Chemistry: Form WS3.2.1A Name _____

PERIODIC TABLE Date _____ Period _____

How is the Periodic Table Arranged?

Below is a portion of the periodic table. In the answer spaces provided in the table, fill in the [1] atomic number, [2] electron configuration, [3] number of shells, and [4] number of outer shell electrons as indicated in the key below. Then, answer the questions that follow.

Moseley

KEY

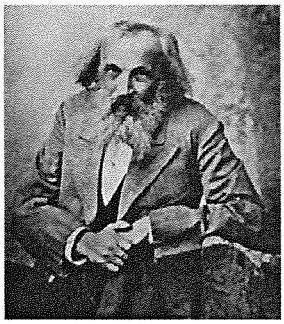
Symbol

[1] Atomic Number _____

[2] Electron Configuration _____

[3] Number of Shells _____

[4] Number of Outer Electrons _____



Mendeleev

H [1] _____ [2] _____ [3] _____ [4] _____							**He** [1] _____ [2] _____ [3] _____ [4] _____
Li [1] _____ [2] _____ [3] _____ [4] _____	**Be** [1] _____ [2] _____ [3] _____ [4] _____	**B** [1] _____ [2] _____ [3] _____ [4] _____	**C** [1] _____ [2] _____ [3] _____ [4] _____	**N** [1] _____ [2] _____ [3] _____ [4] _____	**O** [1] _____ [2] _____ [3] _____ [4] _____	**F** [1] _____ [2] _____ [3] _____ [4] _____	**Ne** [1] _____ [2] _____ [3] _____ [4] _____
Na [1] _____ [2] _____ [3] _____ [4] _____	**Mg** [1] _____ [2] _____ [3] _____ [4] _____	**Al** [1] _____ [2] _____ [3] _____ [4] _____	**Si** [1] _____ [2] _____ [3] _____ [4] _____	**P** [1] _____ [2] _____ [3] _____ [4] _____	**S** [1] _____ [2] _____ [3] _____ [4] _____	**Cl** [1] _____ [2] _____ [3] _____ [4] _____	**Ar** [1] _____ [2] _____ [3] _____ [4] _____
K [1] _____ [2] _____ [3] _____ [4] _____	**Ca** [1] _____ [2] _____ [3] _____ [4] _____						

Answer the questions below by referring to the data on the table you filled in on the first page.

1. In what order are the elements of the *Periodic Table* arranged? _____

2. What do all the elements in a vertical column of the *Periodic Table* have in common? _____

3. What do all the elements in a horizontal row of the *Periodic Table* have in common? _____

4. By what two characteristics are all the elements of the *Periodic Table* placed in a particular row and column?

5. Imagine element number 15 had never been discovered. What characteristics would you predict it to have based on its location on the periodic table? _____

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	?	S	Cl	Ar
K	Ca						

6. Which element has 3 outer electrons and 2 shells? _____

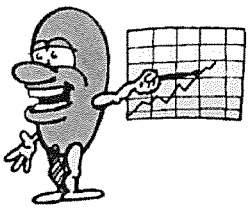
7. How is helium different from neon and argon? How is it similar? _____

Chemistry: Form WS3.3.1A Name _____

PERIODIC TABLE Date _____ Period _____

What are the Trends in the Periodic Table?

Below is a portion of the periodic table. In the answer spaces provided in the table, fill in the [1] atomic number, [2] atomic radius, [3] number of shells, and [4] number of outer shell electrons as indicated in the key below. Then, answer the questions that follow.



KEY

Symbol
[1] Atomic Number . . . . . _____
[2] Atomic Radius . . . . . _____
[3] Number of Shells . . . . . _____
[4] Number of Outer Electrons _____

H [1] _____ [2] _____ [3] _____ [4] _____							**He** [1] _____ [2] _____ [3] _____ [4] _____
Li [1] _____ [2] _____ [3] _____ [4] _____	**Be** [1] _____ [2] _____ [3] _____ [4] _____	**B** [1] _____ [2] _____ [3] _____ [4] _____	**C** [1] _____ [2] _____ [3] _____ [4] _____	**N** [1] _____ [2] _____ [3] _____ [4] _____	**O** [1] _____ [2] _____ [3] _____ [4] _____	**F** [1] _____ [2] _____ [3] _____ [4] _____	**Ne** [1] _____ [2] _____ [3] _____ [4] _____
Na [1] _____ [2] _____ [3] _____ [4] _____	**Mg** [1] _____ [2] _____ [3] _____ [4] _____	**Al** [1] _____ [2] _____ [3] _____ [4] _____	**Si** [1] _____ [2] _____ [3] _____ [4] _____	**P** [1] _____ [2] _____ [3] _____ [4] _____	**S** [1] _____ [2] _____ [3] _____ [4] _____	**Cl** [1] _____ [2] _____ [3] _____ [4] _____	**Ar** [1] _____ [2] _____ [3] _____ [4] _____
K [1] _____ [2] _____ [3] _____ [4] _____	**Ca** [1] _____ [2] _____ [3] _____ [4] _____						

Answer the questions below by referring to the data on the table you filled in on the first page.

