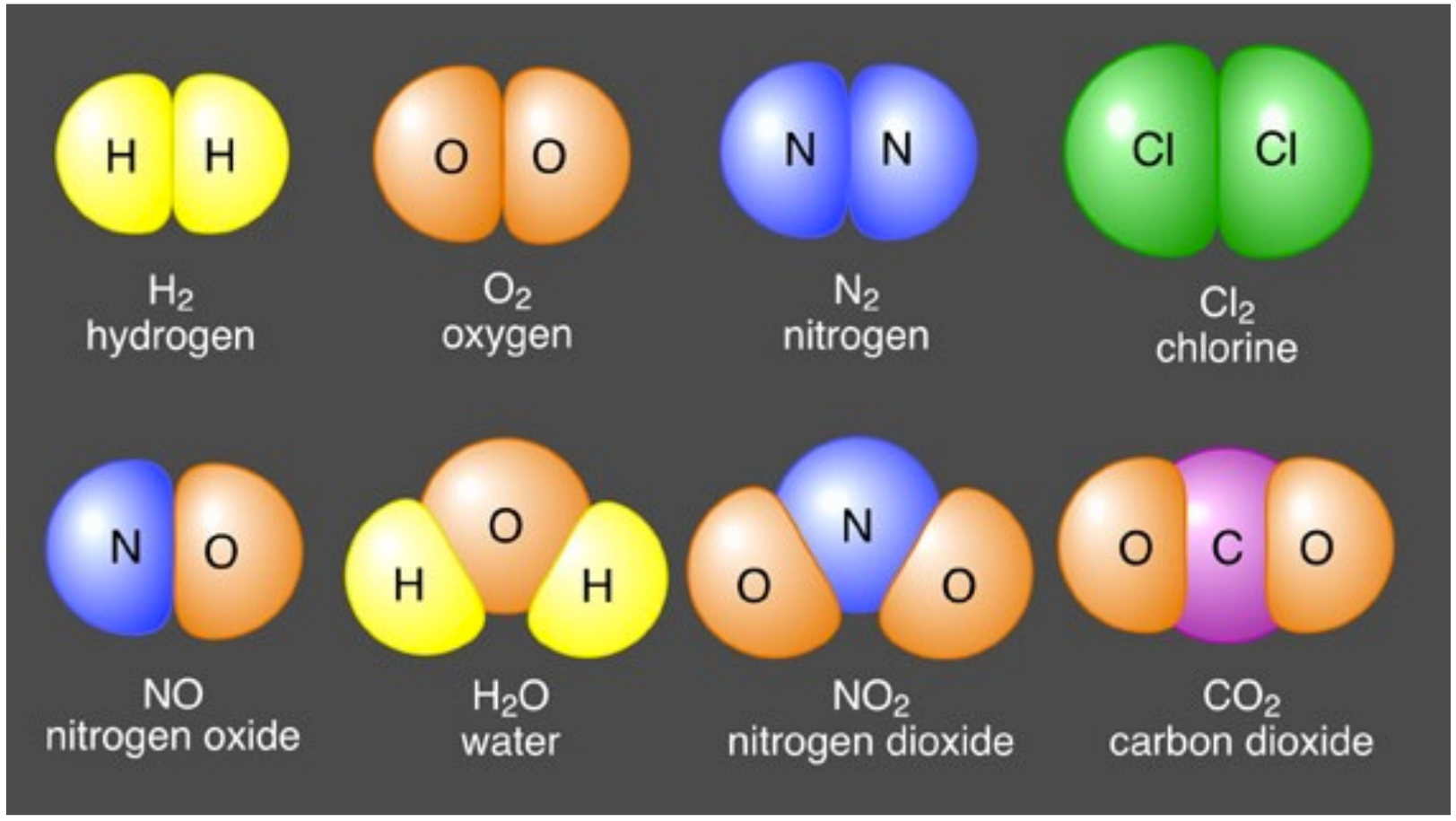
Good Morning

- Please grab a whiteboard.
- Draw the dot diagrams for the following atoms:
  - Carbon:
  - Oxygen:

This Week

- Monday: 8.1 and 8.2
- Tuesday: 8.3 and 8.4
- Wednesday: Finish 8.4 and lab
- Thursday: Rock Candy and Review
- Friday: Ch. 8 Quiz



Molecular Compounds

8.1 Molecular Compounds

- Describe the information a molecular formula provides.
- Made of two or more different elements.
- Distinguish between the boiling and melting points of molecular and ionic compounds.

