



Animated Chemical Bonding

electrons, and metallic bonding can be considered a combination of both.

Chemical bonds form to lower the energy of the system. Each component of a system becomes more stable by forming a bond. A full valence shell equals stability.

Students should be able to explain how the valence shell of electrons affects the type of bonding between elements and how compounds bond because of electrostatic charge.

Create

Step 2: Define and Design a Bond Model

Have students form into small teams. Assign each team a type of bond to model.

Have each team develop their own definition for their bond. Have them brainstorm at least five examples of elements or compounds that form this type of bond.

Have students create a visual model of the bond. The model should also include a description of the bond and a justification for the elements they chose to demonstrate the bond. Evaluate the model for accuracy. Have students make necessary changes.

Step 3: Plan and Build a Bonding Animation

Once the model is complete, have students use a storyboard to map out how their animation will demonstrate the chemical bond. The team should write and develop a narrative script to explain how the bond is made in this example, and share other examples of where this type of bond can be found.

Have each team create a clay animation simulation of their chemical bond. The animations should contain models of each atom/element showing protons, neutrons, and electrons and their charges. Models should also demonstrate how these charges and structures contribute to the type of bond this element makes.

Identifiers

Grade Level

8–11

Subject

Science

Duration

3 class periods

Objective

Students demonstrate understanding of a chemical process.

Description

Students create a clay animation that demonstrates how a specific type of chemical bond (ionic, covalent, or metallic) is formed.

Application

Clay Animation Kit and Frames™

Process

Introduction

Now that you have studied the different types of chemical bonds (ionic, covalent, and metallic), create a clay animation model that will help the students in next year's course understand how valence shell electrons affect the types of bonds that different elements make.

Engage

This project is a great summative assessment after you have introduced and explained the various types of chemical bonding.

Step 1: Study How Chemical Bonds

Form

Chemistry deals with concepts at a molecular or atomic level, making students think abstractly or conceptually. In chemistry courses, you complete experiments and create concrete models that demonstrate what is happening at a molecular level to help students understand these concepts. Having them create clay animations to demonstrate processes and models also helps make these concepts tangible.

This project is a culminating activity to reinforce and remind students of concepts you have covered. So, before they begin working on a clay animation, cover, and UNcover, important chemistry concepts through reading, models, lab work, and discussions.

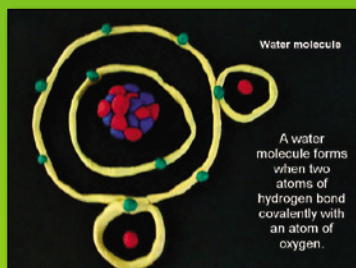
Before creating animations that demonstrate chemical bonding, students must be familiar with how chemical bonds form. Share examples of the various types of bonds: ionic, covalent, and metallic. Ionic bonding involves the transfer of electrons, covalent bonding involves sharing of

Steps for Students

Creating an Animation in Frames™

Once you have all of your images collected, use Frames to animate a chemical bond.

1. Connect your camera to the computer.
2. Launch Frames.
3. Click the Library button to navigate to the camera and import the frames you have captured.
4. Click and drag the pictures in the storyboard to change the order.
5. Click the New blank frame button on the toolbar to add more frames.
6. Click the Text tool on the Tools panel to add text. Use the handles and Format options to change how the text looks.
7. Click the Record tool on the Tools panel to add narration.
8. Select a frame or group of frames and adjust the Duration slider on the Tools panel to change the timing.
9. Click the Save button on the toolbar to save changes.
10. Click the Project button and choose Export to create an animated movie to share.



Create

Step 4: Share the Animations

Have the students share their clay animations with the rest of the class. Use this as a review before an exam. You might also want to share them with a local access television station and other chemistry classes in your area.

Modifications

Before students can truly understand bonding, which requires knowledge of valence shells and electrons, they must understand the Periodic Table and what makes each element unique. Have each student in your class create a clay model of an element and animate it to demonstrate the valence shells and electrons.

Apply the clay animation process to other chemistry concepts such as electrostatic charge or micelles. You may even want to create a new television series about chemistry concepts to help new chemistry students visualize the concepts more clearly; however, remember that creating the animation is more learning intensive than watching it.

Assessment

The introductory activities, including discussions, reading, and lab work, will build a foundation of knowledge appropriate for students to create the animation.

As the teams work, be sure to evaluate their initial model. Their description of how the bond works will provide insight into their thinking. Ask questions to test their knowledge about the bond. Be sure to ask why they chose the elements or molecules used in the model.

The storyboard is a clue into how well students can verbalize and visualize the chemical bond for someone else. The animation is a culmination of their model, storyboard, planning, and teamwork. Students' ability to answer peer questions after showing their animation will indicate comfort and fluency with the concept.

Resources

Winter, Mark J. **Chemical Bonding**. (Oxford Chemistry Primers, No 15). ISBN: 0198556942

ChemWeb Online (a ThinkQuest entry) library.thinkquest.org/19957/

Periodic Table of the Elements periodic.lanl.gov

An Introduction to Chemical Bonding www.newi.ac.uk/buckleyc/bonding.htm

Standards

NSEA–National Science Education Standards

As a result of their activities in grades 9–12, all students should develop an understanding of the structure of atoms, the structure and properties of matter, and chemical reactions. (Physical Science–CONTENT STANDARD B)

NETS for Students–2007

1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students:

- a. apply existing knowledge to generate new ideas, products, or processes.
- b. create original works as a means of personal or group expression.
- c. use models and simulations to explore complex systems and issues.
- d. identify trends and forecast possibilities.



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