1. As you go from left to right across a row of the *Periodic Table*:
   a. What happens to the atomic number and the number of protons? _____
   b. As a result, what happens to the pull on the electrons? _____
   c. Therefore what happens to the atomic radius? _____
   d. Finally, what does this mean about the likelihood of losing electrons? Do the elements become more or less metallic? _____
2. As you go from top to bottom down a column of the *Periodic Table*:
   a. What happens to the number of shells? _____
   b. As a result, what happens to the atomic radius? _____
   c. Therefore, what happens to the pull on the electrons? _____
   d. Finally, what does this mean about the likelihood of losing electrons? Do the elements become more or less metallic? _____
3. Based on the analysis above, where do metals tend to be located on the *Periodic Table*? _____

   _____
4. Based on the analysis above, where do nonmetals tend to be located on the *Periodic Table*? _____

   _____
5. What do the elements at the extreme right of the *Periodic Table* have in common? What affect does this have on the chemical properties? _____

   _____
6. Where on the *Periodic Table*, approximately, is the border between the metals and nonmetals (the metalloids)?

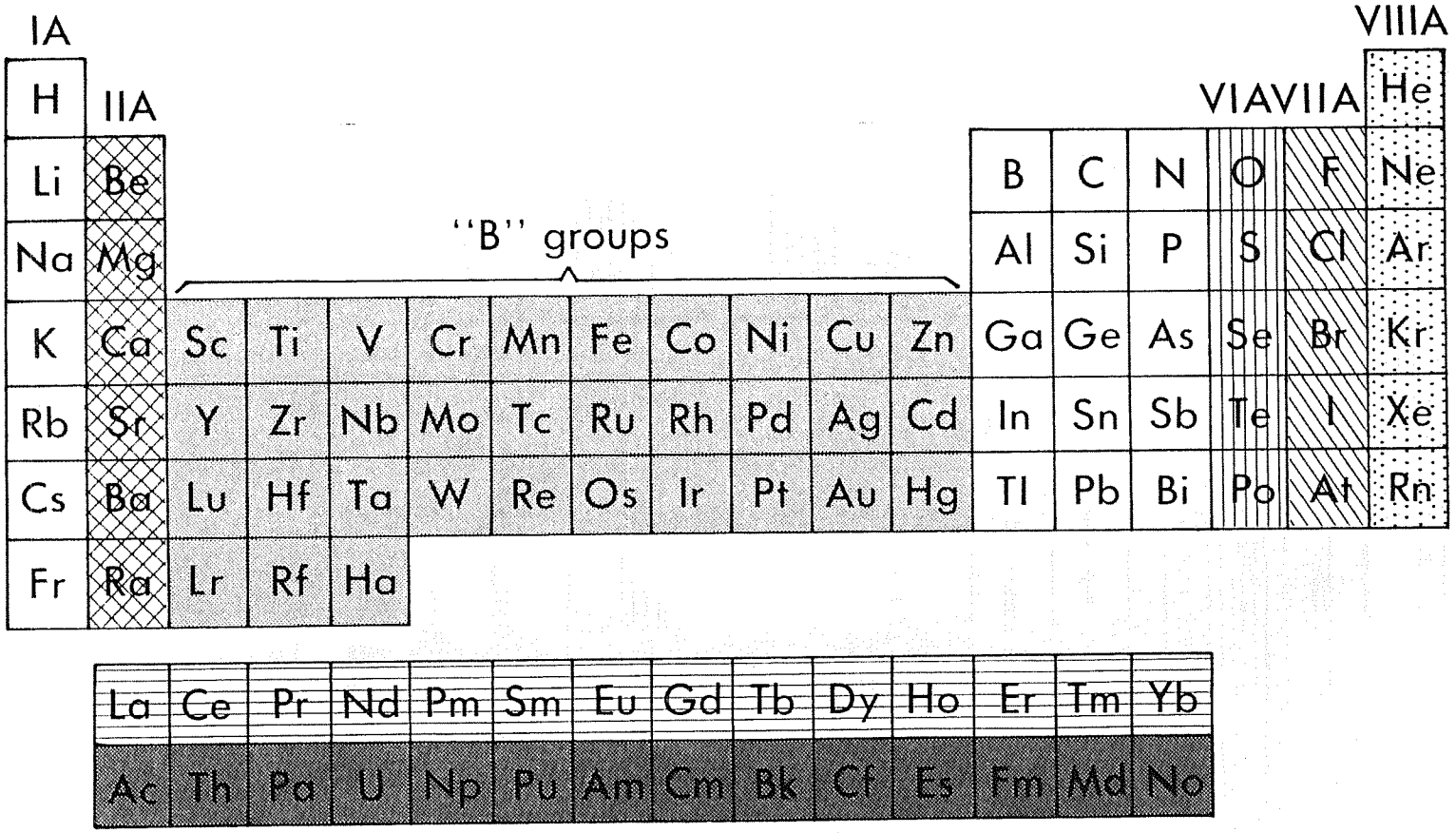
   _____

PERIODIC TABLE WORKSHEET

Name _____

1. Where are the most active metals located? _____
2. Where are the most active nonmetals located? _____
3. As you go from left to right across a period, the atomic size (decreases / increases). Why? _____
4. As you travel down a group, the atomic size (decreases / increases). Why? _____
5. A negative ion is (larger / smaller) than its parent atom.
6. A positive ion is (larger / smaller) than its parent atom.
7. As you go from left to right across a period, the first ionization energy generally (decreases / increases). Why? _____
8. As you go down a group, the first ionization energy generally (decreases / increases). Why? _____
9. Where is the highest electronegativity found? _____
10. Where is the lowest electronegativity found? _____
11. Elements of Group 1 are called _____ .
12. Elements of Group 2 are called _____ .
13. Elements of Group 3-12 are called _____ .
14. As you go from left to right across the periodic table, the elements go from (metals / nonmetals) to (metals / nonmetals).
15. Group 17 elements are called _____ .
16. The most active element in Group 17 is _____ .
17. Group 18 elements are called _____ .
18. What sublevels are filling across the Transition Elements? _____
19. Elements within a group have a similar number of _____ .
20. Elements across a series have the same number of _____ .
