



A Resumé of Plastics Recycling

Introduction

Many enquiries are received for information on the recycling of plastics. Although the term "recycling" is used most of 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.

The Plastics Recycling Sequence

1. The waste plastics materials are collected from whatever source such as from households, from supermarkets and from garbage dumps. Although collection of litter is perfectly feasible it becomes a matter of logistics because litter is rarely concentrated. Time and collecting expenses therefore unfortunately militate against the viable collection of litter.
2. The collected plastics are then sorted by type of plastics and often also by colour - especially in the case of film.
3. Individual types of sorted plastics are compressed and baled.
4. The bales are delivered to the real recycler who may do further sorting once the bales are opened.
5. The plastics articles are size-reduced i.e. cut up into smaller pieces or granules.
6. The granules are put through a washing plant to remove labels; residual contents packed in the item and soil from, for instance, a municipal garbage dump.
7. After drying the granules are fed into an extruder. They get melted down and the melt is extruded through multi-hole dies in the form of continuous strings.
8. The strings are water cooled and chopped up into pellets by a revolving cutter.
9. The pellets are bagged and are then ready to be sold to anyone who wants to use them to produce new plastics articles.

Collection and Sorting

At present a number of collectors obtain waste plastics from factories, shops and garbage dumps. They quickly become selective and do not collect types that they find difficult to sell.

They also do the initial sorting into the 6 major tonnage plastics types. It is at this point that difficulties can arise as the end-user does not want cross-contamination of materials in the pellets supplied to him. These main plastics types - with their acronyms in brackets - are:

Low density and linear low density polyethylene (PE-LD and PE-LLD)

Almost all the thin, slightly milky, usually transparent packaging film used for fresh and frozen vegetable bags, blanket packs, pillow and disposable nappy wraps, soft supermarket carry-out bags, fertiliser bags, dry cleaners film packaging and for the bulk of the shrink- and stretchwrap films, black



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garbage bags and building film are made from PE-LD/LLD. Soft, squeezable bottles, soft covers for fridge containers, the soft containers themselves and the softer varieties of black agricultural pipe are also made from PE-LD/LLD.

This is the largest single type of plastics recovered in the RSA and comprises about 50% of the total amount of plastics recycled.

There is a high demand for this type of material from recyclers.

High density polyethylene (PE-HD)

This material is extensively used for the manufacture of the strongly coloured (even when white), non-translucent or -transparent bottles used to pack items like milk, methylated spirits, paraffin, mineral turpentine, bleaches, scouring powders, fabric softeners, motor oils etc. The bottles are usually from 750ml to 5ℓ capacity but 20 and 25ℓ jerry-can-like containers with screw caps are also made. If any of the above products, like methylated spirits etc, are packed in clear, transparent bottles the bottles will be of PVC or PET and not PE-HD.

Practically all buckets and basins are made from PE-HD and it is extensively used for black agricultural pipe especially in diameters of more than 25mm. PE-HD plastics crates are all returnable and it is ILLEGAL to recycle them unless supplied by the owners of the crates.

PE-HD is also used for the manufacture of the slightly hard, paper-like handle carry-out bags used in supermarkets, also called vest-type carry bags or VCB's.

There is a high demand for PE-HD, especially bottles, by the recyclers.

Polypropylene (PP)

PP is used for all the "Coca-Cola" type bottle caps, for most other screw-on caps and for dispenser caps with a snap-hinge closure. (The soft type of press-on cap or closure is made from PE-LD/LLD).

It is also extensively used for yoghurt, margarine and ice-cream packs where it can be confused with polystyrene containers. However it is easy to identify PP in such containers. If the container wall is bent sharply it will not crack but only show a stress mark.

Automotive battery cases are also made of PP as are plastics chair shells, most of the plastics cups and plates and most of the rigid kitchen ware of the micro-wave ovenable type. Woven plastics sacks are made from PP as is the highly transparent, shiny shirt and lingerie packs.

There is a good demand for PP for recycling.

Polystyrene (PS)

The polystyrene mostly seen is the white, very light, friable, expanded or foamed polystyrene (PS-E). Although this material is recyclable it has such a large volume to mass ratio that it is completely uneconomical to transport and recycle at present.

