

33.1 Characteristics of Chemical Bonds

Chemistry

Summarize main points from each video.

Video Title / topic _____

Video Title / topic _____

Video Title / topic _____

Topic Introduction



Summarize your understanding of each paragraph.

A chemical bond is a lasting attraction between atoms, ions or molecules that enables the formation of chemical compounds. The bond may result from the electrostatic force of attraction between oppositely charged ions as in ionic bonds; or through the sharing of electrons as in covalent bonds.

A chemical bond is an attraction between atoms. This attraction may be seen as the result of different behaviors of the outermost or valence electrons of atoms.

There are four basic types of bonds that can be formed between two or more molecules, ions or atoms. Intermolecular forces cause molecules to be attracted or repulsed by each other: covalent bond, polar covalent bond, ionic bond, and metallic bonding.

The two extreme cases of chemical bonds are: Covalent bond in which one or more pairs of electrons are shared by two atoms; Ionic bond in which one or more electrons from one atom are removed and attached to another atom.

Read/Summarize Text



1. Read the passage.
2. Underline key expressions in each sentence.
3. Re-write each word (or expression) you underlined.
4. Summarize the passage.

Chemical bond.

The strength of chemical bonds varies considerably; there are "strong bonds" or "primary bond" such as metallic, covalent or ionic bonds and "weak bonds" or "secondary bond" such as dipole–dipole interactions, the London dispersion force and hydrogen bonding.

Since opposite charges attract via a simple electromagnetic force, the negatively charged electrons that are orbiting the nucleus and the positively charged protons in the nucleus attract each other. An electron positioned between two nuclei will be attracted to both of them, and the nuclei will be attracted toward electrons in this position.

https://en.wikipedia.org/wiki/Chemical_bond

Re-write words you underlined

Using a complete sentence, summarize or rephrase the passage

Read Text for Comprehension

Read this article for deeper understanding. No summary is required, although you may want to circle, underline, or mark key ideas and words.

Covalent bonds are chemical bonds between two non-metal atoms. An example is water, where hydrogen (H) and oxygen (O) bond together to make (H₂O). A full outer shell usually has eight electrons, or two in the case of hydrogen or helium. Valence electrons are the electrons held comparatively loosely in the outer shell of the atom. The structure of electron shells is determined by “Quantum Mechanics”.)

The number of valence electrons is decided by the size of the atom. Electrons orbit atomic nuclei in a way that is a very rough analogy of the way that planets orbit stars. They are like fuzzy orbital paths around an atomic nucleus. The first layer can contain up to two electrons, while the layers after that usually contain up to eight. Covalent bonds are formed by atoms sharing valence electrons.

If for example, an atom contained nine electrons, the first two would orbit very close to the nucleus, the next seven would orbit a little farther away. The outer seven electrons would be less tightly held than the inner two electrons because they are further away from the positively charged nucleus. If this atom gets close to another atom, with a loosely held electron in its outer shell, a new orbital will become available to the loosely held electron. This new electron orbital is bound to both atomic nuclei and has a lower energy level than the original electron orbital. The electron can spontaneously jump to it and emit a photon with the excess energy. Now we have an electron orbiting both atoms which results in the atom that provided the electron having a small net positive charge and the other atom having a small net negative charge. The two atoms are now held together by the electromagnetic force of attraction between positive and negative charges. This is called a covalent bond. To break this bond requires the supply of the same amount of energy as was released when it was formed.

A water molecule consists of one oxygen atom and two hydrogen atoms held together by a covalent bond. In this case the oxygen atom shares one electron with each hydrogen atom. This means that the oxygen atom has a small net positive charge and the hydrogen atom has a small net negative charge. As a result the oxygen and hydrogen atoms are attracted to each other due to the electromagnetic force. (Also note that because of this the water molecule is a polar molecule. ie. it's charge is not evenly distributed.)

