

Name: _____

Chem 9, Section: _____

Lab Partner: _____

Experiment Date: _____

Synthetic Polymers and Plastics

Part A: Physical Characteristics

Find or choose one type of each of the following plastic polymers, and report the following characteristics:

Plastic number	Short Name (HDPE, LDPE, etc)	Clear (yes or no)	Opaque (yes or no)	Flexibility (can be bent?)	Durability (hard or soft)	Breakability (can be cracked?)	Recyclable (yes or no)
1							
2							
3							
4							
5							
6							
7							

Part B: Density Tests

Report for plastic samples in each liquid: sinks rapidly, sinks slowly, floats on top, floats below surface

Plastic number	1:1 ethanol/water density = 0.94 g/cm ³	Water density = 1.0 g/cm ³	10% NaCl solution density = 1.08 g/cm ³
1			
2			
3			
4			
5			
6			

Relative Plastic Densities:

Less than 0.94 g/cm ³	Less than 1.0 g/cm ³	Less than 1.08 g/cm ³	More than 1.08 g/cm ³

Ranking of densities:

(lowest) _____ (highest)

Part C: Polymer Bouncy Balls

Polymer Ball composition	Approximate height bounced	Physical characteristics
Ball #1:		
Ball #2		
Ball #3		

Questions

1. Which of the Big Six plastics was the most flexible?
2. Which of the Big Six plastics would be the best material for each of the following examples?
Use short names to identify each plastic (e.g. HDPE).

a replacement for a glass window ?

a take-out container for food?

a flexible, expandable bag for carrying items?

a lightweight bottle cap?
3. An unknown plastic floats in a 10% NaCl solution but sinks in water. What is the range of possible density values this plastic may have? Suggest the composition of this plastic.

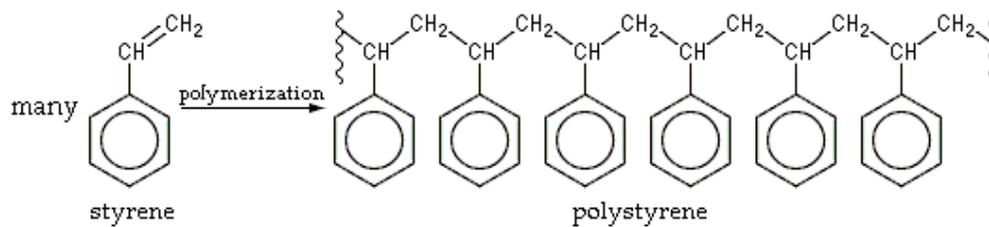
4. Why is it important to dislodge any adhering bubbles in the density tests?

5. PET plastic (number 1) is the most valuable waste plastic at the present time. Suggest a way to separate it commercially from other waste plastics.

6. Sometimes plastic containers are made from two polymers and not just one. What would happen to the water density test if HDPE and PVC were mixed?

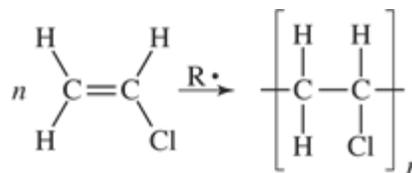
7. Why are plastic recyclers very concerned about identifying the different polymers and not mixing them together?

8. The figure below depicts polymerization of polystyrene (PS). Circle the original monomers and determine how many monomers are present.



9. Polyvinylchloride (PVC) is composed of the vinyl chloride monomer. The monomer structure and general reaction are shown at right.

Draw a polyvinyl chloride polymer composed of five monomers arranged in a head-to-tail pattern.



10. For the bouncy balls you made, what is the name of the monomer?

What is the role of each of the following in the formation of the polymer?

glue

borax

cornstarch

11. Which ball bounced the highest? Based on your data in the table, which compound was most likely responsible for this?