21. A colored ion generally indicates a _____ .
22. As you go down a group, the elements generally become (more / less) metallic.
23. The majority of elements in the periodic table are (metals / nonmetals).
24. Elements in the periodic table are arranged according to their _____ .
25. An element with both metallic and nonmetallic properties is called a _____ .

GROUP NAMES



Name _____ Date _____ Class _____

9 PERIODIC TABLE

A. UNDERSTANDING VOCABULARY

In the space at the left, write the term that correctly completes each statement. Use each of the terms listed.

actinide series	law of octaves	octet rule
alkali metal family	metal	period
electron configuration	metalloid	periodic law
group	noble gases	periodic table
lanthanide series	nonmetal	triads

_____ **1.** A representation of how the electrons in an atom are distributed among the various levels and sublevels is called a(n) _____.

_____ **2.** In the uncombined state the most stable atoms are found among the _____.

_____ **3.** An element with three or fewer electrons in the outermost energy level is considered a(n) _____.

_____ **4.** All elements located in the same vertical column on the periodic table are referred to as a(n) _____.

_____ **5.** With increase in atomic number, electrons are being added to the 4*f* sublevel in the _____ of elements.

_____ **6.** An element that exhibits both metallic and nonmetallic properties is called a(n) _____.

_____ **7.** All elements located in the same horizontal row on the periodic table are referred to as a(n) _____.

_____ **8.** Dobereiner grouped elements with similar properties into sets of three with one element having a mass midway between the remaining two. These sets were termed _____.

_____ **9.** An element with five or more electrons in the outermost energy level is considered a(n) _____.

_____ **10.** The arrangement of the known elements in the 1860's based on the repetition of similar properties every eighth element was referred to as the _____.

_____ **11.** The placement of elements with similar electron configurations in columns in order of their increasing principal quantum number forms the _____.

_____ **12.** That an atom with four pairs of electrons in its outer energy level is particularly stable is a statement of the _____.

_____ **13.** That the properties of elements are a periodic function of their atomic numbers is a statement of the _____.

_____ **14.** As atomic number increases, electrons are being added to the 5*f* sublevel in the _____ of elements.

_____ **15.** The group containing the most active metals, each of which has one electron in the outer level is the _____.