Tug of War

- In the Copper (II) Chloride lab, there was a winner.
- Why did one win out over the other?

Covalent Bonds

- Compounds that "share" electrons.
- This sharing bonds them together.
- The tug of war is a stalemate.
- Electrons occupy orbitals in **both** atoms.

Molecules

- Neutral group of atoms bonded together.
- The electrons that they share keep the atoms from breaking apart.
- These are joined together by covalent bonds.

Covalent Bonds

- Formed in Non-Metals.
- Non-Metals tend to want to gain electrons.
- Really don't want to give them up.
- Compromise - share electrons so that they are more stable.

Molecular Formulas

- Molecular compounds of a particular substance form in the same way all the time.
- A molecule of water always has 2 hydrogen and 1 oxygen atom.
- The molecular formula shows the ratio of atoms of each element a molecule contains.

Formulas

- Diatomic Molecules: usually gasses.
- Red letters on the PTE indicate state at room temperature.
- With the exception of 8A, all of the elements with red letters are gasses at room temp and are diatomic.

Examples

- Hydrogen Gas: 2 hydrogen atoms. H_2
- Oxygen Gas: 2 oxygen atoms. O_2
- Carbon Monoxide: 1 carbon and 1 oxygen. CO

Molecular vs. Ionic

- Ionic compounds could grow and grow. Not true in molecular compounds.
- Alternating charges held them together. We talked about **formula units**.
- Molecular compounds are made up of two or more non-metals. Not all molecules are compounds. Why?

Boiling/Melting Point

- Substances with molecular bonds have a low boiling and melting point compared ionic or metallic bonds.

True or False

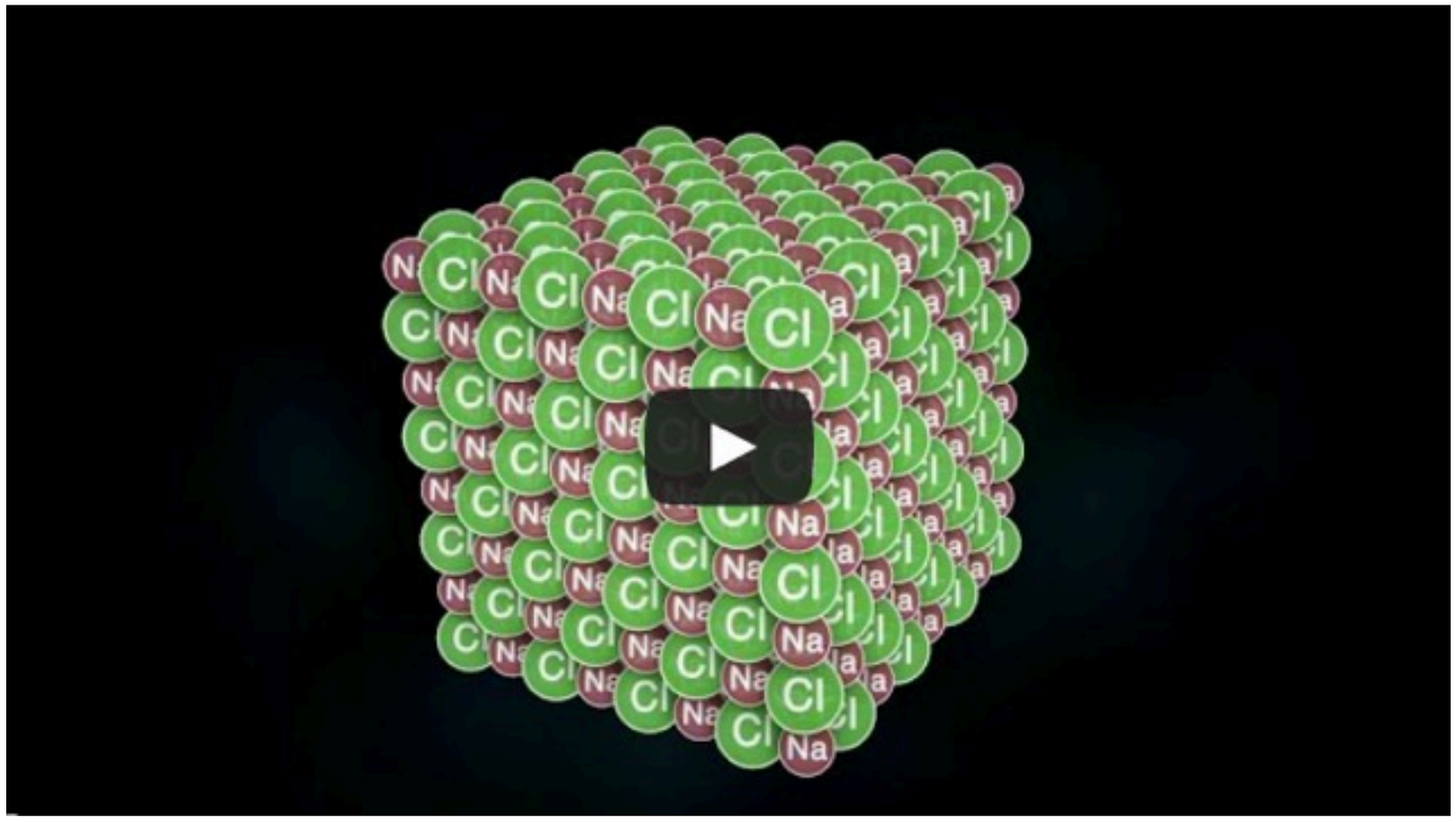
- On your whiteboards, write T or F for the following statements:
- All compound contain molecules.
- Most molecular compounds are composed of two or more non-metals.
- Atoms in molecular compounds share electrons.

