

Unit 5 - What's the Final Product: Reactions and Stoichiometry

Content Area: **Science**
Course(s): **Chemistry Honors**
Time Period: **December**
Length: **4 weeks**
Status: **Published**

Transfer Skills

Not all chemicals when mixed will react. Students will be able to predict the outcomes of mixing reactants and the amounts of products produced that will affect the percentage yield.

Enduring Understandings

Chemical formulas provide information about the amount of chemicals that can be used or produced during a reaction.

Matter is conserved in a chemical reaction

Balanced equations allow you to determine the amount of product produced from a given amount of reactant or activity series of the reactivity of elements can be used to predict if reactions will occur.

Chemical formulas can provide much information about the amount of chemicals that can be used or produced during a reaction.

Quantities of all reactants are not always completely consumed.

Not every combination of reactants will produce a chemical reaction

Essential Questions

How do chemical reactions obey the law of conservation of matter?

How can you predict the products of a chemical reaction?

How can we determine if a chemical change has taken place?

To what extent are all chemical reactions the same?

How is stoichiometry used to obtain quantitative information from balanced equations?

To what extent can you determine which reactant will be used up first?

Content

Synthesis, decomposition, single and double replacement, combustion, activity series, Stoichiometry, Limiting reactant, excess reactant, theoretical yield, actual yield, percent yield,

Skills

Balance chemical reactions

Write word equations and formula equations for a given chemical reaction.

Predict the products of simple reactions given the reactants.

Use the activity series of metals and some nonmetals to predict the products of single replacement reactions.

Predict if a reaction will occur and what the products will be using an activity series.

Solve various types of stoichiometric problems by balancing equations using moles, mass, representative particles, and volumes of gases (at standard temperature and pressure)

Identify the limiting reactant for a reaction and use it to calculate theoretical yield.

Calculate the amount reactant remaining after a reaction is complete.

Calculate percent yield.

Calculate the yields in a multi-step reaction with different percent yields.

Resources

Standards

SCI.9-12.5.1.12.A.2	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
SCI.9-12.5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
SCI.9-12.5.1.12.B.3	Revise predictions and explanations using evidence, and connect explanations/arguments

to established scientific knowledge, models, and theories.

SCI.9-12.5.1.12.B.4

Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

SCI.9-12.5.1.12.D.2

Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

SCI.9-12.5.1.12.D.3

Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.

SCI.9-12.5.2.12.A.2

Account for the differences in the physical properties of solids, liquids, and gases.

SCI.9-12.5.2.12.B.1

Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.

SCI.9-12.5.2.12.B.2

Describe oxidation and reduction reactions, and give examples of oxidation and reduction reactions that have an impact on the environment, such as corrosion and the burning of fuel.

SCI.9-12.5.2.12.B.3

Balance chemical equations by applying the law of conservation of mass.