**Dissolving Liquids in Water**

**Curriculum Links:**

OM1.2 Examine methods of altering and combining materials to create objects that meet student- and/or teacher-specified criteria. [SI, TPS]

SE1.2 Explore how humans and animals use their senses to interact with their environment. [CP, DM, SI]

LS2.2 Investigate interactions between liquids and solids, and technologies based on those interactions. [CP, SI, TPS]

MC5.2 Investigate how reversible and non-reversible changes, including changes of state, alter materials. [SI]

MS7.1 Distinguish between pure substances and mixtures (mechanical mixtures and solutions) using the particle model of matter. [SI, CP]

MS7.3 Investigate the properties and applications of solutions, including solubility and concentration. [SI, DM]

FD8.1 Investigate and represent the density of solids, liquids, and gases based on the particle theory of matter. [SI, TPS]

FD8.3 Investigate and describe physical properties of fluids (liquids and gases), including viscosity and compressibility. [SI]

AE9.1 Distinguish between physical and chemical properties of common substances, including those found in household, commercial, industrial, and agricultural applications. [SI]

**Science Background:**

* Liquids have characteristic properties based on the molecules they are made of.
* The properties of liquids depend on the attractions the molecules of the liquid have for each other and for other substances.
* Liquids can dissolve certain other liquids, depending on the attractions between the molecules of both liquids.
* Polar liquids, like water, dissolve other liquids which are polar or somewhat polar.
* Polar liquids, like water, do not dissolve nonpolar liquids like oil.

**Materials:** Water, Vegetable oil, Isopropyl rubbing alcohol, 70%, Corn syrup, 3 Clear plastic cups, 3 Small cups, 3 Popsicle sticks or stirrers

**Directions:**

1. Label 3 clear plastic cups Alcohol, Oil, and Syrup.
2. Pour water into all three labeled cups until each is about half-full.
3. While looking at the water from the side, slowly pour the alcohol into its labeled cup.
4. Without stirring, watch to see if the alcohol dissolves in the water on its own. Record your observations in the chart.
5. After waiting about 10 seconds, stir to see if the alcohol dissolves. Record your observations.
6. Repeat Steps 2–5 for oil and corn syrup.

**Expected Results**

* The alcohol looks kind of gray and swirly as it goes into the water. The alcohol tends to stay on the surface of the water because it is less dense than water. It does not seem to dissolve immediately but dissolves when stirred.
* The oil stays on the surface of the water because it is less dense than water but it does not appear to mix much at all with the water. When stirred, the oil breaks apart a bit and then forms a layer again on the surface of the water. The oil does not dissolve.
* The corn syrup sinks in the water because it is more dense than water. It seems to stay there without much initial dissolving. After stirring, the corn syrup dissolves into the water and the solution turns clear.

**Inquiry Questions:**

**Source:** <http://www.middleschoolchemistry.com/lessonplans/chapter5/lesson7>