8.2 Covalent Bonding

- Electrons are shared.
- The Octet rule and it's exceptions.
- Dot Structures.
- Double and triple covalent bonds.
- Covalent vs. coordinate covalent bonds.

Octet Rule

- Everyone wants 8 valence electrons.
- Covalent bonds allow atoms to share electrons so that they get electron configurations similar to noble gases.
- Example: Oxygen Gas: O_2.



How Atoms Bond

Single Covalent Bond

- Each atom shares **one** of it's unpaired electrons with another atom.
- Hydrogen gas.

Dot Structure

- Oxygen: O
- Hydrogen: H

Shared Electrons

- We use dot structure to note molecular bonds.
- H_2:
- H_2O:

You Try

- Methane (CH_4)
- Ammonia (NH_3)

Double and Triple Covalent Bonds

- Atoms share 2 or 3 unpaired electrons.
- Atoms gain noble gas electron configuration.
- These are noted in similar ways that single covalent bonds are.

Examples

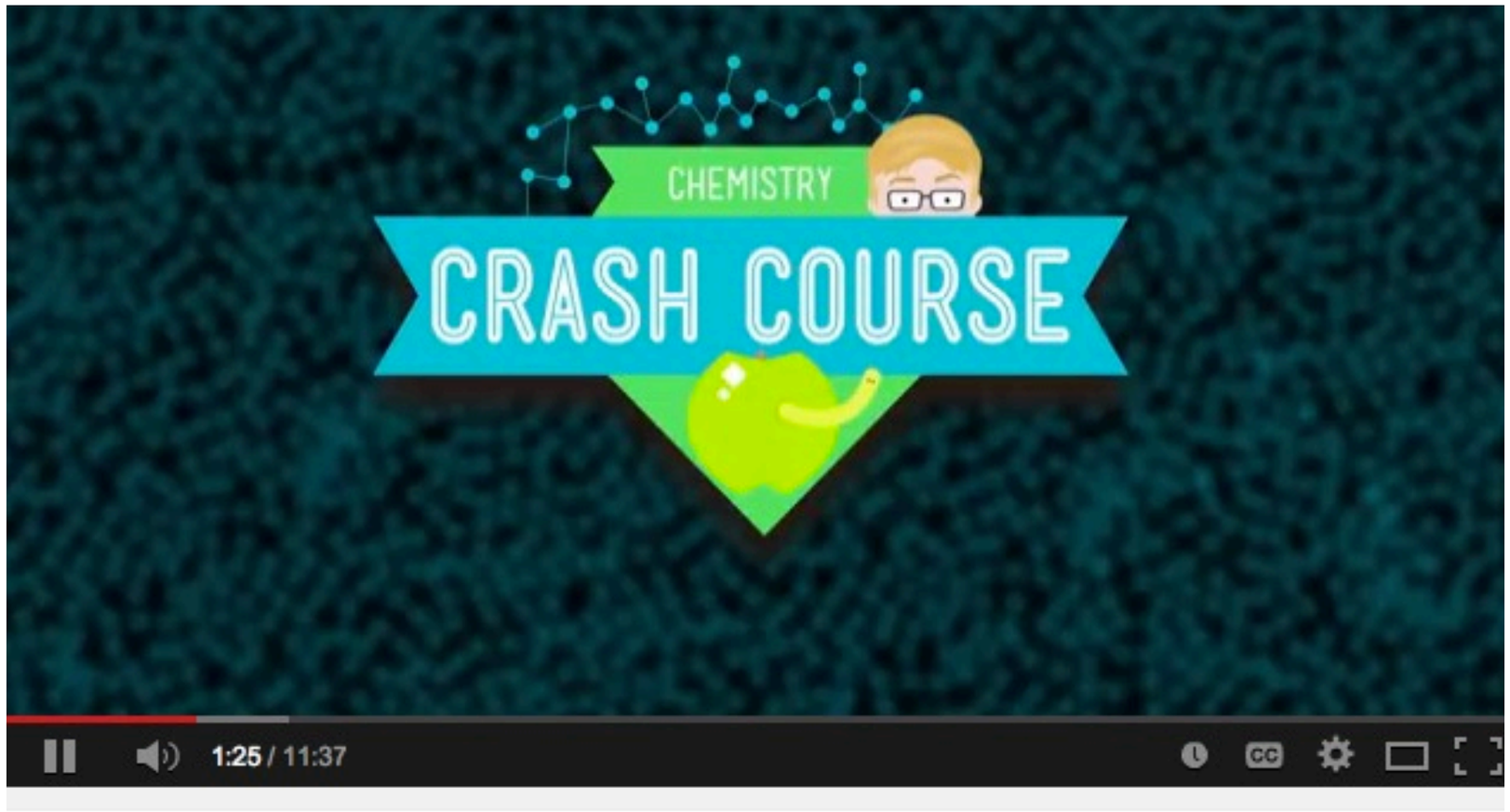
- Nitrogen: N N
- Carbon Dioxide: O C O

Electrons Move Fast

- If we could see electrons being shared, what would it look like?
- How can we draw this?

Examples

- Cl Cl
- H H
- O C O



Bonding Models and Lewis Structures

Notes

- There is no contact between ions in ionic bonds.
- There are single, double and triple covalent bonds.
- No more, right?

Coordinate Covalent Bonding

- Sometimes an atom will share paired electrons with another atom.
- One atom shares more electrons than the other.
- The electrons still act as shared electron between atoms much like other covalent bonds.

Noting Coordinate Covalent Bonds

- Because one atom donates more electrons to be shared, an arrow is drawn from the atom that donates electrons to the atom that received the electrons.
- This happens in many polyatomic ions.
- Example: C O

Polyatomic Ions

- We are familiar with the charge on many polyatomic ions.

- Lewis structures help to explain the reason why these things bond the way that they so and why they still have a charge.

Examples

- Hydroxide:

- Carbonate:

