2.1 ATOMIC STRUCTURE

2.1 Assignment

1. Chemical bonds are formed when atoms share, donate or accept electrons. In your own words, explain how Dalton's, Thomson's and Rutherford's models do not allow for chemical bonding.

Dalton's model- did not know about subatomic particles yet; therefore, there were no electrons to bond

Thomson's "Plum Pudding" model- electrons and protons are scattered throughout the atom. These particles would be attracted to one another and it would be hard to remove an electron

Rutherford's "Nuclear model"- getting there, but only one sphere around the nucleus would become an issue as the number of electrons increase

Rutherford's "Solar System" model- electrons would be attracted to the positive nucleus and would cause the atom to collapse.

2. The Bohr model is useful for representing electron shells, however, this model has been replaced by the Quantum Mechanical Model. Explain how this is more accurate representation of the atom.

deBroglie and Schrodinger contributed to the quantum mechanical model. With these scientists came the fact that electrons can act like a wave and a particle (wave-particle duality) and the Schrodinger equation. This helps explain electron movement within an atom. Schrodinger also used a mathematical equation to predict the location of an electron (resulting in the "cloud" or 3D nature of the shell). The Bohr model assumed that electrons existed in specific energy levels and moved in a 2D motion.

3. Use the characteristics of the atoms described above, and the examples given below to complete the following chart.

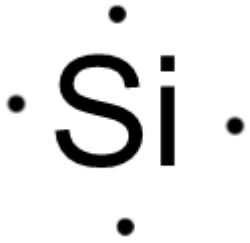
Atom	Closet Noble Gas	Most Common Ion
a. Sodium	Neon	Na^+
b. Chlorine	Argon	Cl^-
c. Silicon	Neon or Argon	Si^{4+} or Si^{4-}
d. Aluminum	Neon	Al^{3+}
e. Oxygen	Neon	O^{2-}

4. Draw the Lewis Dot Diagrams for the **atoms** below:
    - Aluminum

    - Calcium

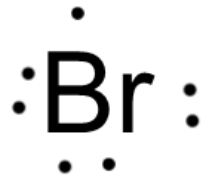
    - Sulfur

    - Silicon



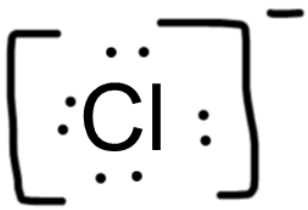
    - Neon

- Bromine

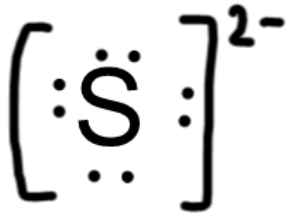


5. Draw the Lewis Dot Diagrams for the **ions** below:
   - Al^{3+}

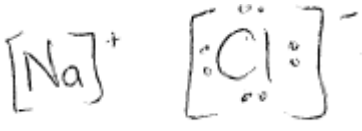
   - Cl^{-}



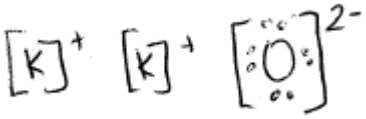
   - S^{2-}



6. CHALLENGE! Draw the Lewis Structure for the following **compounds**. Hint: to begin, determine if the compound is ionic or covalent.
   - Sodium Chloride



   - Potassium Oxide



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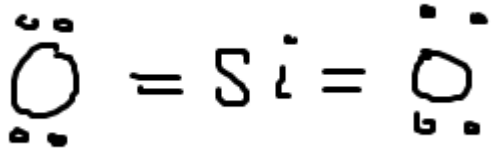
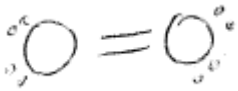
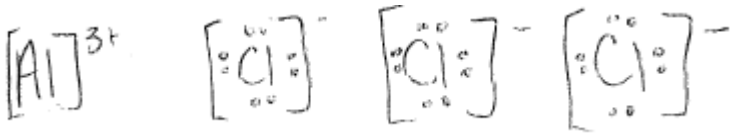
- Silicon dioxide



- Oxygen gas



- Aluminum chloride



- Boron Tribromide