

**Chemistry of Fuel Unit Objectives:** By the end of this unit, students will be able to...

- Define the following: energy, work, and matter.
- Define and provide examples of the first and second law of thermodynamics.
- Define and summarize the concept of entropy.
- Describe the relationship between energy transformation and entropy.
- Compare and contrast kinetic and potential energy.
- Define enthalpy and bond energy.
- Compare and contrast bond energy and enthalpy and describe when energy is absorbed and when it is released in a chemical reaction (particularly in regards to when bonds are formed and when they are broken).
- Compare and contrast endothermic and exothermic reactions.
- Explain why light and heat are given off during combustion using the concept of bond energy, enthalpy, and exothermic reactions.
- Define activation energy and provide examples.
- Use enthalpy and bond energies to explain why it is not feasible for water to be a sustainable source of combustible fuel.
- Define petroleum and explain the conditions under which it was formed.
- Summarize the processes in which petroleum products are created.
- Defend why petroleum is the primary source of energy in the US.
- Summarize how petroleum use is related to current atmospheric carbon dioxide levels.
- Explain the meaning of a carbon neutral fuel and summarize why it is of interest at the moment.
- Summarize the concerns related to the fact that petroleum fuels contain nearly every element on the periodic table, particularly in regards to biomagnification.
- Utilize the molecular properties of fossil fuels to explain why they are a primary cause of air pollution.
- Summarize the environmental and health impacts related to the acquisition and use of petroleum.
- Predict the future of petroleum use based on current trends.