

PLASTICS RECYCLING / COLLECTIONS / IDENTIFICATION TRAINING

INTRODUCTION

Many enquiries are received for information on the recycling of plastics. Although the term “recycling” is used, most of the time the enquiries really equate to “collecting”. It is only after collection that plastics, or any other recyclable materials, are recycled, i.e. processed to get an end-product that can be re-used for manufacturing other articles.

SOURCE OF WASTE PLASTICS

At present a number of collectors obtain their waste plastics from different sources like:

- **Industrial Waste / Factories (or primary waste)**
This waste can be obtained from the large plastics processing, manufacturing and packaging industries. Rejected or waste material usually has good characteristics for recycling and will be clean. Although the quantity of material available is sometimes small, the quantities tend to be growing as consumption, and therefore production increases.
- **Commercial Waste**
This waste is often available from workshops, supermarkets and wholesalers. The plastics available from these sources will often be contaminated.
- **Agricultural Waste**
These waste plastics can be obtained from farms and nurseries. This is usually in the form of packaging (plastics containers or sheets), irrigation of hosepipes.
- **Municipal Waste**
This plastics waste can be collected from residential areas (domestic or household waste), streets, parks, collection depots and waste dumps / landfill sites.

IDENTIFICATION OF DIFFERENT TYPES OF PLASTICS

There are several simple tests to distinguish between the common types of plastics so that they may be separated for processing.

1. **The Water Test**
Add water in a bowl and cut small pieces of plastics and drop them in the bowl of water and see if the pieces sink or float.
2. **Burning and Odour Test**
Hold a piece of plastic with tweezers or on the back of a knife and apply a flame. Does the plastic burn? If so, what colour? When flame is extinguished smell the fumes from the sample. Did it make smoke? Did it continue to burn once the flame was removed?
3. **Fingernail Test**
Can a sample of the plastic be scratched with a finger nail?
4. **Polymer Identification Logos**
A logo is a triangle with a number inside

IDENTIFICATION OF PET PRODUCTS

PET stands for Polyethylene Terephthalate. This polymer is used mainly for the following products:

- **Bottles** for edible and automotive oils, mineral water, dairy products, carbonated drinks and household detergents.
- **Film** for specialised packaging like tea outer packs, sachet liners for aggressive chemicals used in beauty care, and oven cooking bags.
- **Other Packaging** such as blister packs, wide neck jars for peanut butter and vending cups.

SIMPLE TESTS TO IDENTIFY PET

1. Polymer Identification Logo:



2. Density or Water Test

Cut small pieces of PET samples and place in water. PET will sink in the water.

3. Burning and Smell Test

PET burns easily, burns yellow with a black smoke with a sweet aromatic smell. It bubbles whilst burning.

4. Fingernail or Rigidity Test

PET can be cut with a sharp knife, and cannot be scratched with a fingernail.

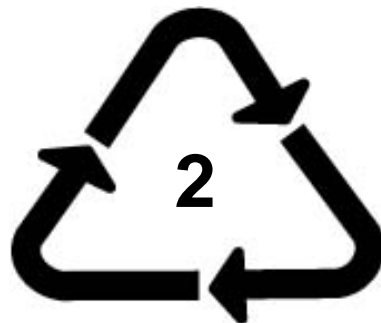
IDENTIFICATION OF PE-HD PRODUCTS

PE-HD stands for Polyethylene High Density. This material is extensively used for the manufacture of the following products:

- **Bottles to pack** - milk, methylated spirits, paraffin, bleaches, fabric softeners, motor oils, household detergents. The bottles are usually from 750ml to 5L capacity but 20L & 25L jerry-can-like containers with screw caps are also made from PE-HD.
- **Buckets and Basins** – practically all buckets and basins are made from PE-HD.
- **Agricultural Pipes** – it is extensively used for black agricultural pipes especially in diameters of more than 25mm.
- **Plastic crates** – plastic crates are returnable and it is illegal to recycle them unless permission is given by the owners to recycle them.
- **Bags** – it is used to manufacture vest-type carry bags (VCB's) and also used to manufacture some refuse bags.

SIMPLE TESTS TO IDENTIFY PE-HD

1. Polymer Identification Logo:



PE-HD

2. Density or Water Test

Cut small pieces of PE-HD samples and place in water. PE-HD will float on the water.

3. Burning and Smell Test

PE-HD burns easily, it burns like a candle with a blue flame with a yellow tip, melts and drips, smells like candle wax. Very little smoke is generated.

4. Fingernail or Rigidity Test

PE-HD can be cut with a sharp knife, and scratches difficult with a fingernail.

