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Molecular Collisions

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CONCEPT MAP OF UNIT		
To understand inelastic and elastic collisions as well as temperature, concentration, surface area, and orientation as it pertains to collision theory.	TOPIC	Molecular Collisions
	TEACHER	Miranda, Steve, and Kaitlin
	GRADE	High School

LEARNING STANDARDS

CHEMISTRY

PERFORMANCE
INDICATOR 3.4
Use kinetic molecular theory (KMT) to explain rates of reactions and the relationships among temperature, pressure, and volume of a substance.
Major Understandings:
3.4c Kinetic molecular theory describes the relationships of pressure, volume, temperature, velocity, and frequency and force of collisions among gas molecules.
3.4d Collision theory states that a reaction is most likely to occur if reactant particles collide with the proper energy and orientation.
3.4f The rate of a chemical reaction depends on several factors: temperature, concentration, nature of the reactants, surface area, and the presence of a catalyst.

PHYSICS

4.1d Kinetic energy is the energy an object possesses by virtue of its motion.
5.1r Momentum is conserved in a closed system.

MATH

Definite integral of the rate of change of a quantity over an interval interpreted as the change of the quantity over the integral.

LEARNING TARGETS

Students will be able to:

- Manipulate the given model
- Explain how surface area, temperature, concentration, and orientation influence molecular collisions
- Explain how surface area, temperature, concentration, and orientation influence inelastic collisions
- Determine the distance traveled given the velocity of the particle

OPTIONAL INSTRUCTIONAL TOOLS

Netlogo Model

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Chemistry	Physics	Mathematics	Cross-Cutting
LESSON ESSENTIAL QUESTIONS	**LESSON ESSENTIAL QUESTIONS**	**LESSON ESSENTIAL QUESTIONS**	**LESSON ESSENTIAL QUESTIONS**
How does surface area, temperature,	How does surface area, temperature,	Given the velocity of the particles, how far	What factors influence the inelastic

concentration, and orientation influence molecular collisions?	concentration, and orientation influence inelastic collisions?	have the particles traveled?	collisions needed to form a new molecule?
VOCABULARY	VOCABULARY	VOCABULARY	VOCABULARY
Collision Theory, Kinetic Energy, mass, concentration, surface area, temperature, orientation, Boltzmann's Constant	Inelastic collisions, Elastic collisions, Momentum, Kinetic Energy, mass and velocity	Integral, derivative, function, ratio, velocity	Patterns, factors, relationships

ADDITIONAL INFORMATION

[Enter your information here]