

Unit 04: Chemical Reactions

Content Area:

Course(s):

Time Period: **Year**

Length: **180**

Status: **Published**

Unit 4

Unit Title:	Chemical Reactions
Suggested Duration:	Four weeks

Interdisciplinary Connections

Interdisciplinary Connections
Reading and Writing Companion Standards for History, Social Studies, Science and Technical Subjects <ul style="list-style-type: none">▪ Grades 9-10▪ Grades 11-12
Math Practices: https://www.nj.gov/education/standards/math/Index.shtml
Science Practices: https://www.nj.gov/education/standards/science/Index.shtml
Find and paste appropriate <u>Companion Standards or Practices</u> here.

Mathematics—Metric conversions, solving for an unknown, interpreting graphs

Language Arts- Reading scientific documents for comprehension, writing conclusions, writing lab reports

Social Studies—Historical events leading to scientific discoveries and/or revisions

Foreign Language – Chemical nomenclature relates to the learning of any language

Technology Integration

Technology Integration
Northern supports the integration of the SAMR Model : a framework which extends learning through the use of technology. The installation of interactive boards, the purchase of softwares and subscriptions, and the investment in 1:1 laptops and various other instructional technologies are examples of Northern's commitment to enhancing students' learning and preparing the 21st century learner for college and careers.

- *Use of Atomic Emission Spectroscopes*
- Vernier Computer-based probes and software
- ViewBoard for presentation of information and interactive activities
- United Streaming/Discovery Education
- Laptops/Computer Lab—web based project
- AP Classroom.

Standard(s) Addressed

Course Skills

TRA-1.A Identify evidence of chemical and physical changes in matter

TRA-1.B Represent changes in matter with a balanced chemical or net ionic equation: a. For physical changes. b. For given information about the identity of the reactant and/or product. C. for ions in a chemical reaction.

TRA-1.C Represent a given chemical reaction or physical process with a consistent particulate model.

TRA-1.D Explain the relationship between macroscopic characteristics and bond interactions for: a. Chemical processes. b. Physical processes.

TRA-2.B Identify species as BrønstedLowry acids, bases, and/or conjugate acid-base pairs, based on proton-transfer involving those species.

TRA-2.C Represent a balanced redox reaction equation using half-reactions

SPQ-4.A Explain changes in the amounts of reactants and products based on the balanced reaction equation for a chemical process.

SPQ-4.B Identify the equivalence point in a titration based on the amounts of the titrant and analyte, assuming the titration reaction goes to completion.

STAGE I Desired Results

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<i>Objective (Transfer)</i>
<i>This unit explores chemical transformations of matter by building on the physical transformations studied in Unit 3. Chemical changes involve the making and breaking of chemical bonds. Many properties of a chemical system can be understood using the concepts of varying strengths of chemical bonds and weaker</i>

intermolecular interactions. When chemical changes occur, the new substances formed have properties that are distinguishable from the initial substance or substances. Chemical reactions are the primary means by which transformations in matter occur. Chemical equations are a representation of the rearrangement of atoms that occur during a chemical reaction. In subsequent units, students will explore rates at which chemical changes occur

Mastery

Big Ideas/Understandings

Students will understand that...

BIG IDEA 1: SCALE, PROPORTION, AND QUANTITY

(SPQ) Quantities in chemistry are expressed at both the macroscopic and atomic scale.

Explanations, predictions, and other forms of argumentation in chemistry require understanding the meaning of these quantities, and the relationship between quantities at the same scale and across scales.

BIG IDEA 3: TRANSFORMATIONS (TRA)

At its heart, chemistry is about the rearrangement of matter. Understanding the details of these transformations requires reasoning at many levels as one must quantify what is occurring both macroscopically and at the atomic level during the process. This reasoning can be as simple as monitoring amounts of products made or as complex as visualizing the intermolecular forces among the species in a mixture. The rate of a transformation is also of interest, as particles must move and collide to initiate reaction events.

Essential Questions

What makes fireworks explode?

Why is the mass of a raw egg different than a boiled egg?

What are the processes related to changes in a substance?

Acquisition

Students will know . . .

[See “essential knowledge” in each topic of College Board CED for Unit 4](#)

Students will be skilled at . . .

In Unit 3, students constructed particulate level representations of compounds and molecules and explained the forces that come into play when particles interact. In Unit 4, students will describe and construct equations of chemical systems and learn to balance

those equations. Students should be able to identify and effectively represent types of reactions (e.g., acid-base, redox, precipitation) and then use that knowledge to make hypotheses or predictions about the outcome of a reaction. Additionally, students should be able to support their claims about the identity and amount of product yield through evidence gained with both experimentation and the principles of stoichiometry. Further, students should be able to determine the output of a reaction when the number of moles of reactants change or are in limited/excess supply. This practice of effectively representing balanced chemical equations and using stoichiometry to calculate outcomes of such reactions is critical to student success in the remainder of the course.

STAGE II Assessment Evidence

STAGE II Assessment Evidence	
Common Summative Assessments	Common Formative Assessments
Tests Quizzes Laboratory Reports and analyses	Exit Slips Quizzes Homework Problems Participation in class discussions and in performance of lab experiments Laboratory notebook AP Classroom Unit checks
Modifications	
How are the evaluations/assessments modified/accelerated? (i.e.: alternate assessment). All courses follow a balanced assessment system with Practice, Assessments, Evaluations.	

Modifications on 504 plans may be submitted at ([SSD](#)), prior to testing. Both exclusion **statements** and **extensions** exist for each standard to accommodate different paces.

STAGE III Learning Plan

STAGE III Learning Plan
Organize plan by weeks
4.1 Introduction for Reactions 4.2 Net Ionic Equations 4.3 Representations of Reactions 4.4 Physical and Chemical Changes 4.5 Stoichiometry 4.6 Introduction to Titration 4.7 Types of Chemical Reactions 4.8 Introduction to Acid-Base Reactions 4.9 Oxidation-Reduction Reactions
Modifications
How are the activities modified/differentiated? (i.e.: abridged text)

Modifications on 504 plans may be submitted at ([SSD](#)), prior to testing. Both exclusion **statements** and **extensions** exist for each standard to accommodate different paces.

Specific Resources for Unit

Specific Resources for Unit
Attached Affirmative Action Compliance Checklist

Selected College-Board practice problems

Chang, Raymond and Goldsby, Kenneth A. Chemistry, 13th Edition. New York, McGraw-Hill. 2019

The College Board. AP Chemistry Guided Inquiry Experiments: Applying the Science Practices. 2013.

Demmin, Peter and David Hostage. AP Chemistry, Fifth Edition. New York: D&S Marketing Systems, Inc., 2005

Vonderbrink, Sally. Laboratory Experiments for Advanced Placement Chemistry. Batavia: Flinn Scientific, 2001.

POGIL Activities for High School Chemistry, Batavia: Flinn Scientific, 2012, AP Classroom

Diversity, Equity, & Inclusion

Diversity, Equity & Inclusion

Provide a brief description of how this unit addresses DE&I.

Career Readiness (9.2), Life Literacies and Key Skills (9.4) Standards

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.2	Attend to financial well-being.
WRK.K-12.P.3	Consider the environmental, social and economic impacts of decisions.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.6	Model integrity, ethical leadership and effective management.
WRK.K-12.P.7	Plan education and career paths aligned to personal goals.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Climate Change Education

ClimateChange Education

Enduring Understandings/Core Ideas

Performance Expectations

Math and ELA- Provide a brief description of a lesson or activity that relates to Climate Change. All other Content Team copy and paste the Core Idea and Performance Expectation from NJDOE link above.