ACTIVITY 3: INVESTIGATING RECYCLING NUMBERS

The purpose of this experiment is to investigate the densities of different plastics in order to learn about the recycling numbers system for plastic containers, which was developed by the Society of the Plastics Industry (SPI).

Materials:

- Plastic containers of varying types according to recycling numbers 1-7, e.g., several containers of each type
- Pairs of strong scissors
- Graduated cylinders (100mL)
- Electronic mass balances
- water
- Rulers with millimeter tick marks

First, inform students that they will be working with a partner to investigate the different types of materials used in plastic containers, as categorized by the recycling numbers, by comparing their densities. You may wish to review the calculation of volume of a rectangular prism (V=lhw) as well as density (d = m/v).

Next, have students obtain a sample of each type of container, number 1-7, by cutting credit card-sized pieces of each. Have students cut square-shaped pieces of each plastic small enough to fit into the graduated cylinder. Make the pieces the same size if possible. Measure the mass, length, and width of the pieces.

Since the plastic is too thin to precisely measure its thickness (e.g., the height of the rectangular prism) have students use the method of water displacement to measure the volume of each plastic. They should fill the graduated cylinder and measure the volume of water. Then, put a small square of one type of plastic in the graduated cylinder and measure the new water volume. The difference between water volumes represents the volume of the plastic. This should be repeated for each type of plastic.

Once the volume of the plastic is determined, along with its mass, the density can be calculated in g/mL or g/cm^3 (*note: 1mL = cubic centimeter*).

Similarly, using the measured volume and the measured dimensions of length and width of the plastic piece, its thickness can be calculated using the rectangular prism volume equation.

Last, summarize the calculations and measurements of each plastic type using **the student handout data table**. This should allow the group to compare each plastic type in terms of its dimensions, mass, volume, and density.

What conclusions can be drawn about the different types of plastic from this experiment? How do the densities compare? Are the plastics all the same thickness? How do the rankings compare from most to least in terms of density and thickness? Have groups compare their data with each other's to summarize class findings.