Name: _____
Hour: ____ Date: _____

Chemistry: *Ionization Energies*

Directions: Below is a table of the 1st, 2nd, and 3rd ionization energies for the first 20 elements. On the graph, plot the 1st ionization energy vs. atomic number. (The atomic number should be along the x-axis.) Then, on the same graph, plot the 2nd ionization energy vs. atomic number, and similarly for the third ionization energy. Use all of the elements of a good graph. After completing your graph, answer the questions at the bottom of this page.

Atomic Number	Chemical Symbol	1st Ionization Energy (kJ/mol x 10^{-3})	2nd Ionization Energy (kJ/mol x 10^{-3})	3rd Ionization Energy (kJ/mol x 10^{-3})
1	H	1.3	----	----
2	He	2.4	5.2	----
3	Li	0.5	7.3	11.8
4	Be	0.9	1.8	14.8
5	B	0.8	2.4	3.7
6	C	1.1	2.4	4.6
7	N	1.4	2.9	4.6
8	O	1.3	3.4	5.3
9	F	1.7	3.4	6.0
10	Ne	2.1	4.0	6.3
11	Na	0.5	4.6	6.9
12	Mg	0.7	1.5	7.7
13	Al	0.6	1.8	2.7
14	Si	0.8	1.6	3.2
15	P	1.0	1.9	2.9
16	S	1.0	2.3	3.4
17	Cl	1.3	2.3	3.9
18	Ar	1.5	2.7	3.9
19	K	0.4	3.1	4.6
20	Ca	0.6	1.1	4.9

1. In general, what happens to the 1st ionization energy as you go across a period?

2. In general, what happens to the 1st ionization energy as you go down a group / family?

3. List the elements for which the 2nd ionization energy is significantly higher than the 1st (say, more than four times higher).

4. Explain why the elements you listed in your answer to question three have such large 2nd ionization energies.

5. List the elements for which the 3rd ionization energy is significantly higher than the 2nd (say, more than four times higher).

6. Explain why the elements you listed in your answer to question five have such large 3rd ionization energies.