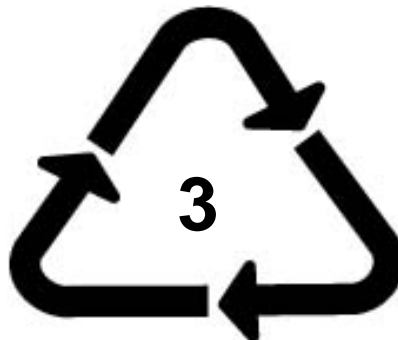
IDENTIFICATION OF PVC PRODUCTS

PVC stands for Poly Vinyl Chloride. This polymer is extensively used in the production of the following products:

- **Medical Uses:** blood transfusion sets, flooring, waterproof fabrics, medicine bottles.
- **Motor Industry:** artificial leather, underbody cover, skin for dashboards, car door panels.
- **Packaging:** bottles, clear trays for toiletries and food, cling film, chocolate trays.
- **Building Industry:** pipes and gutters, cable insulation, floors and walls, window frames, cladding.
- **Mining Industry:** pipes, boots, protective clothing, gloves.

SIMPLE TESTS TO IDENTIFY PVC

1. Polymer Identification Logo:



PVC

2. Density or Water Test

Cut small pieces of PVC samples and place in water. PVC will sink in the water.

3. Burning and Smell Test

PVC burns slow and is self-extinguishing, burns with yellow flame and has a sour, acidic smell.

4. Fingernail or Rigidity Test

PVC can be cut with a sharp knife, and some products can be easily scratched with a fingernail.

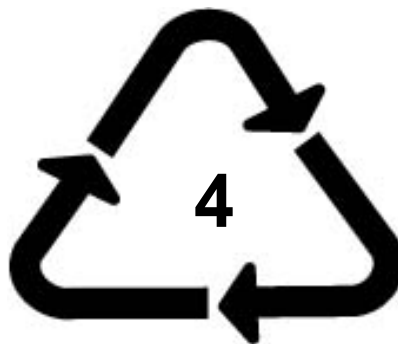
IDENTIFICATION OF PE-LD PRODUCTS

PE-LD stands for Low Density Polyethylene. This polymer is used mainly in producing the following products:

- **Packaging Film:** used for fresh and frozen vegetable bags, blanket packs, soft supermarket carry-out bags, fertilizer bags, dry cleaners film, garbage bags, and the bulk of shrink – and stretch wrap films.
- **Bottles:** soft, squeezable bottles, soft containers, cosmetic tubes.
- **Pipes:** varieties of black agricultural pipes, especially for low pressure.

SIMPLE TESTS TO IDENTIFY PE-LD

1. Polymer Identification Logo:



PE-LD

2. Density or Water Test

Cut small pieces of PE-LD samples and place in water. PE-LD will float on the water.

3. Burning and Smell Test

PE-LD burns easily, burns like a candle with a blue flame with yellow tips, drips when burning and smells like candle wax. Very little smoke is generated.

4. Fingernail or Rigidity Test

PE-LD can be cut with a sharp knife, and is easy to scratch.

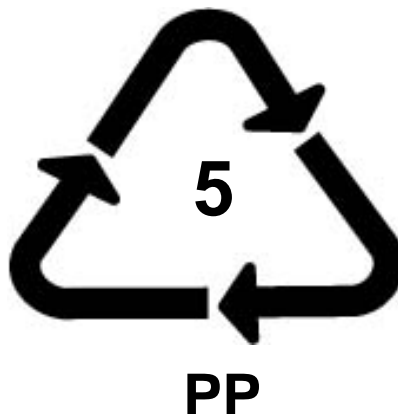
IDENTIFICATION OF PP PRODUCTS

PP stands for Polypropylene. This polymer is mainly used in the production of the following products:

- **Bottle Caps for:** Coca-Cola type bottles, dispenser caps, caps with snap-hinge closures.
- **Containers:** like margarine tubs, yoghurt packs, ice cream packs.
- **Kitchenware:** plastic cups, plastic plates, microwave oven-type kitchenware.
- **Other Uses:** automotive battery cases, plastic chairs, woven plastic sacks.

SIMPLE TESTS TO IDENTIFY PP

1. Polymer Identification Logo:



2. Density or Water Test

Cut small pieces of PP samples and place in water. PP will float on the water.

3. Burning and Smell Test

PP burns slowly, burns like a candle with a blue flame with a yellow tip, drips when burning and smells like paraffin. Very little smoke is generated.

