

GLASS/PLASTIC ANALYSIS TEAM

BACKGROUND:

In any crime scene, glass and plastic shards, no matter the size, can be an important factor in determining who may have been present when a crime took place. For example, if the crime involves an explosive attack (e.g. a pipe bomb made from a PVC pipe), investigators can collect shards of the explosive device, analyze the composition of those shards and, in turn, obtain possible leads into where the materials for the explosive device were obtained, or who made the initial purchase. In this lab, your team will use the displacement method to determine the densities of the specimens collected for evidence. You will then compare your calculated densities to the pre-determined densities of the following known materials:

Plastic type	Density <i>mass/volume</i>	Glass type	Density
Acrylic	1.17-1.20	Car headlight glass	2.20-2.29
Polybutylene terephthalate (PBT)	1.30-1.38	Car window glass	2.53-2.75
Polyethylene, high-density (HDPE)	0.94-0.96	Pyrex (labware)	2.23-2.72
Polyethylene, low-density (LDPE)	0.89-0.94	Soda-lime-silicate (bottle, window glass)	2.40-2.63
Polyethylene terephthalate (PET)	1.29-1.40		
Polyesters, unsaturated	1.01-1.46		
Polypropylene (PP)	0.89-0.91		
Polystyrene (PS)	1.04-1.08		
Polyvinyl chloride (PVC), flexible	1.10-1.35		
Polyvinyl chloride (PVC), rigid	1.30-1.58		

PART I: GATHERING EVIDENCE

In this part of the investigation, your team will search your assigned area for any traces of glass or plastic left at the crime scene. Look for containers, shards, or other materials sharing the visual characteristics of glass or plastic. Continue gathering evidence until your entire group has gathered **3 – 4 visually different** types of glass or plastic evidence. Be sure to diagram where the evidence was located and observe the following protocol:

- ✓ Wear gloves, lab coats, and shoe covers before entering the crime scene.
- ✓ When locating evidence, **carefully** remove the specimen and place it in an evidence bag (if possible).
- ✓ After locating evidence, note all details in your EVIDENCE LOG.
- ✓ Check the bottoms of your shoe covers for evidence that you may have accidentally stepped on or missed.

PART II: DETERMINE DENSITIES OF GLASS & PLASTIC SPECIMENS

Fill in the worksheet on the next page as you complete this lab.

1. Organize all specimens as Specimen A, B, C, ..., etc.
2. Before you begin, zero out your weighing scale (ask for help if needed).
3. Weigh about 10 grams of your first specimen on the scale. (Cut or alter the sample if it's under/overweight, but be sure it fits into the 10 mL cylinder in step 4). Record the mass in your worksheet.
4. Using a pipette, transfer about 4 mL of water to the 10 mL graduated cylinder. Record this initial volume in your worksheet.
5. Add the specimen to the graduated cylinder, making sure the specimen is fully submerged in water. Record this final volume in your worksheet.
***Note:** if the final volume exceeds 10 mL, repeat steps 2-5 with a smaller specimen.
6. Subtract the initial volume from the final volume. Record this displaced volume in your worksheet.

7. Divide the mass by the displaced volume to obtain the density of your specimen. Record this density in your worksheet.
8. Repeat steps 2-7 for all specimens.

Specimen	Mass (g)	Initial Volume (mL)	Final Volume (mL)	Displaced Volume	Density ($\text{mass}/\text{volume}$)
A					
B					
C					
D					

9. Answer the following analysis questions:

a. Using the given densities in the Background reading, match the densities of your unknown specimens to the known ones.

- i. Specimen A _____
- ii. Specimen B _____
- iii. Specimen C _____
- iv. Specimen D _____

b. Of what forensic significance is the density of glass/plastic specimens?

PART III: REVIEW THE POLICE REPORTS

Over the next few pages, your team will need to review the official police report of the crime as well as witness interviews. Some witness accounts will contradict others so it's your job to determine, based on your understanding of the evidence your team collected, who could be an innocent bystander and who could be a suspect.

DO NOT CONVERSE WITH OTHER ANALYSIS TEAMS AT THIS TIME!

You must form your own conclusions as a team first. If it helps, use the following analysis techniques:

- ✓ Note the WHO, WHAT, WHERE, and WHEN of the witness accounts.
- ✓ What are the relationships between witnesses?
- ✓ Create a timeline of where witnesses were at the time of the crime.

Use this space for notes and brainstorming...

PART IV: CONSULT YOUR PEERS

As a team, consult with **one** other analysis team that you feel may enhance your investigation (e.g. Hair and Fiber Analysis). Ask and answer the following questions:

Analysis team being consulted? _____

What physical evidence did this team gather? _____

What techniques did this team use to analyze their evidence?

What conclusions did this team arrive at? Why?

After consulting with the other analysis team, how does this change your original conclusions? Why?

PART V: CONCLUDING ANALYSIS

As soon as everyone has had a chance to converse with other investigative teams, we will all gather together and draw our final conclusions.