Name _____ Date _____ Class _____

B. DISCOVERING CONCEPTS

In the space at the left, write the letter of the term or phrase that correctly answers each question or best completes each statement.

_____ **1.** Lustrous, malleable, ductile elements that are good conductors of electricity and heat are classified as _____.

a. metals **b.** nonmetals **c.** metalloids **d.** noble gases

_____ **2.** The electron configuration of a certain element ends with $3p^5$. Which of the following describes its position in the periodic table?

a. period 5, group IIIA(13) **c.** period 3, group VIIA(17)
b. period 3, group VA(15) **d.** period 5, group VA(15)

_____ **3.** Which of the following elements has an electron configuration that demonstrates the increased stability of one full and one half full sublevel over that of one full sublevel with no special pattern in the second sublevel?

a. Cr **b.** Co **c.** Cu **d.** Cd

_____ **4.** Which of the following is an example of a metalloid?

a. I **b.** B **c.** Br **d.** In

_____ **5.** The periodicity of the elements is basically a function of their _____.

a. nuclear stability **c.** mass numbers
b. atomic numbers **d.** principal quantum numbers

_____ **6.** An element with seven electrons in the outer level would be a _____.

a. metal **b.** metalloid **c.** noble gas **d.** nonmetal

_____ **7.** As the atomic number in a period increases, the degree of nonmetallic character _____.

a. increases **c.** decreases
b. increases then decreases **d.** remains the same

_____ **8.** In what region of the periodic chart are electrons being added to the *d* sublevel as atomic number increases?

a. alkali metals **c.** nonmetals
b. actinide series **d.** transition elements

_____ **9.** Which of the following electron configurations could represent a transition element in the ground state?

a. $1s^2 2s^2 2p^6 3s^2$
b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
c. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$
d. $1s^2 2s^2 2p^6 3s^2 3p^6$

_____ **10.** Elements in a vertical group have similar chemical properties because of similar _____.

a. nuclear configurations **c.** principal quantum numbers
b. outer electron configurations **d.** mass numbers

_____ **11.** The period number in the periodic table designates the _____.

a. total nuclear charge
b. maximum number of outer electrons in the row
c. maximum number of nucleons in the row
d. principal quantum number for the outer electrons

_____ **12.** Elements in period four will have an electron configuration with how many energy levels?

a. 2 **b.** 4 **c.** 8 **d.** 16

_____ **13.** Arsenic is in group VA(15) and period 4. What is the electron configuration of its outermost energy level?

a. $3d^5$ **b.** $5s^2 5p^2$ **c.** $4s^2 4p^3$ d. $4s^0 3d^5$

Name _____ Date _____ Class _____

C. INTERPRETING CONCEPTS

1. Match the concept or discovery in column one with the scientist in column two most closely associated with it.

_____	**a.** periodic law based on atomic number	**(1)**	Dobereiner
_____	**b.** triads of elements	**(2)**	Mendeleev
_____	**c.** law of octaves	**(3)**	Moseley
_____	**d.** predicted properties of undiscovered element "ekasilicon"	**(4)**	Newlands

2. Scandium ($Z = 21$), a transition element, has the electron configuration:

$$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$$

Write the electron configurations for the next two elements.

Ti ($Z = 22$) _____

V ($Z = 23$) _____

3. Match the description with the correct group from the periodic table of the elements.

_____	**a.** halogen family	**(1)**	Group VIA(16)
_____	**b.** alkali metal family	**(2)**	Group IB(11)
_____	**c.** noble gas family	**(3)**	Group VIIIA(18)
_____	**d.** chalcogen family	**(4)**	Group IA(1)
_____	**e.** alkaline earth family	**(5)**	Group VIIA(17)
_____	**f.** transition elements	**(6)**	Group IIA(2)

4. Underline the element that is considered to be a metalloid: calcium, oxygen, antimony, sodium.

5. Explain why helium and beryllium, both containing two electrons in the outer level, are not at all similar in properties.

_____

_____

_____

6. In general, how do transition elements differ from other elements in electron configuration?

_____

7. Explain why chromium actually has one electron in the 4*s* sublevel and 5 electrons in the 3*d* sublevel instead of the predicted 2 in the 4*s* sublevel and 4 in the 3*d* sublevel.

