Unit 5- Chemical reactions & Stoichiometry

PS-5 Chemical reactions & stoichiometry- Chemical changes are described qualitatively and quantitatively using chemical equations. By writing balanced chemical equations, students will be able to predict types and quantities of products formed from these reactions.

TS-5.1 Chemical equations– Chemical reactions are described by using balanced chemical equations. These show the relationship between reactants, products and conditions that make the reaction proceed.

    5.1.1 Write a chemical equation using correct chemical formulas and symbols
    5.1.2 Balance chemical equations using atom counts and coefficients
       Key Ideas: reactant, product, catalyst, state symbols, Law of Conservation of Matter

TS-5.2 Chemical reactions- Chemical reactions can be grouped based on patterns of reactivity or driving forces (redox or acid/base). Characteristics of chemical reactions involve energy changes, rates and equilibria.

    5.2.1 Identify the types of chemical reactions based on types of particles and the pattern of reactivity
       Key Ideas: synthesis/combination, decomposition, single replacement, double replacement & combustion
    5.2.2 Identify the types of chemical reactions based on driving forces
       Key Ideas: reduction/oxidation, acid/base, activity series (metals & nonmetals)
    5.2.3 Predict the products of chemical reactions based on types of particles and the patterns of reactivity
    5.2.4 Write ionic, net ionic and half reaction equations using oxidation states for a given molecular equation

TS-5.3 Mole Concept- A mole is an SI unit for quantity of matter that allows scientists to study immensely small atoms and molecules in a macroscopic way.

    5.3.1 Describe the mole as a quantity.
       Key Ideas: representative particles (atoms, molecules & formula units)
    5.3.2 Calculate the molar mass of a substance
    5.3.3 Relate the mole and number of particles using Avogadro's number
       Key Ideas: Standard temperature & pressure
    5.3.4 Relate the mole and the mass of a substance using molar mass
    5.3.5 Relate the mole and volume of a gas at STP using molar volume
    5.3.6 Convert between moles, mass, volume and particles
    5.3.7 Determine empirical and molecular formulas using the composition of a compound

TS- 5.4 Stoichiometry- Stoichiometry is the relationship between amounts of products and reactants.

    5.4.1 Determine mole ratios from the coefficients of a balanced chemical equation

    5.4.2 Solve stoichiometric problems using masses, particle numbers and volumes of gases at STP

    5.4.3 Identify limiting reactants of a chemical reaction given quantities of reactants

    5.4.4 Solve for percent yield using actual yields and theoretical yields calculated using stoichiometry percent error