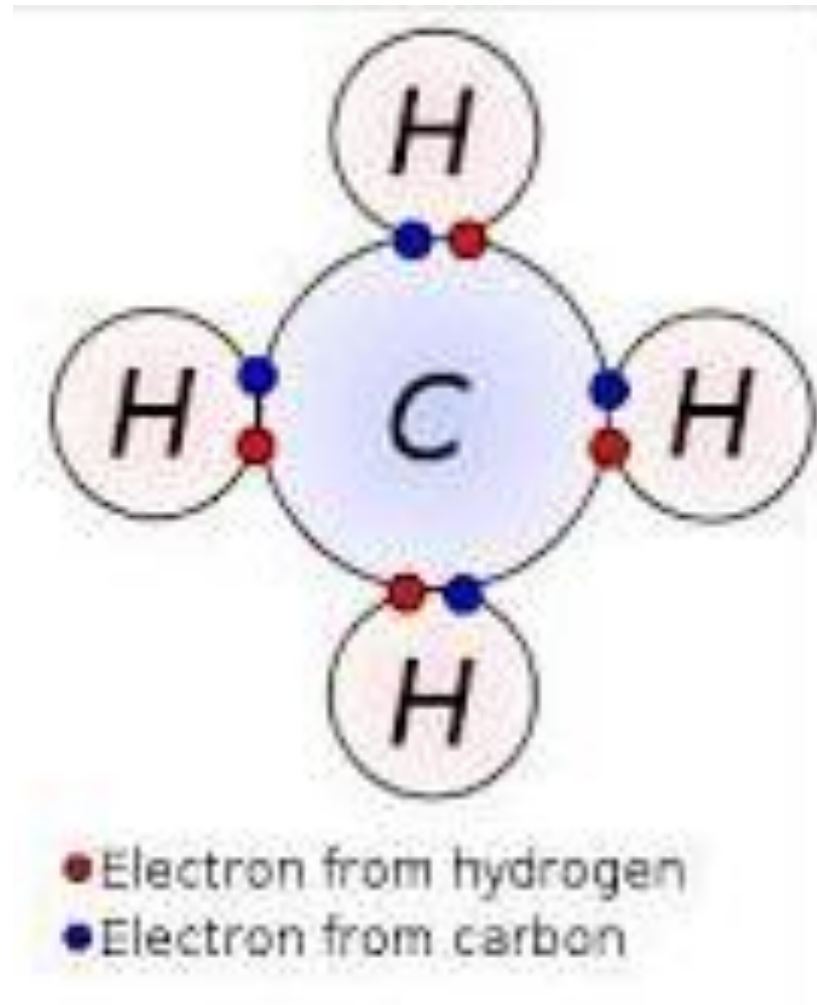
NOTE: *Covalent bonds are weaker than ionic bonds, and have a lower melting point. They are also thought to be poor conductors of electricity and heat.*

Draw Illustration



Copy and Label the Illustration in the Space Provided

A covalent bond, also called a molecular bond, is a chemical bond that involves the sharing of electron pairs between atoms.



