

# Unit 4: Periodic Table and Bonding

## Objectives

1. Locate families or groupings on the periodic table and list general characteristics of each.
2. Determine the number of valence electrons for an element from its position on the periodic table.
3. Describe and explain the change in each of the periodic properties down a group and across a period of elements using the concepts of electron configuration and effective nuclear charge (radius, ionization energy, electronegativity, activity).
4. Identify the valence electrons in an atom and explain their role in determining the bonding capacity of an atom.
5. Draw the electron dot notation for a given element.
6. Compare/contrast ionic and covalent compounds.
7. Identify the representative particles of elements (atoms), ionic compounds (formula units) and molecular or covalent compounds (molecules).
8. Diagram the formation of an ionic bond between two given elements using electron-dot diagrams.
9. Differentiate between atoms and ions; write equations for formations of cations and anions.
10. Use the periodic table to determine the charge of an ion.
11. Memorize the formula, charge and name of the polyatomic ions.
12. Write the formulas and names for ionic compounds.
13. Draw Lewis dot structures for simple molecules using the octet rule.
14. Write the formulas and names for molecular (covalent) compounds.
15. Using VSEPR theory, predict the shapes of molecules and draw structural formulas for these molecules.
16. Describe the metallic bond and explain the physical properties of metals in terms of metallic bonding.
17. Predict whether bonds are ionic, polar covalent or non-polar covalent using electro-negativity values.
18. Determine the partial charge distribution (dipoles) in a polar covalent bond.
19. Determine the polarity of a molecule using electronegativity differences.
20. Differentiate between intermolecular forces and intramolecular forces.
21. Describe the intermolecular (IM) forces: dipole-dipole, hydrogen bonding, dispersion (London) forces; predict the type of IM force(s) present in a substance; relate the type of IM force to properties of a substance.