Chapter 2 Project

Chemical Bonds and Beyond!

Project Goal + Timeline

In this project, you will be reviewing your knowledge of chemical bonds by creating three short videos that contrast ionic bonds with covalent bonds and then apply these concepts by explaining carbon's unusual bonding capacity and water's unique properties. This project should be completed either alone or in pairs within a two-hour time frame.

Directions

Create three short explainer videos using the following guidelines.

- Each video should be between 30 seconds and 1 minute in length. (This is not much time, so get straight to the point and be succinct.) The video may be recorded using a handheld camera (such as a phone camera) or using a video recording program on a laptop, tablet, or other device.
- For the video's visual aspect, be creative! For example, you can draw visuals on a whiteboard (actual or virtual). Or you can create and/or use 3-D models. If you like, you can use video editing programs.
- You must include a narration for your video. This narration could be an audio recording or compiled through a text-to-voice program.
- Begin each video by stating the video number and the video's purpose. (Example: "This is video number 1. I'm going to show you how ionic bonds form by demonstrating with sodium chloride.)
- After stating the video's purpose, complete the video as described.

Video 1: Ionic Bonds

This video will cover the formation of the ionic bond in sodium chloride (NaCl). Show Bohr models for sodium and chloride. Use Bohr models to explain how these atoms could combine to form NaCl.

After making your video, answer these application questions:

1. What contribution do protons make to the formation of this bond?
2. What contribution do electrons make to the formation of this bond?
3. If the number of neutrons in Na was to increase or decrease by 1, what would happen to the mass of this atom?

Video 2: Covalent Bonds

This video will cover the formation of covalent bonds in water (H_2O). First, show Bohr models for hydrogen and oxygen atoms. Then use Bohr models to show how these atoms combine to form a water molecule. Define the term *electronegativity*. Next, apply the concept of electronegativity to your Bohr model to explain why these particular covalent bonds are considered polar.

After making your video, answer these application questions:

1. How does the role of electrons in the bonds of a water molecule compare with the role of electrons in the bonds of NaCl?
2. Water molecules are polar. What does it mean for a molecule to be polar? How does the shape of the water molecule contribute to the molecule's polarity?
3. List three properties of water that are critical for maintaining life.
4. For one of these properties stated in Question 3, briefly explain how a water molecule's polarity contributes to it.

Video 3: Bonds in Carbon

This video will cover the bonding capacity of carbon. Depict butane, a simple hydrocarbon, using a line formula (rather than Bohr models). Use symbols for all atoms, not just the carbons. Explain the unique bonding capacity of carbon and use your hydrocarbon model to demonstrate this bonding capacity. Important note: Do not just use the butane as a background image. Use the butane in your explanation by pointing or indicating specifically to places that demonstrate carbon's bonding capacity.

Then, define the term *functional group*. Choose one functional group from Figure 9 in Lesson 2.3 that would alter some property of this butane molecule. Draw or model one specific way this functional group could functionalize your butane molecule. (Don't just explain it. Show it by replacing a hydrogen atom with this functional group.)

After making your video, answer these application questions:

1. Identify one new property that this "butane" would have after being functionalized with your chosen functional group.
2. How could this hydrocarbon form a cyclic hydrocarbon?

Project Materials

- Camera, such as phone camera or laptop camera (for filming video)
- Visual aid materials for video, such as a whiteboard (actual or virtual; hawkes.biz/whiteboard)
- Questions
- Pen or pencil
- *Optional: video props, such as chemical models*

Student Checklist

- ☐ Create Video 1
- ☐ Answer Video 1 questions
- ☐ Create Video 2
- ☐ Answer Video 2 questions
- ☐ Create Video 3
- ☐ Answer Video 3 questions