



collisions™

General Game Guide

Collisions: General Game Guide

Audience: Middle and high school

Subject: Chemistry

Pricing: Subscription model

Platform: Android, iOS, web version

About Collisions

Collisions is a system of interconnected digital chemistry games designed to give middle and high school students a deepened understanding of fundamental chemistry concepts through exploratory game play. Collisions covers a broad range of chemistry topics and showcases chemistry as a system through interconnected experiences that can be played individually or as a whole. Collisions demonstrates through gameplay how different chemistry concepts affect one another. Just like in chemistry, everything in the game is interconnected.

Collisions encourages exploration and discovery by offering a safe environment for players to make mistakes and learn from those mistakes. The actions that the player performs, reflect the real actions of chemistry. The rules of Collisions are grounded in the rules of chemistry, so as students learn to play the game, they simultaneously learn chemistry.

Curriculum Integration

Collisions includes the following robust games:

- Acids & Bases
 - Atoms
 - Covalent Bonding
 - Intermolecular Forces
 - Ionic Bonding
 - Ions
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Standards Alignment

Collisions is aligned to specific standards from the following sources:

- Next Generation Science Standards
 - For alignment to your state's standards, email educators@playmadagames.com.
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Collisions Overview

Integrated Chemistry Concepts

Atoms

- Proton # = electron #
- Electron Configuration
- Aufbau Principle
- Hund's Rule
- Periodic trends

Covalent Bonding

- Octet rule
- Types of bonds
- Bond polarity
- Molecular shape

Acids & Bases

- Bronsted-Lowry acids and bases
- Strong vs. weak acids
- Neutralization reactions
- Amphoteric substances

Ions

- Cation and anion formation
- Octet rule
- Ionic radii
- Ionization energy

Ionic Bonding

- Cation and anion attraction
- Ionic compounds contain 1 type of cation and 1 type of anion
- Ionic compound neutrality
- Ionic ratios

Intermolecular Forces

- Polar vs. nonpolar compounds
- Types of IMFs (London Dispersion Forces, Dipole-Dipole, Hydrogen Bond)
- IMF strength

Sandbox

Each Collisions game includes an exploratory Sandbox designed for extended practice and review of specific chemistry content.

The Sandbox will unlock upon completion of the tutorial levels.

Achievements (25 - 45 minutes)

Each Sandbox includes a unique set of Achievements for students to work through. These Achievements will introduce and/or review important chemistry concepts. As the instructor, you can have students work through all Achievements or assign specific Achievements that align with your lesson's objective.

Extended Play

In addition to the Achievements, we encourage you to use the Sandbox in a manner that most complements your instructional method.

Collisions Overview (cont.)

Challenges

Each Collisions game has a series of Challenges. The first level(s) of each game include a tutorial to introduce players to the game mechanics. Subsequent core levels unlock upon successful completion of the previous level. The connected levels bridge content from two games together, challenging students to draw connections and further explore how different chemistry concepts affect one another. These connected levels unlock upon successful completion of the associated core levels.

Atoms

Player will use protons and electrons to build atoms and explore atomic size.

- 11 core levels

Covalent Bonding

Player will bond atoms to build molecules of various shapes and bond polarities.

- 11 core levels
- 4 connected levels to Atoms

Acids & Bases

Player will remove protons from acids, add them to bases and explore the strength of various acids.

- 10 core levels
- 3 connected levels to Covalent Bonding

Ions

Player will manipulate energy to add or remove electrons and form ions.

- 7 core levels
- 3 connected levels to Atoms

Ionic Bonding

Player will explore how ions of various charges interact to form ionic compounds.

- 8 core levels
- 3 connected levels to Ions
- 3 connected levels to Acids & Bases

Intermolecular Forces

Player will form IMF's of various types and strengths by building molecules of different polarities.

- 11 core levels
- 3 connected levels to Atoms
- 3 connected levels to Covalent Bonding