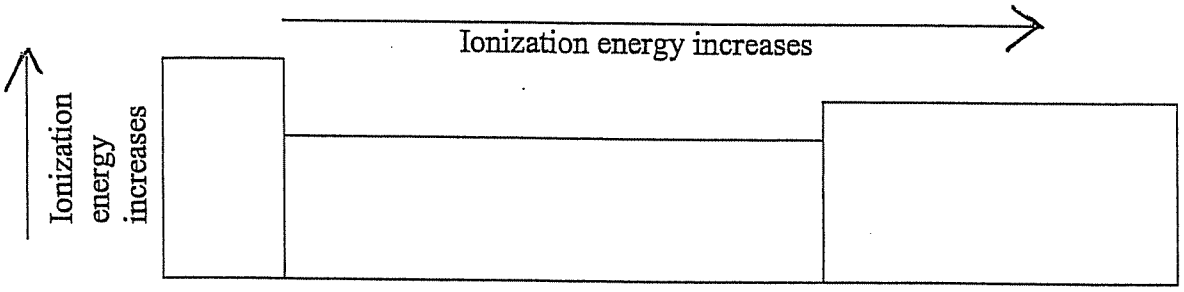
Chem 11 Periodic Trends Name:

1. Attract or repel? a. positive and positive R b. negative and negative R c. positive and negative A

2. Place arrowheads in the correct direction on the horizontal and vertical lines below.

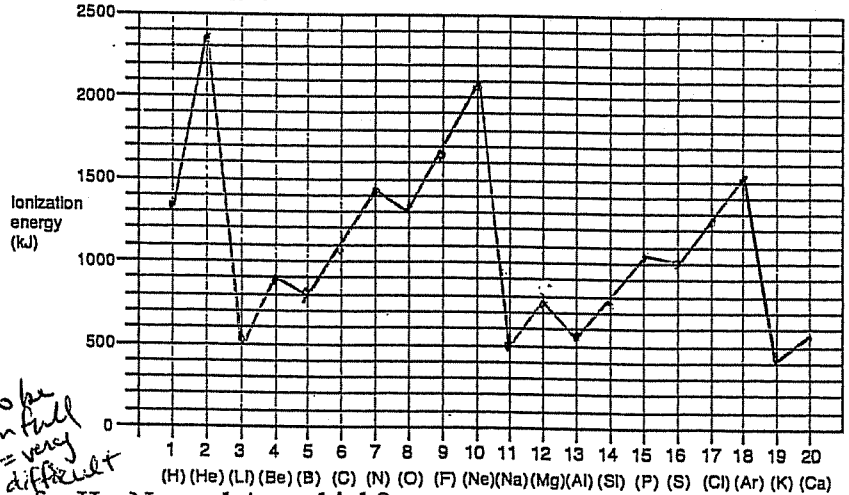


3. Which member of each of the following pairs should have a greater ionization energy?
a) Br or (Cl) b) Al or (Cl) c) (Ne) or Xe d) (Mg) or Ba e) F or (Ne) f) Rb or (I)

4. The ionization energies (IE) of the first 20 elements are given in the table below.

Atom	Atomic #	IE (kJ)	Atom	Atomic #	IE (kJ)	Atom	Atomic #	IE (kJ)
H	1	1312	O	8	1314	P	15	1012
He	2	2372	F	9	1681	S	16	1000
Li	3	520	Ne	10	2081	Cl	17	1251
Be	4	899	Na	11	496	Ar	18	1521
B	5	801	Mg	12	738	K	19	419
C	6	1086	Al	13	578	Ca	20	590
N	7	1402	Si	14	787			

Plot the ionization energy versus atomic number on the following graph and connect each point to the next with a straight line. Then answer the following questions.



electrons have to be removed from full shells = very difficult

a) Why are the ionization energies for He, Ne, and Ar so high?
b) Why do the ionization energies decrease going from He to Ne to Ar? outer most electrons are further from nucleus, attraction smaller, easy to remove
c) Why is there a general increase in ionization energy going from Li to Ne? electrons closer to nucleus, increased attraction
d) "Filled subshells and half-filled subshells have a special stability which requires extra energy to be applied before electron removal can occur". This general statement is supported by the existence of the electron configuration exceptions found for Cu and Cr. What experimental evidence exists in the graph "ionization energy versus atomic number"?

half-filled N & P have half-filled p → IE higher than elements around them

Be & Mg, He, Ne & Ar have filled shells → IE higher than elements around them

Valence = number of electrons available for bonding
= combining capacity

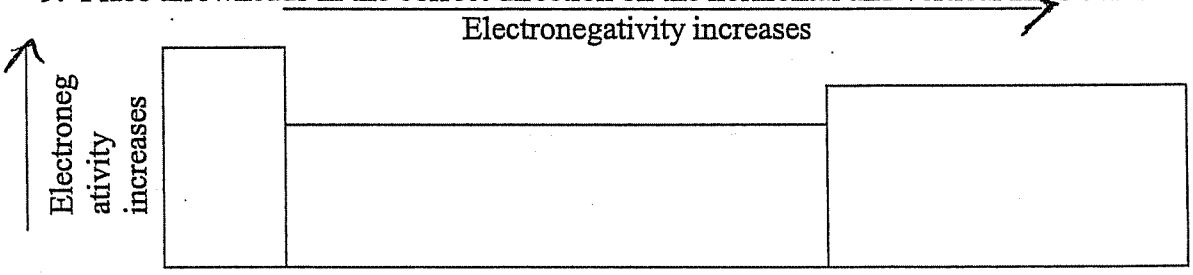
5. Consider two atoms: O and Te.
   a) Which atom has the larger atomic radius? Te
   b) Which atom has the larger ionization energy? O
   c) Which atom has more shells? Te
   d) How many valence electrons does Te have? 6
   e) What is the valence of Te? 2
   f) Which atom has a greater electrostatic attraction between its nucleus and outermost electrons? O

6. Consider two atoms: Ga and Br.
   a) Which atom has a larger atomic radius? Ga
   b) Which atom has the larger ionization energy? Br
   c) Which atom has more shells? Same
   d) How many valence electrons does each atom have? Ga = 3 Br = 7
   e) What is the valence of each atom? 3 = Ga 1 = Br
   f) Which atom has a greater electrostatic attraction between its nucleus and outermost electrons? Br

7. Consider two atoms: Li and F.
   a) Which atom is larger? Li
   b) Which atom has the stronger attraction to the outer electrons on a neighbouring atom, based only on the atomic radius? F
   c) Which atom has the greater nuclear charge? F
   d) Which atom can attract electrons from an adjacent atom most strongly, based on both size and nuclear charge? F
   e) Fill in the blanks: In general, when going from left to right across the periodic table the electronegativity of the atoms will increase.

8. Consider two atoms: F and I.
   a) Which atom is larger? I
   b) Which atom has a stronger attraction to the outer elelctrons of another atoms? F
   c) Fill in the blanks: In general, when going down a family of the periodic table the electronegativity of the atoms will decrease.

9. Place arrowheads in the correct direction on the horizontal and vertical lines below.



10.
   a) Ignoring the noble gases, which atom is the most electronegative? F
   b) Ignoring the noble gases, which atom is the least electronegative? Fr
   c) Which is more electronegative, K or Be? Be
   d) Which is more electronegative, Pb or S? S