_____

_____

Name _____ Date _____ Class _____

D. USING CONCEPTS

Examine the following electron configuration for element X and use it to answer questions 1-10.

$$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^2$$

1. In what period would element X be located? _____
2. In what group would element X be located? _____
3. Element X is located in what region of the periodic table? _____
4. What is the atomic number of element X? _____
5. In general what properties would you expect element X to exhibit?

_____

_____

6. How many electrons are in the outer energy level of element X? _____
7. How many electrons are in the 4th energy level of element X? _____
8. An element called Y has 2 more protons than element X. What is the electron configuration of element Y?

_____

9. The correct configuration for element Y is an apparent contradiction to the diagonal rule. What is the basis for this contradiction?

_____

_____

10. In this same period the next apparent contradiction to the diagonal rule would occur at what atomic number? _____

Chemistry: Form WS3.3.2B

Name _____

PERIODIC TABLE

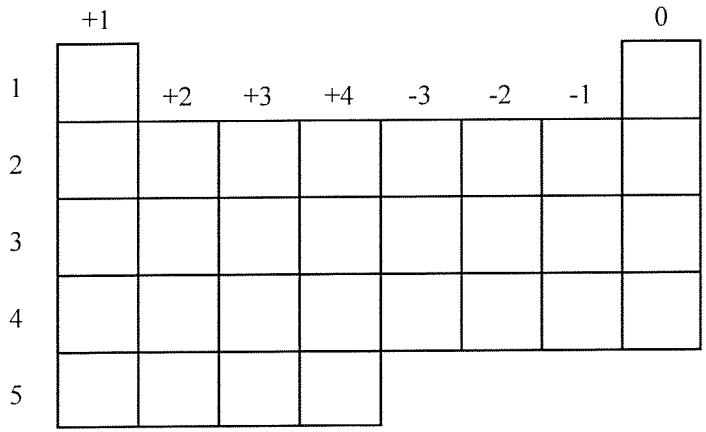
Period _____ Date _____

Periodic Table of the Elements on Mars

Below is a list of the 30 elements found on Mars. Place them in their proper place in the Martian Periodic Table using the information below. Martian elements follow the same natural laws as the elements on Earth. (*Note:* The symbols and the elements described below are fictitious.)

ELEMENT LIST

A	P
B	Q
C	R
D	S
E	T
F	U
G	V
H	W
I	X
J	Y
K	Z
L	⊠
M	♀
N	☼
O	‡



Use the descriptions below to put the elements in the proper place on the Martian Periodic Table.

1. The most metallic element is R.
2. The most nonmetallic element is O.
3. The inert gases are L, ♀, G, and V. Lis the lightest, G is the heaviest and ♀ is in period 2.
4. Their lightest element of all is E.
5. All of the following elements have three shells and the number of outermost electrons for each is as follows: K = 1; H = 2; ‡ = 3; W = 4; I = 5; D = 6; and C = 7
6. Element W has 14 protons.
7. B has 7 electrons.
8. Q has an atomic weight of 5 and a +1 oxidation state.
9. Y has only 1 electron in its outermost shell, but has 4 shells.
10. The N family is made up of the elements N, ‡, P, and X in order of increasing weight.
11. J is the heaviest of all atoms and is radioactive.
12. M is in period 5 and has an oxidation state of +2.
13. ☼ is in period 2 and group 2
14. U is like our element carbon and is in the same family as W, Z, and J.
15. Their solvent, like our most important liquid has the formula E_2F.
16. The oxidation states of the following elements are: ⊠ = –1; S = + 2; A = –2, and T = –3
17. Now every space should be filled. Can you give each element its proper atomic number?

