

Name _____

Date _____

Due Date _____

Mark _____/20

Correct and Hand in Again by _____

Chemistry 11

In-Class Activity on Trends on the Periodic Table

This Assignment will be given 20 marks as a “show me” assignment.

Part 1—Chemical Reactivity

Use the Results of the Experiment on Trends in Reactivity of Elements to answer the following summary questions.

1. As you move down a column of *metals*, the reactivity (*increases/decreases*) _____
2. As you move down a column of *non-metals*, the reactivity (*increases/decreases*) _____
3. As you move from the left side toward the center of the periodic table, the reactivity (*increases/decreases*) _____
4. Describe the chemical reactivity of the family of elements called the Noble Gases.

Part 2—Valence Electrons and Ion Charge

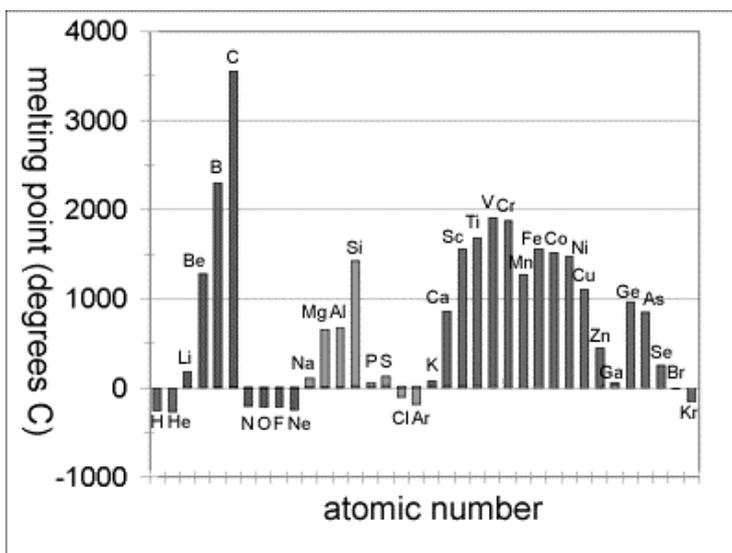
On the following diagram of the Periodic Table, list the number of valence electrons and the most common ion charge in Groups 1,2 & 13-18

of Valence e⁻
Ion Charge

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub						
			La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
			Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Part 3—Melting Points

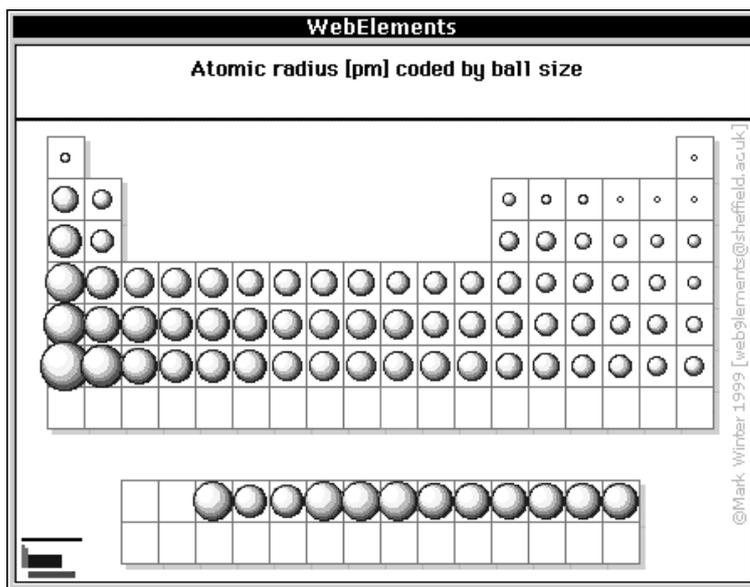
Look at the following graph showing the melting points of different elements and answer the questions below it:



1. Look at the melting points of the elements Li, Na and K (Group 1). The melting points of the Alkali Metals appear to be (*higher/lower/about the same as*) _____ the melting points of other metals.
2. What is the general trend in melting points of the Alkali Metals as you move down the column from Li to K? (*increase/decrease*) _____
3. What can you say about the bonds that hold the atoms together as you move down the column of Alkali Metals? _____
4. What is the general trend in melting points of the Halogens as you move down the column from F to Br? (*increase/decrease*) _____
5. What is the general trend in melting points of the Group 16 elements as you move down the column from O to Se? (*increase/decrease*) _____
6. What is the general trend in melting points of the Noble Gases as you move down the column from He to Kr? (*increase/decrease*) _____
7. Do non-metals have the same melting point trend as metals? _____
8. Look at the elements in Period 2 (Li→Ne). What is the trend in melting points as you move from Li on the left side toward C in the middle of the Periodic Table _____
Is the same trend observed for Period 3 from Na to Si? _____
9. Which element has the highest melting point of all elements in the first 3 Periods? _____

Part 4—Atomic Radius

Look at the picture here showing the relative Atomic Radii (size of atoms) of the elements in the Periodic Table. Use the information to answer the questions below:



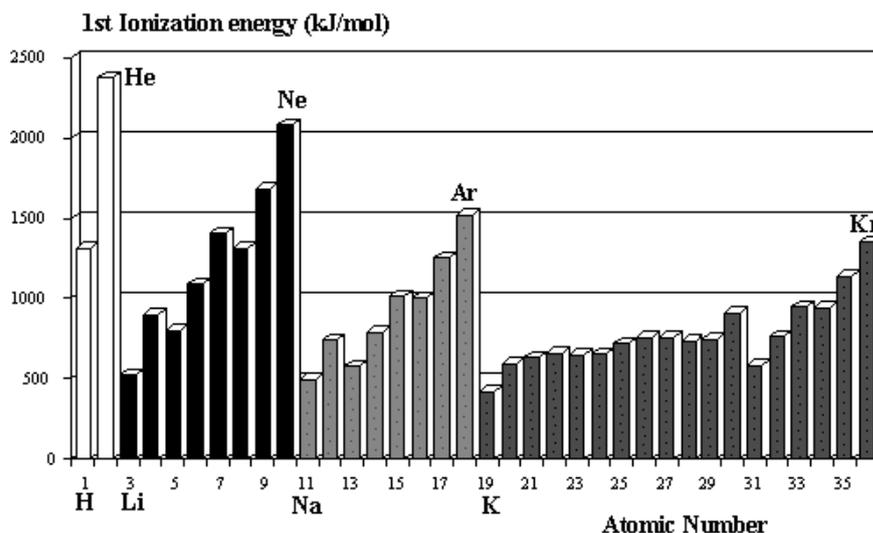
1. What is the general trend in atomic radius (size of atoms) as you move from left to right across any Period? (*increase/decrease*) _____
2. As you move from Li to Ne, electrons are filling (*the same/different*) _____ energy levels(s). This may help explain why atoms *don't* get bigger as you move to the right within a period.
As you move across from Li to Ne, what is happening to the number of *protons* in the nucleus? _____. What do the protons do to the electrons? _____. Suggest a reason why the atoms in a period actually get *smaller* as you move from left to right. Get help from your teacher if you can't get this one!
3. What is the general trend in atomic radius (size of atoms) as you move *down* a vertical column (group)? (*increase/decrease*) _____
Suggest a reason for this trend. (*Hint: are electrons filling up the same energy level (orbitals) as you move down a column?*)

Part 5—First Ionization Energy

Define **First Ionization Energy** (Use textbook or other reference. It is available on the internet!)

Look at the following graph of the First Ionization Energies of the elements in the first three periods and use it to answer the questions below:

Trends in Ionization Energy



1. What is the general trend in first ionization energy as you move from left to right across any Period? (eg. from Li → Ne or from Na → Ar) (*increase/decrease*) _____
2. Keeping in mind the trend in atomic radius as you move from left to right across a period, suggest a reason for this trend in ionization energies. (Hint: *What happens to the distance and the force of attraction between the nucleus and the outer electron as atoms get smaller?*)
3. What is the trend in ionization energy as you move down a vertical column, like from Li → Na → K or from He → Ne → Ar → Kr? (*increase/decrease*) _____
4. Suggest a reason for this trend based on atomic radius (size) and the distance and force of attraction between the nucleus and the outer electron.

Part 6—Densities

Log on to the internet and select the site (see Chem 11 Webpage-Unit 8)

<http://www.webelements.com/webelements/properties/text/image-line/density.html> This will give you a graph showing the densities of the elements. Use the information to answer the following questions:

- Which nine elements are the most dense on the table? _____
Under "Full table charts" on the left, click "Flash" From the panel below at the bottom of the chart, select "Ball Chart" Hold the cursor over the 9 biggest balls to get names and densities.
- What is the trend in densities as you move down the column of Alkali Metals? _____
Click "Group 1" under "Group charts" on the left.
- Do the rest of the groups have a similar trend in density as you move down? _____
Click other Groups.
- Suggest why alloys containing Aluminum and Magnesium are used in airplanes?
(Hint: How do their densities compare with most other common metals?)
- What is the density of Titanium?_____. What about Aluminum? _____. Why might a person spend a huge amount of money for a titanium bicycle frame when it is more dense and far more expensive than aluminum? _____
- As you move from left to right within a period, are the most dense elements on the left, on the right, or in the center? _____
- The approximate density of air is about 1.3 g/cm^3 . From your general knowledge, which gases are less dense than air? _____ What would these gases be used for? _____ The gas with the *second lowest* density is used for this purpose more commonly than the least dense gas. Suggest a reason for this.
- Radon gas is a dangerous radioactive gas that has been linked to lung cancer. In which part of a home would it most likely be found? _____
Hint: Where is it in the column? How dense would it be compared to other gases?
- If you got notice that chlorine gas had spilled and was heading your way, where would it be safest to go? _____
- What method is often used to separate gold from gravel? _____
What property of gold makes this process useful? _____
- What would happen if you put a nickel in a beaker containing liquid mercury? _____
_____. Would the same thing happen if you put a piece of platinum in the mercury? _____.
Explain.