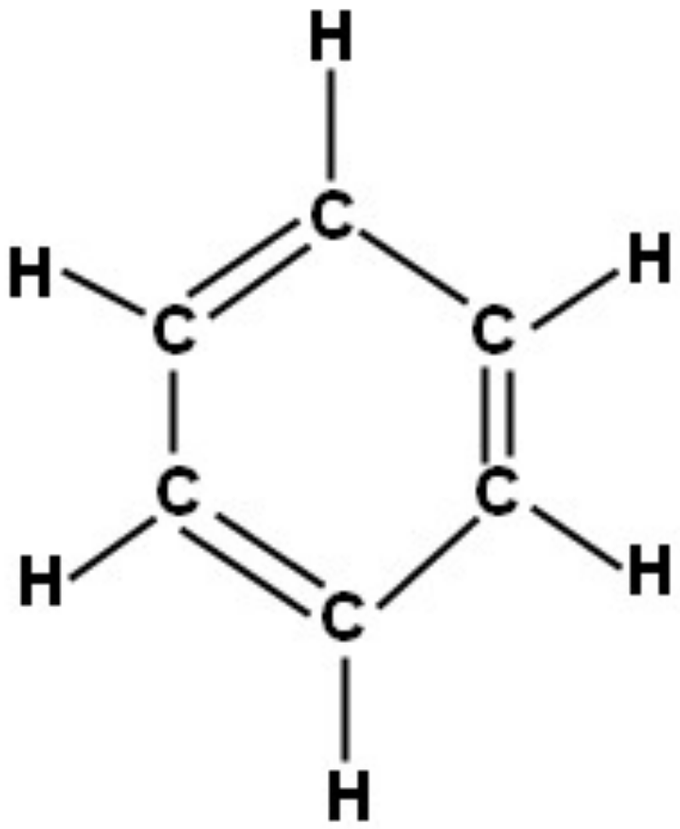
- Sulfate:

Bond Dissociation Energy

- When atoms create bonds energy is released.
- Products are more stable than the reactants.
- If you want to break the bond, you need to add energy.
- The stronger the bond, the more energy is needed.

Covalent Dissociation

- Covalent bonds vary in their strength.
- Double bonds take more energy than single bonds.
- Triple bonds are even stronger.



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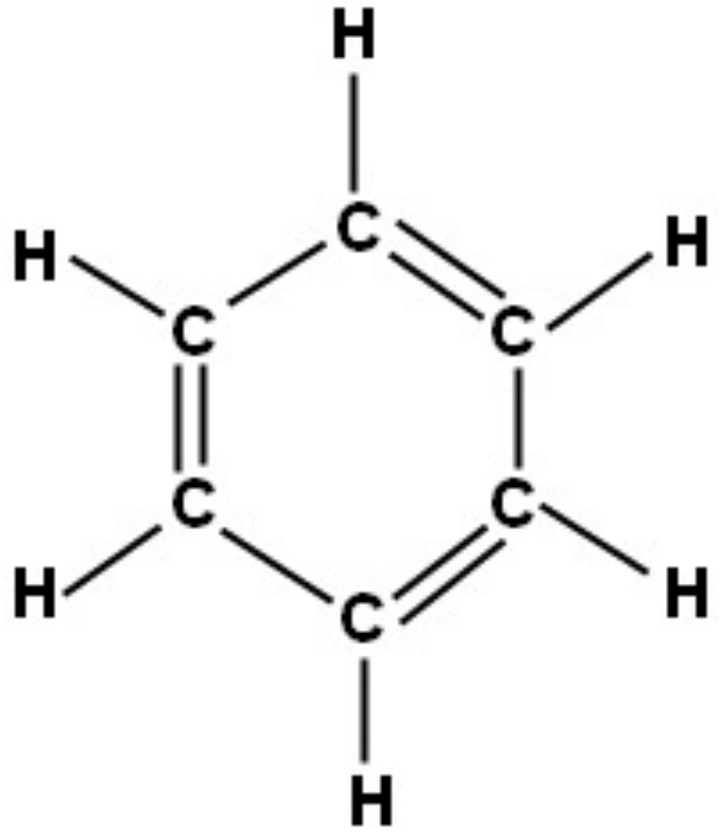

Hydrocarbons

Calculating Dissociation Energy

- The energy released when one molecule breaks apart is relatively small, but so is one molecule.
- Dissociation energy is calculated by the energy given off when a **mole** of bonds is broken.

The Mole

- 6.02 x 10^23.
- A mole represents this number the way that a dozen means 12.

Resonance

- It is possible to represent some molecules with more than one valid dot structure.
- Originally scientists though that the structure must alternate between the two structures, creating a vibration.
- They have found that this is not the case, but still refer to it a resonance.

Ozone O_3

- How would you draw the dot structure for this molecule?

Exception to the Octet Rule

- It is impossible to draw some molecules so that there are 8 valence electrons on each atom.
- These compounds can be less stable than other molecular compounds.
- Example: NO_2: O N O

Other Examples

- Phosphorus pentachloride

- Sulfur hexafluoride