**Skill 15.01 Problem 1**

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| (a) Which side of the periodic table is associated with nonmetals? Metals? |
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| (b) Identify whether each of the following is a metal, nonmetal, metalloid, or noble gas |
| Silicon  Sodium  Sulfur  Xenon |
| (c) Based on the electron arrangement of the electrons, indicate whether each atom is a metal or nonmetal. |
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**Skill 15.02 Problem 1**

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| Below are models that depict the arrangement of electrons in metals in nonmetals. Propose how metals and nonmetals can be described in terms of their electron arrangements. |
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**Skill 15.03 Problem 1**

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| The diagrams below show the arrangement of electrons for different atoms. Complete the following based the diagrams.  I.  II. |
| (a) For each atom circle the outer most electron(s). |
| (b) For which atom are the outer electrons most attracted to the nucleus? Explain. |
| (c) Both atoms shown are unstable. For each atom, indicate whether losing or gaining electrons would increase the stability of the atom. |

**Skill 15.04 Problem 1**

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| (a) Arrange the following in order from low to high with respect to ionization energy. Justify your reasoning in terms of atomic principles. |
| Na, Li, K, Cs, Rb  Cl, Na, Al, S, Mg |
| Which atom depicted below would have the highest ionization energy? Explain.  I.  II |
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| Which atom depicted below would have the highest ionization energy? Explain.  I.II. |
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**Skill 15.05 Problem 1**

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| The first three ionization energies of some element are as follows:  I1 = 520 kJ/mol, I2 = 7300 kJ/mol, I3 = 11815 kJ/mol  Which atom shown below is most consistent with the data? Explain.  I.  II. |
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| The first five ionization energies of some element are as follows:  I1 = 1086 kJ/mol, I2 = 2350 kJ/mol, I3 = 4620 kJ/mol, I4 = 6220 kJ/mol, I5 = 38,000kJ/mol  To which group does this element belong? Explain. |
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**Skill 15.05 Problem 2**

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| Consider the following electronic configurations for 3 different neutral atoms.  1s22s22p6  1s22s22p63s1  1s22s22p63s2 |
| (a) Which atom has the largest first ionization energy? Explain. |
| (b) Which atom has the smallest first ionization energy? Explain. |
| (c) Which atom has the largest second ionization energy? Explain. |

**Skill 15.06 Problem 1**

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| Arrange the following from low to high with respect to atomic radius. Justify your reasoning. | |
| Mg, Na, Ar, Al | Rb, K, Li, Cs |

**Skill 15.07 Problem 1**

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| (a) Which of the following has the smallest atomic radius? Explain.  Ne, O2-, Na+, Mg2+ |
| (b) Which of the following has the smallest atomic radius? Explain.  Al3+, Ne, O2-, N3- |

**Skill 15.08 Problem 1**

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| Arrange the following from low to high with respect to electronegativity. |
| (a) I, Cl, F, Br |
| (b) F, Mg, Na, Cl |