

Polymer Characterization

Density determination:

- Test the sample with distilled water to see if it floats or sinks.
- If it floats, the density is less than 1.0. Compare to other liquids that may be available to narrow down the density.
- If it sinks, the density is greater than 1.0. Compare to salt solutions to narrow down the density.
- If the sample is big enough and you have the right equipment, you can determine the density of samples that sink by water displacement.
- See table on reverse for polymer densities.

Densities of Common Liquids	
Saturated sodium chloride	1.36
10 % sodium chloride	1.07
distilled water	1.00
46% isopropanol	0.94
vegetable oil	0.92

Burn Tests:

- Warning: Do this over a non-flammable surface with adult supervision.
- Warning: Burning drops of polymer can stick to surfaces and skin.
- Warning: When checking the odor of a sample, do not inhale directly above the flame. You can gently waft a bit of the vapor to smell it.
- Look to see whether the sample melts or shrinks when placed in a flame.
- Note whether the flame is sooty or clean.
- Note whether the sample has an odor when burned.
- Remove the sample from the flame and see if it is self-extinguished or continues to burn.
- Images of some polymer burn tests can be found at:
<http://www.assumption.edu/users/bniece/olympiad/Polymers/BurnTests.html>

Polymer Test Results			
Polymer	Burn Test		Density
	Flame	Odor	
PETE	Melts, bubbles, may shrink. Burns slowly with some black soot.	Sweet	1.37
HDPE	Burns rapidly and cleanly. Drips flames. White smoke when extinguished.	Candle	0.95
PVC	Melts. Will not burn when removed from flame. Burns green on a copper wire.	Acidic	1.38
LDPE	Burns rapidly and cleanly. Drips flames. White smoke when extinguished.	Candle	0.92
PP	Burns slowly. May drip flames	Wood	0.90
PS	Burns rapidly with a very sooty flame. May sparkle	Faintly fruity, may smell like marigolds	1.05
PMMA	Burns noisily with yellow flame. Smokeless when removed from flame.	Fruity	1.16
PC	Difficult to ignite. Bubbles and chars. Will continue to burn with black smoke	Aromatic	1.20
N-66	Melts and burns with a smokeless flame. Will not continue to burn when removed from flame.	Celery or burning plastic	1.14