4. Fingernail or Rigidity Test

PP can be cut with a sharp knife, and does not scratch easily. It has a very smooth, hard surface.

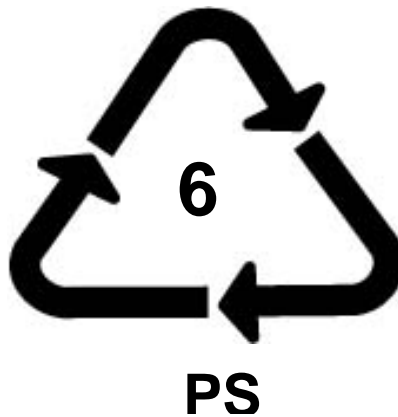
IDENTIFICATION OF PS PRODUCTS

PS stands for polystyrene and is divided into three groups or general purpose (crystal, high impact, expandable polystyrene). This polymer is used for the production of the following products:

- **Crystal Polystyrene for Food Packaging:** Yoghurt tubs, vending cups, salad containers, egg trays, meat trays, display boxes.
Display Packaging: Cosmetic containers, CD cases, cassette housings.
Other Uses: Medical trays, pens and rulers.
- **High Impact Polystyrene for:** Retail coat hangers, computers, television and radio housings, printers, keyboards, refrigerator, freezer and cooler liners, toothbrush handles, telephone housings.
- **Expandable polystyrene for Food Packaging:** meat trays, fruit boxes, vending cups, fish boxes, hamburger take-away clamshells.
Insulation: Cooler Boxes, Cold Rooms, Refrigeration
Protective Packaging: corners for TV's, electronic goods, etc.

SIMPLE TESTS TO IDENTIFY PS

1. Polymer Identification Logo:



2. Density or Water Test

Cut small pieces of PS samples and place in water. PS will sink in the water.

3. Burning and Smell Test

PS burns easily. It burns with bright yellow flame, generates airborne soot and has sweet smell like flowers.

4. Fingernail or Rigidity Test

Some can be cut with a sharp knife, some shatters when struck; some products can be scratched with fingernail.

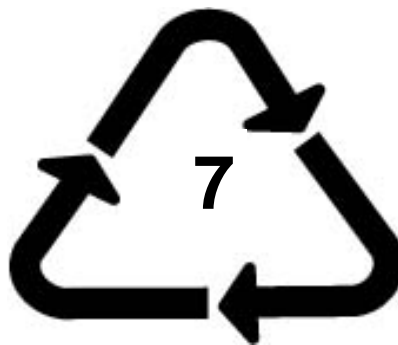
IDENTIFICATION OF PS PRODUCTS

There are approximately forty different types of plastics materials commercially available today. We will take a brief look at some of the more common polymers (raw materials) and what applications they have.

When one has such a long list of plastics, one must develop some means of identifying them.

SIMPLE TEST TO IDENTIFY OTHER PLASTICS

Polymer Identifying Logo for packaging items other than the first six.



OTHER

Where “other” would be ABS, PC, PE-LD, TPA, etc

For non-packaging applications, a different coding system is used, i.e. >acronym<. To illustrate, a polypropylene automotive bumper will carry the following identification logo: >PP<

Material	Burning Rate	Flame	Smell	Application
ABS	Moderate Does not drip, it softens only	Yellow, dark sooty smoke	Styrene, rubber-like	Telephone handset, calculator housing, radio & TV casings, toys.
PA	Burns moderate and drips readily	Blue, with yellow top, bubbles	Burnt hair	Fishing gut, weed eater cord, cable ties, small gears, castors, radiator end tanks and other engineering and automotive components
PC	Burns with difficulty, softens only	Yellow, dark smoke. Bubbles and crackles	Very sweet phenol smell	Business machine parts, camera components, electrical apparatus, tail-lights, baby bottles, traffic lights
PMMA	Burns readily, does not drip, bubbles	Blue, with yellow top	Fruity synthetic wool smell	Spectacles, lenses, safety lamps, reflectors, basins, trays, toys, signage

POM	Moderate, drips readily	Blue, almost invisible	Smell of formaldehyde	Gear wheels, bushes, aerosol cans, cigarette lighters, gas cartridges
PUR	Readily, drips easily	Yellow, dark sooty smoke	Strong, sharp smell	Fridge insulators, steering wheels and dashboard padding, car bumpers, mattresses and foam rubber

ABS – Acrylonitrile Butadiene Styrene

PA – Polyamide / Nylon

PC – Polycarbonate

PMMA – Poly(methyl methacrylate)

POM – Polyacetal

PUR – Polyurethane