Trends of the Periodic Table

A- has the most metallic charecter in the 3p block

B- is a transition metal

D- is a metalloid in the carbon family

E- has fifteen protons

F- only has one s electron in it's valence shell

G- has four valence electrons and a smaller radius than A

I- is a metalloid that reacts similarly to E

J- has a full d sublevel and a $4s^2$ valence

K- is an alkali metal with a mass less than F

L- has the least metallic charecter in group thirteen

M- is a noble gas with a larger atomic radius than argon

P- the alkaline earth metal with the lowest mass

Q- has a smaller radius than I

R- when it gains one electron it will have the electron configuration of argon

S- when it gains two electrons it forms it's most common ion

T- is the smallest halogen

W- is the fourth transition metal

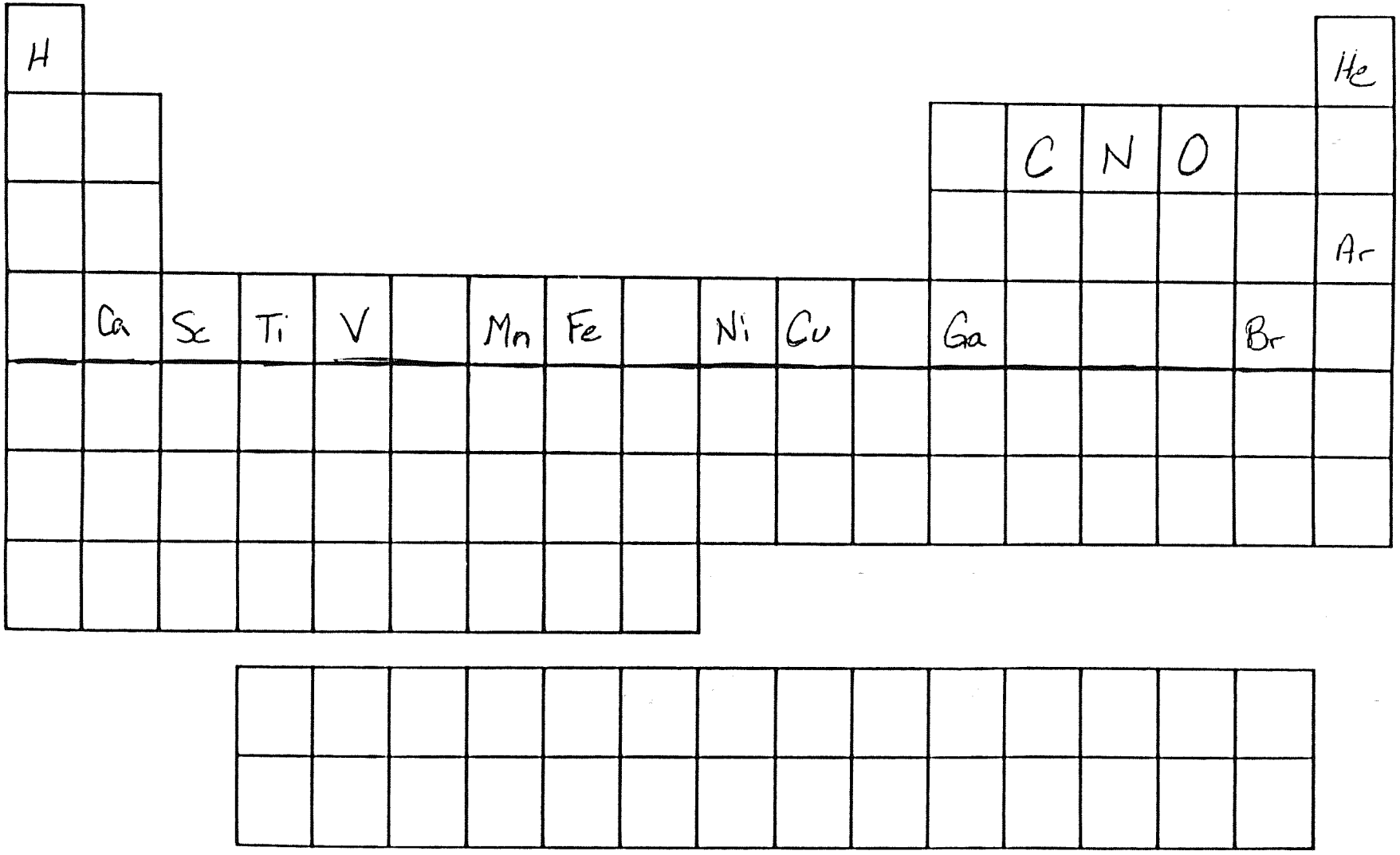
X-will form a positive two ion in period three

Y- is the most metallic element in period four

Z- does not form an ion naturally

Table A-3

Periodic Table



PERIODIC TABLE WORKSHEET

The code letters A to Z (omitting J) have been assigned to the first 25 elements in the short-form periodic table. These code letters do not represent the chemical symbols, nor have the letters been assigned in alphabetical order. These letters are presented in groups, and your assignment is to arrange these elements in the proper periodic form, according to the information given pertaining to certain members of the group in Table I. In Table II you are to indicate the atomic number of the letters, after you have decided on a position for the letters in Table I. The best way to start is to find in which group each family belongs, and then arrange the elements within the group. The following elements belong together in gruops: ZRD, PSIF, XBE, LHT, QKA, WOV, YMC, GUN.