https://en.wikipedia.org/wiki/Covalent_bond

Draw (Copy) the Illustration Here

Interpret a Graph



Write the title of the graph _____

Circle the type of chart this represents

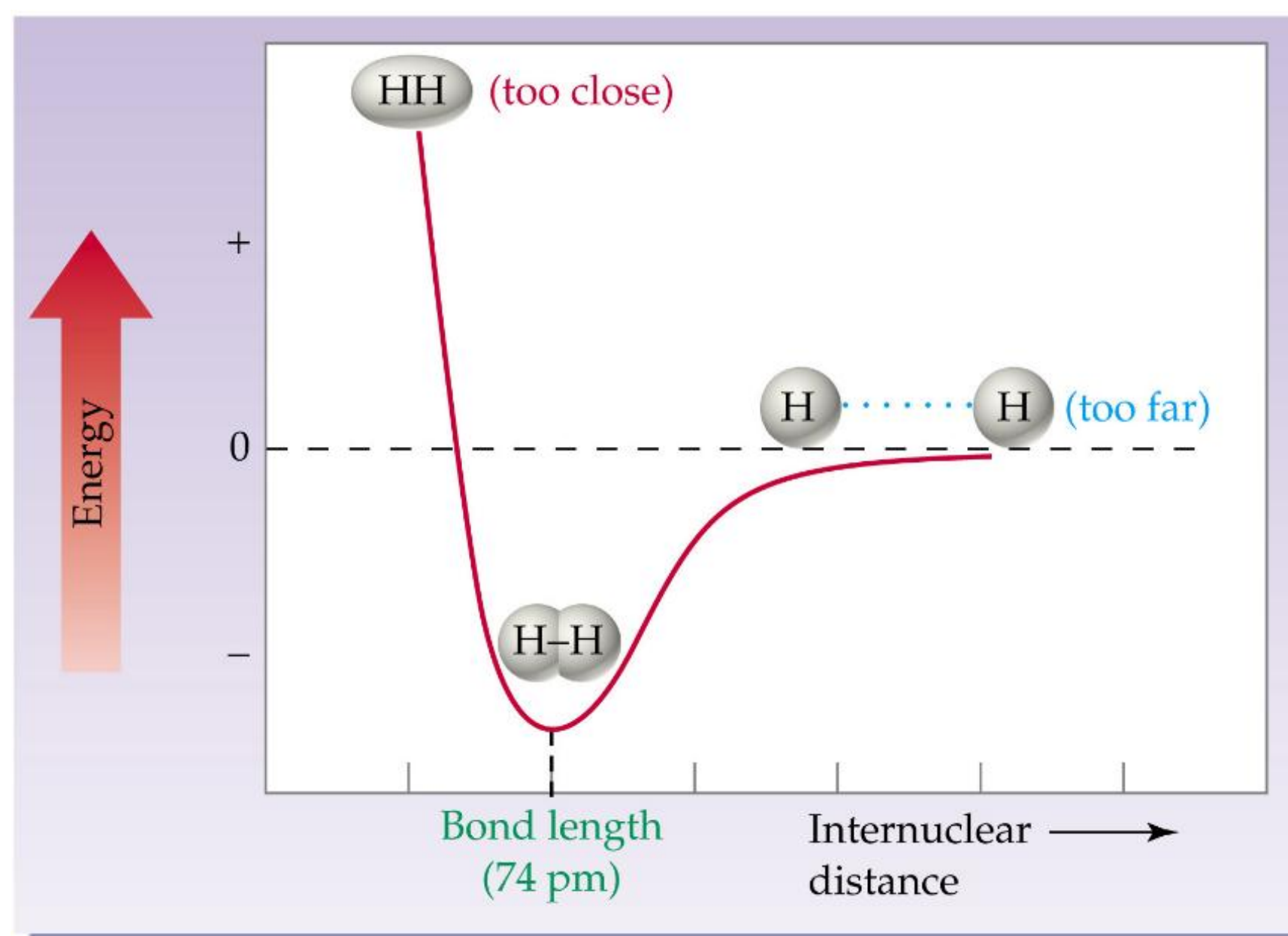
Bar Chart *Line Chart* *Pie Chart* *Other*

If applicable,

What does the X-axis represent _____

What does the Y-axis imply _____

Summarize what this graph represents or conveys



A graph of potential energy versus internuclear distance for the H₂ molecule. If the hydrogen atoms are too far apart, attractions are weak and no bonding occurs. If the atoms are too close, strong repulsions occur. When the atoms are optimally separated, the energy is at a minimum.

http://wps.prenhall.com/wps/media/objects/602/616516/Chapter_07.html

Show-Off Your Smarts!



Instructions

- Complete as an individual or small group.
- Discuss your ideas/answers/responses in a small group.
- Select one person to present your responses to the class.

Q1. How can this information be applied to a young-person's life?

Q2. How does this information apply to (or impact) communities?

Q3. When do scientists need to apply this information? How?

Q4. How would a person from 100 years ago view this information?

