	Chemical Properties	Where found	How used
Row 1		Helium 2 He	colourless, odourless	does not react with other chemicals	natural gas fields	Used for inflating balloons, and for arc welding
Row 2						
Row 3