The following clues are given:

U has a total of six electrons.
NA_2 is the simple formula of an oxide.
E is a noble gas.
S is a member of the Sodium family.
D has the smallest atomic mass in its group.
O has an atomic number larger than V but smaller thanW.
C has five electrons in its outer energy level.
L has an outer electron configuration of s^2.
O is a halogen.
The atomic mass of T is more than that of H but less than that of L.
M has an atomic number one less than that of A.
The atomic radius of Q is larger than that of A.
The electrons of atom N are distributed over three energy levels.
Atoms of I are larger than those of S.
R has the largest atomic mass of its group.
F is a gas.
Atom B contains 10 protons.
Q has an atomic mass less than that of K.
Y is more metallic than either M or C.
X has an atomic number one higher than F.
P has an atomic number one greater than X.

Table I

PERIOD	GROUP I	II	III	IV	V	VI	VII	VII
1								
2								
3								
4								

NAME:_____ DATE:_____SECTION_____LAB_____

Size Does Matter

Procedure:

1) Using your Chemistry Reference Table complete the following chart.

Element	Symbol	Atomic Number	Atomic Radius (pm)	Classification- Metal, Nonmetal or Metaliod
Lithium				
Sodium				
Potassium				
Rubidium				
Cesium				

2) On a piece of graph paper plot the atomic radius in (pm) (y-axis) vs. atomic number (x-axis) going down a group. Label this **Chart A** Atomic Radius vs. Atomic Number Down Group 1.

3) Using your Chemistry Reference Table complete the following chart

Element	Symbol	Atomic Number	Atomic Radius (pm)	Classification- Metal, Nonmetal or Metaliod
Sodium				
Magnesium				
Aluminum				

Silicon				
Phosphorus				
Sulfur				
Chlorine				
Argon				

4) On a piece of graph paper plot the atomic radius (pm) (y-axis) vs. atomic number (x-axis) going across a period. Label this **Chart B** Atomic Radius vs. Atomic Number Across a Period 3.

Reflection:

Compare the atomic radius of metals to the atomic radius of non-metals in a given period.

Questions:

1) What happens to atomic size as you go across Period 3 (Na to Cl)? Why?

2) What happens to atomic size as you go down Group 1 (Li to Rb)? Why?

3) Which group of elements has the smallest atomic radius respectively for their period?

4) Which group of elements has the largest atomic radius respectively for their period?

Use the following information about sodium to answer questions 5 through 11.

Sodium is a metallic element with a symbol **Na** (from Latin *natrium* or Arabic *natrun*) and atomic number 11. It is a soft, silvery-white, highly reactive metal and is a member of the alkali metals within "group 1". It has only one stable isotope, ^{23}Na.

Elemental sodium was first isolated by Sir Humphry Davy in 1806 by passing an electric current through molten sodium hydroxide. Elemental sodium does not occur naturally on Earth, but quickly oxidizes in air and is violently reactive with water, so it must be stored in an inert

medium, such as a liquid hydrocarbon. The free metal is used for some chemical synthesis, analysis, and heat transfer applications.

Sodium ion is soluble in water in nearly all of its compounds, and is thus present in great quantities in the Earth's oceans and other stagnant bodies of water. In these bodies it is mostly counterbalanced by the chloride ion, causing evaporated ocean water solids to consist mostly of sodium chloride, or common table salt. Sodium ion is also a component of many minerals.

5) Give the electron configuration for sodium. _____

6) Give the electron configuration for the sodium ion (Na^+). _____

7) What do you think will happen to the size of sodium when it becomes an ion? Why?

8) Based on the passage explain why sodium metal in its natural or free state is not found in the Earth's crust. How is sodium present in the Earth's crust?

9) Why is the sodium ion soluble in water?

10) Based on the passage the best definition of molten is
(1) To dissolve
(2) To liquefy by heat
(3) To pass or fade away
(4) To solidify
(5) To glow

11) What do you think will happen to the size of an atom (such as fluorine) when it forms a negative ion? Why?

NAME:_____ DATE:_____SECTION_____LAB_____

Who Is Bigger Than Whom?

Background:

Ions are not the same size as the atoms they come from. When positive ions loose an electron(s) and negative ions gain an electron(s), their size will change.

Purpose:

We will use the chart below to investigate what occurs when ions are formed. We will use the elements going across period four.

Data:

Element	Atomic Radius (pm)
K	
Ca	
Ga	
Ge	
As	
Se	
Br	

Ion	Ionic Radius (pm)
K^+	133
Ca^{2+}	99
Ga^{3+}	62
Ge^{4+}	53
As^{3-}	222
Se^{2-}	198
Br^-	195

Procedure:

1) Use your CRT and obtain the atomic radii of the elements going across group four.