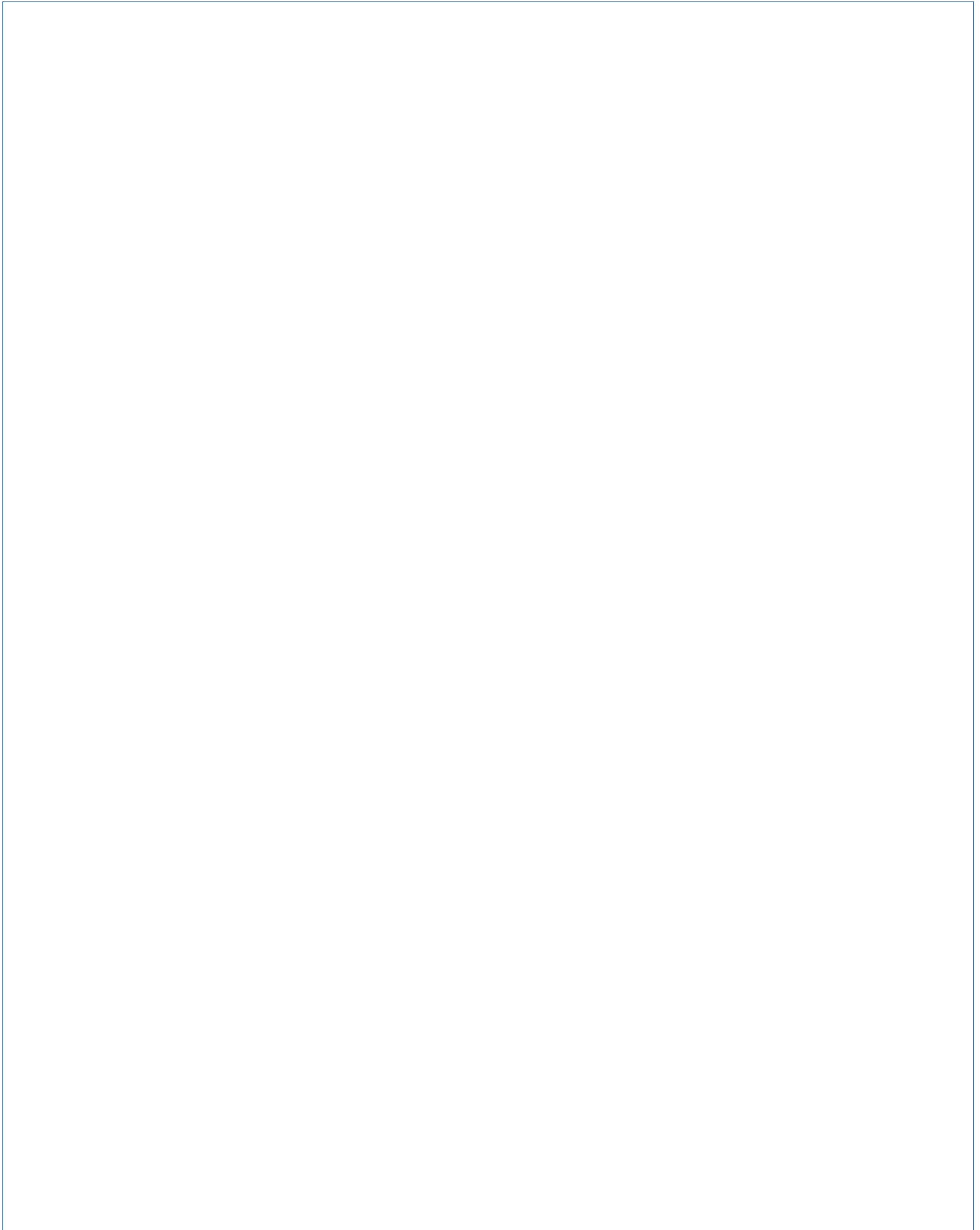
Q5. How does this topic connect to other science topics or math?

Write down at least three words introduced or covered by this topic.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Make a Poster

In the space provided here, create/draw a poster which conveys the concepts you have learned on this topic.

A large, empty rectangular box with a thin blue border, intended for the student to create a poster. The box occupies the majority of the page below the instructions.