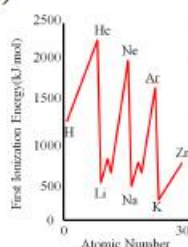


**Atomic Structure and Properties**  
**1.5 Atomic Structure and Electron Configuration**  
**Worksheet**

- 1) The following questions pertain to the element potassium.
  - a. Write the equation for the first ionization of potassium.
  - b. Draw the shell model that represents the potassium atom.
  - c. Identify the electron that has the lowest ionization energy in the shell model that you drew.
  - d. Use Coulomb's law to explain why this electron has the lowest ionization energy
  - e. Use the 'shielding effect' to explain why this electron has the lowest ionization energy.
- 2) Why is the first ionization energy for lithium less than that of neon? (Discuss both atoms in your response.)



- 3) What is the electron configuration for nitrogen in its ground state? (long form)
- 4) What is the electron configuration for manganese in its ground state? (long form)
- 5) What is the ground state electron configuration of the iodine ion,  $I^-$ ? (long form)
- 6) What is the ground state electron configuration of calcium ion,  $Ca^{2+}$ ? (long form)
- 7) What is the ground state electron configuration of arsenic? (long form)
- 8) What is the complete ground state electron configuration for  $Zn^{2+}$ ?
- 9) What is the ground state electron configuration of palladium? (short form)
- 10) What is the ground state electron configuration of lead? (short form)
- 11) What is the ground state electron configuration of rutherfordium? (short form)
- 12) What is the ground state electron configuration of plutonium? (short form)

13) Which of the following are isoelectronic?

- a. Ne and  $F^-$
- b.  $Ca^{2+}$  and  $Se^{2-}$
- c. N and  $F^-$
- d. I and  $Ba^{2+}$
- e.  $K^+$  and  $Ca^{2+}$

14) Draw an orbital diagram for sulfur in its ground state.

15) Draw an orbital diagram for iron in its ground state.

16) Draw the orbital diagram for calcium in its ground state.

17) Draw the orbital diagram for silicon in its ground state.

18) Draw an orbital diagram for carbon in its ground state.

19) Draw an orbital diagram for phosphorus in its ground state.

20) Draw an orbital diagram for selenium in its ground state.

21) On average, electrons from the 2s subshell of an element are further from the nucleus than electrons from the 2p subshell of an element; however, the energy required to remove an electron of an element from 2s is greater than that of 2p. Provide an explanation for this fact.