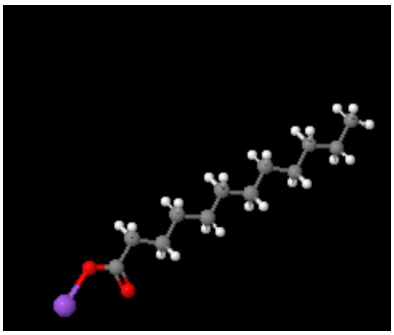
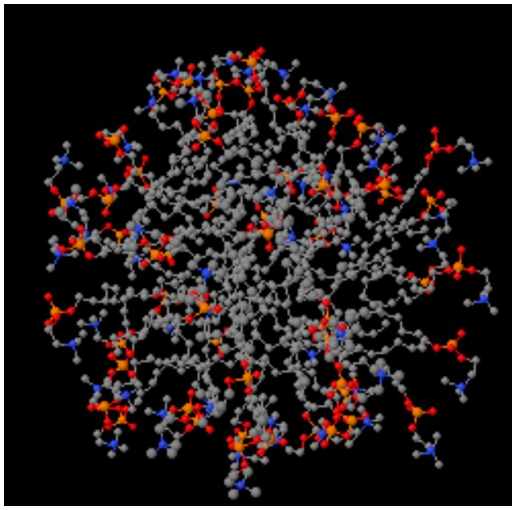
Why is Soap so Dope?!

**Purpose**: *To understand how the structure of soap molecules help it function -how it's able to break down fats and oils*



Nearly all compounds fall into one of two categories: **hydrophilic** ('water-loving') and **hydrophobic** ('water-hating'). Water and anything that will mix with water are hydrophilic. Oil and anything that will mix with oil are hydrophobic. When water and oil are mixed they separate. Hydrophilic and hydrophobic compounds just don't mix.

The cleansing action of soap is determined by its polar and non-polar structures in conjunction with an application of solubility principles. The long hydrocarbon chain is non-polar and hydrophobic (repelled by water). The "salt" end of the soap molecule is ionic and hydrophilic (water soluble). A soap molecule is pictured in the diagram to the right.



When grease or oil (non-polar hydrocarbons) are mixed with a soap- water solution, the soap molecules work as a bridge between polar water molecules and non-polar oil molecules. Since soap molecules have both properties of non-polar and polar molecules the soap can act as an emulsifier -something that breaks up nonpolar molecules. This means that while oil (which attracts dirt) doesn't naturally mix with water, soap can suspend oil/dirt in such a way that it can be removed. The soap will form bubbles around the fats, called **micelles** (pictured on the left). Since the micelle is soluble in water, it can easily be washed away.

**Reading questions**:

1. What is the definition of hydrophobic?

2. What is the definition of hydrophilic?

3. After watching the reading the article and watching the demo, explain in your own words how soap works.