2) Label the y-axis atomic radius in picometers. Create an appropriate scale.

3) Label the x-axis Period 4 Element. Place each element symbol evenly spaced out on the axis.

4) Choose a color for atomic radius. Graph the atomic radius in picometers vs. the element. Connect the points with a line.

5) Choose a different color. Graph the ionic radius in picometers vs. the ion. Connect the points with a line.

Questions:

1) What occurs to the atomic radius as you go across a period?

2) What is the underlying reason for this change?

3) Describe what happens to an atom's radius when it becomes a positive ion.

4) Give a possible reason for your answer to question 3.

5) Describe what happens to an atom's radius when it becomes a negative ion.

6) Give a possible reason for your answer to question 5.

7) What are the electron configurations of K^+ and Ca^{2+}?

   K^+ :_____

   Ca^{2+} :_____

8) Why are they isoelectronic?

9) Even though K^{+1} and Ca^{+2} are isoelectronic Ca^{+2} is smaller, why do you think Ca^{+2} is smaller than K^{+1}?

10) What are the electron configurations of As^{3-}, Se^{2-} and Br^{-}?

As^{3-}:_____

Se^{2-}:_____

Br^{-}:_____

11) Even though As^{-3}, Se^{-2} and Br^{-1} are isoelectronic As^{-3} is the largest, why do you think As^{-3} is the largest?

Reflection:

A) Describe what happens to the electrons and the size of a metal as it becomes a positive ion.

B) Describe what happens to the electrons and the size of a non-metal as it becomes a negative ion.

C) What is the main factor which determines the size on a ion?

NAME:_____ DATE:_____SECTION_____LAB_____

You Can't Take That Away

Introduction:

The First Ionization Energy is the energy needed to remove the outer most electron from an atom.

Procedure:

1) Using your CRT complete the chart to the right by filling in each element's first ionization energy.

Element	Symbol	Atomic Number	First Ionization Energy	Classification-Metal, Nonmetal or Metalloid
Nitrogen				
Phosphorus				
Arsenic				
Antimony				
Bismuth				

Atomic Number	Element	First Ionization Energy (kJ/mol)
19	K	419
20	Ca	590
21	Sc	633
22	Ti	659
23	V	651
24	Cr	653
25	Mn	717
26	Fe	762
27	Co	760
28	Ni	737
29	Cu	745
30	Zn	906
31	Ga	579
32	Ge	762
33	As	944
34	Se	941
35	Br	1140

2) On a piece of graph paper plot the First Ionization Energy (y-axis) vs. Atomic Number (x-axis) going down a group. Label this **Chart A** First Ionization Energy vs. Atomic Number Down Group 15.

3) On a piece of graph paper plot the First Ionization Energy (y-axis) vs. Atomic Number (x-axis) going across a period. Label this **Chart B** First Ionization Energy vs. Atomic Number Across Period 4.

Questions:

1) Based on your **Chart A**, what happens to first ionization energy as you go down a group?

2) Based on **Chart B**, what happens to first ionization energy as you go across a period?

3) Based on **Charts A & B**, describe a metal in terms of first ionization energy.

4) Based on **Charts A & B** describe a non-metal in terms of first ionization.

5) Which group in the Periodic Table do you think will have in general the highest ionization energies? Why?

4) Give the electron configuration for K and Ca. Based on the configurations explain why there is such a large jump in first ionization energy between K and Ca.

K:_____ First Ionization Energy:_____kJ/mol

Ca:_____First Ionization Energy:_____kJ/mol

5) Give the electron configuration for Zn and Ga. Based on the configuration explain why Zn has a much larger first ionization energy than Ga.

Zn:_____ First Ionization Energy:_____kJ/mol

Ga:_____ First Ionization Energy:_____kJ/mol

6) Give the two reasons why first ionization energies in general increases across a period.

7) Give two reasons why first ionization energies in general decrease down a group.

Reflection:

Describe what happens to metallic character as you go down a group and across a period.

Homework:

The chart to the right shows the ionization energies for each ionization of magnesium. This is the amount of energy needed to remove each individual electron from magnesium. Based on the chart and on magnesium's electron configuration answer the following questions.

Magnessium	
Ionization	Energy (kJ/mol)
1st	737
2nd	1450
3rd	7732
4th	10542

a. Explain why there is an increase in IE after the 1st ionization.

b. Explain why there is such a large increase in IE for the 3rd ionization.