

Trends Handout name: _____

There are 7 trends on the periodic table that we will follow. Using your periodic table, answer all of the questions in the packet. Think hard.

The periodic table has _____ groups that go _____ + _____.

The rows that go across left to right are called the _____.

Similar elements are found in _____.

Elements with the same number of electron orbitals are found in the _____.

The elements are arranged by increasing _____.

This is equal to the _____ of _____ and _____.

The atomic mass minus the atomic number equals the number of _____.

Trend #1 atomic mass

What is the group trend for atomic mass? Why does this trend exist?

What is the period trend for atomic mass? Why does this trend exist?

Explain what happens at the cobalt-nickel part of the table concerning mass and the period trend? Look also at the argon-potassium masses.

Trend #2 Atomic Size (the atomic radius measured in in pico-meters)
 Fill in the tables for atomic size across period 2, then for groups 2 and 18 below.

atom	Li	Be	B	C	N	O	F	Ne
Radius in pm								

The Period TREND for atomic size/atomic radius is

Why do atoms get smaller going across a period?

The Group TREND for atomic size or atomic radius is...

GROUP 2 atom	radius in pm
Be	
Mg	
Ca	
Sr	
Ba	
Ra	

GROUP 17 atom	radius in pm
F	
Cl	
Br	
I	
At	

Trend #3: Nuclear Charge

or what is the charge of nucleus of each atom
List the net nuclear charge for Period 2 atoms below. Then do the same for any 2 groups that you choose. Label WHAT GROUP you use, then add symbols and their values.

atom	Li	Be	B	C	N	O	F	Ne
Net Nuclear Charge								

Describe the TREND for Net Nuclear Charge going across a period.

GROUP	Net Nuclear Charge

GROUP	Net Nuclear Charge

Describe the TREND for Net Nuclear Charge going down any group.

Trend #4 Electronegativity

Define Electronegativity (EN): _____

_____.

Look at Table S, which element has the highest EN value? _____ What is it? _____

Define RELATIVE SCALE: _____

_____.

Fill in this abbreviated Periodic Table, put the EN value for each listed element below its symbol. Fill in the GROUP NUMBERS ACROSS THE TOP SET OF EMPTY BOXES

GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP	GROUP
H	Leave empty						He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca	Ga	Ge	As	Se	Br	Kr
Rb	Sr	In	Sn	Sb	Te	I	
Cs	Ba	Tl	Pb	Bi			

What is the EN TREND going down a group? _____

What is the EN TREND going across a period? _____

Why do most NOBLE GASES have no Electronegativity value?

Which elements of each pair have the higher EN values? (circle higher EN value)

Cl or Ca

Sr or Ge

Br or Cs

What is the TREND FOR EN for the whole periodic table?

Explain how Xenon and Radon can have an EN value even as noble gases.

Explain why group 1 atoms have lower electronegativity values than the group 17 atoms. Explain this difference.

Trend #5: 1st Ionization Energy

Define 1st Ionization Energy:

The unit is _____

Fill in this chart with the 1st Ionization Energy levels for each atom in this chart.

GROUP 1	GROUP 2	GROUP 13	GROUP 14	GROUP 15	GROUP 16	GROUP 17	GROUP 18
H	<i>Leave empty</i>						He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar
K	Ca	Ga	Ge	As	Se	Br	Kr
Rb	Sr	In	Sn	Sb	Te	I	Xe
Cs	Ba	Tl	Pb	Bi	Po	At	Rn

Describe the GROUP TREND for 1st Ionization Energy.

Define the PERIOD TREND for 1st Ionization Energy.

Where are the highest and lowest 1st Ionization Energy values? Why?

If you ever forget a TREND, how will you deal with this on the REGENTS?

Trend #6: Cation and anion size trends

Atom sizes are listed in Table S as atomic radius. Cations form when metal atoms lose electrons, so that they become isoelectric to noble gases. Not only do they lose electrons, they ALWAYS lose all the electrons in the outermost or valence orbital. Cations are ALWAYS smaller than their atoms.

Cations

Fill in this chart going down group 2.

GROUP 2 atom	Atomic electron configuration	Cation electron configuration
Be		
Mg		
Ca		
Sr		
Ba		
Ra		

It is clear that cations are smaller than their atoms from this chart.

The group trend for cation size is

Because...

Fill in these 2 charts going across period 3 and 4. State the period trend for cation size.

atom	Na	Mg	Al
Electron config			
Cation config			

atom	K	Ca	Sc	Ti
Electron config				
Cation config				

Anion Size

Anions form when nonmetal atoms gain enough electrons to fill up the outermost, or valence orbital. They always have the same number of orbitals as the atoms they form from, but with these extra negative charges all repelling each other, anions are a little bit stretched out as compared to the atoms they come from.

Fill in this chart with the electron configurations of the group 17 atoms and anions.

GROUP 17 atom	Atom electron configuration	Anion electron configuration
F		
Cl		
Br		
I		

State the group trend for anion size:

Fill in this chart for anion size going across period 2 and period 3

atom	N	O	F
Electron config			
Anion config			
atom	P	S	Cl
Electron config			
Anion config			

State the period trend for anion size:

Why are anions always bigger than their atoms?

Trend #7 Metallic Properties + Non-Metallic Properties of the Elements

The metals on the table are on the _____ side. The non-metals are on the _____.

Metals properties include:

Nonmetal properties include:

The most metallic element of them all is _____.

The most non-metallic element of them all is _____.

When comparing, which is most metallic: silver, zirconium, or cesium

When comparing, which is most nonmetallic: chlorine, iodine, phosphorous

What are metalloids?

List the symbols of all the metalloids

What are the 2 exceptions to the metalloids?