Plastic Identification Lab Name: _____

Plastics belong to a class of chemical compounds called *polymers*. There are many different types of plastics, each made from a different polymer. A milk jug is a different type of plastic than a yogurt container. Not all plastics can be recycled the same way. Just like not all metals can be recycled the same way: aluminum recycling centers can't recycle steel or lead. Plastic recycling centers must separate the different types of plastics and recycle them differently. One way of distinguishing the different types of plastic is with the Resin Identification Code. Six of the more common are listed here: *fig 1:*

Polymer Name	Resin Code	Common Packaging Application
polyethylene terephthalate	1 PETE	Plastic soft drink bottles, mouthwash bottles, peanut butter and salad dressing containers
high-density polyethylene	2 HDPE	Milk, water and juice containers, grocery bags, toys, liquid detergent bottles
polyvinyl chloride	3 V	Clear food packaging, shampoo bottles
low-density polyethylene	4 LDPE	Bread bags, frozen food bags, grocery bags
polypropylene	5 PP	Ketchup bottles, yogurt containers, margarine tubs, and medicine bottles
polystyrene	6 PS	Videocassette cases, compact disc jackets, coffee cups; knives, spoons and forks; cafeteria trays, grocery store meat trays and fast-food sandwich containers

You will be using a **flow chart** to help separate and identify these 6 different plastics. A flow chart is a graphic representation of a sequence of operations (often used by computer programmers).

Pre-Lab Questions:

Use your flow chart (fig 2) to answer the following questions by placing the correct resin codes in the blanks:

1. Which plastic(s) will burn with a green flame? _____

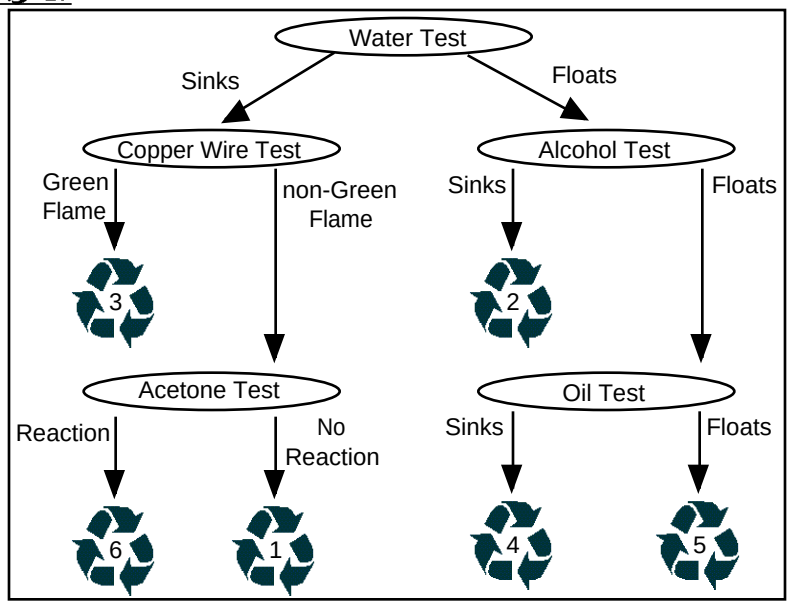
2. Which plastic(s) sink in alcohol? _____

3. Which plastic(s) float in water? _____

4. Which plastic(s) are more dense than water? _____

5. Which plastic(s) require the minimum number of tests in order to determine their identity? _____

fig 2:



Procedure:

At the front desk are cups labeled "A" -- "F", each containing samples of the plastics.

1. Obtain about 5 pieces of one type of plastic (you choose -- **just remember which unknown you're working with!!!**)

2. Take your unknown sample to your lab station. Perform the flow chart tests, according to the instructions on the back, until you've determined which plastic you have. Record your results in the results table.

3. Repeat steps 1 and 2 until you've discovered the identity of each unknown!

Results Table

unknown letter	color	resin ID Code
A		
B		
C		
D		
E		
F		

THIS LAB IS...

plastic ID lab (side 2)

Flow Chart Tests:

Water Test

At this lab station, you have a plastic cup filled 1/2 way with water. Place about 3 of your plastic pellets in the water, and poke the pellets with your finger to knock off any adhering bubbles & to overcome any surface tension. Note if they sink or float. Remove the plastic pellets with your fingers and save them (the pellets and your fingers) for later use. *Do not throw pellets down the sink - they are not water soluble!*

Copper Wire Test

Carefully hold the copper wire in a Bunsen burner flame until the wire is hot. Remove the wire from the flame and touch it to a plastic pellet. Place the wire back into the flame and observe its color. Dispose of pellet in recovery bin after testing. *Do not burn the pellet in the flame!*

Acetone Test

At this lab station, you have a small bottle of acetone and a watch glass. Place one plastic pellet on the watch glass, and a squirt (about 15 drops) of acetone. Let it soak for 30 seconds. Remove the pellet and scratch it with your fingernail. If the pellet is "gooey" this means that the acetone has reacted with the plastic my "loosening up" the polymer chains. If the pellet is unchanged, this means no reaction has taken place. Dispose of pellets in recovery bin after testing.

Alcohol Test

At this lab station, you have a 100 mL beaker of an alcohol solution covered with a watch glass. Uncover the beaker and place 2 clean plastic pellets in the beaker. Poke them with a stirring rod to knock off any adhering bubbles & to overcome any surface tension. Note whether most the pellets float or sink. Scoop the pellets out with a clean plastic spoon and dry them. They can be reused.

Oil Test

At this lab station, you have a 50 mL beaker with oil. Place 2 clean plastic pellets in the beaker. Poke them with a stirring rod to knock off any adhering bubbles. If the pellet hovers in the middle, consider it a "sinker". Scoop the pellets out with a clean spoon & dispose of pellets in the trash can.

fig 3:

DENSITY RANGES (in g/mL) for #1-#6			
#1 PET	1.38 - 1.39	#4 LDPE	0.92 - 0.94
#2 HDPE	0.95 - 0.97	#5 PP	0.90 - 0.91
#3 PVC	1.16 - 1.35	#6 PS	1.05 - 1.07
(water = 1.00)			

Questions:

1. Using fig. 3, approximate the density of the alcohol solution, and explain your reasoning.

2. Why was it important to dislodge any adhering bubbles & overcome surface tension in the density tests?

3. Why would it not be wise to make a canoe paddle out of PVC? What might you use instead?

4. You decide to jazz up your bathroom cabinet by transferring your fingernail polish remover into a more stylish plastic bottle. The next day, reaching for the bottle, you find a messy blob of goo. What was the bottle probably made of? And what is the active ingredient in the polish remover?

5. Two different samples (Y & Z) are placed in concentrated salt water; Y sinks. When more water is mixed in, Z sinks. Given the density of NaCl water = 1.10, what is the identity of Z? ____ What are the possible identies of Y? ___ / ___