Only the solid PS is recycled and it is also in demand. Disposable plates, cutlery and yoghurt containers, margarine, ice cream, take-away food tubs and lids, take-away beverage glasses and lids, easily breakable plastics toys, swizzle sticks, visiting card boxes etc. are made from PS. When bent and pressed, PS snaps easily whilst PP does not. Most of the PS items are glass clear or transparent if coloured. When tapped with a finger nail solid PS items also have a "tinny" sound.



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Poly(vinyl chloride) (PVC)

PVC is easily recyclable. PVC bottles are of high clarity and are used to pack things like bath oils, cooking oil, mineral spring water, distilled water, benzene, mineral turpentine, vinegar, dishwashing liquids and all types of fruit drinks in 750ml to 5ℓ size bottles - the larger ones often with a handle.

PVC high clarity sheet is used to make semi-rigid packaging for flowers, posies, sweets, bubble packs on hanging cards, take-away cake dishes and covers, triangular sandwich containers for delicatessens, clear trays for foods, display trays for toiletries (usually coloured white) sweet making moulds, pastry packing and egg packing.

It might be difficult to differentiate between PVC and PS but again - PS will crack if bent sharply whilst PVC will not. PS also burns easily while PVC stops burning when a flame is taken away.

Rigid PVC (PVC-U) is usually in the form of hard white, grey or blue pipe used for irrigation, soil, waste and vent pipe, electrical conduit and rainwater guttering.

There is a good demand for this type of material as well as for the PVC clear and opaque sheet mentioned above.

PVC can also be plasticised (PVC-P) i.e. a soft and pliable material. This is used for shower curtains, garden hose, and electrical cable covers. There is a demand for this type of PVC also - especially for cable-covering material.

Poly(ethylene terephthalate) (PET)

This is the material from which the body of the "Coca-Cola" type bottle is made. It is highly transparent and the bottles often have heavy ridges on the bottom. PET is now also being used instead of PVC for such items as dish washing liquids and in preserved fruit containers.

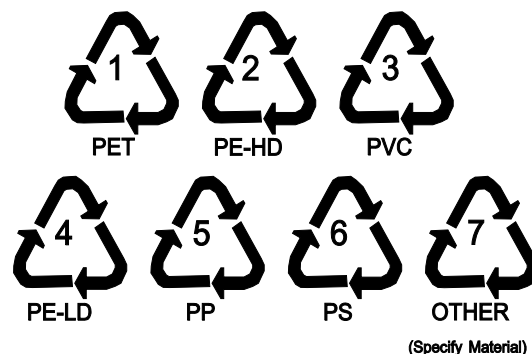
At present only very limited quantities of PET are recycled but recyclers' interest in the product is growing.

Other

There are of course a host of other plastics that can and do land up in garbage, but they occur only sporadically in small quantities and visual identification is difficult. If supplied to recyclers they would probably try to identify these, often engineering, plastics by the type of article in which the unknown plastics material is used.

Note:

Many packaging plastics are difficult to differentiate. A system of IDENTIFICATION for packaging plastics that is being increasingly used overseas and in South Africa is to put a polymer identifying logo on the article - in bottles usually on the base of the bottle. The logo is in the form of a triangle of arrows with a number in it. The number denotes the type of polymer used. Sometimes the acronym for the polymer is put below the triangle. **For "other" the acronym of the material must be specified.**





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For NON-PACKAGING plastics a different coding system is used i.e.: > **ACRONYM** <

The Recycler

It must be stressed that recycling, like everything else, is a matter of commercial and financial viability. The recycler cannot pay too much for collected material as this cost plus the high costs of reprocessing must be low enough to enable him to sell the recycled product. That is one reason why recyclers don't usually accept unsorted wastes and why collected, baled wastes must be delivered to their premises. In addition the recycler has to find end-use markets for recycled materials.

We are far ahead of the rest of the world in the RSA as we already mechanically recycle some 14% of ALL new plastics used i.e. about 150 000 tpa. This percentage figure is 5 times higher than the 1995 figure in the USA and Europe. All recycled plastics are again used in the RSA. Most of the recycled waste plastics come from plastics packaging items especially packaging films and bottles. In fact 30% of plastics used for packaging is recycled, and is included in the above figures.

Because of this already high figure most recyclers only recycle a limited number of plastics types and will be reluctant to increase this if there is no market for their recycled material. *It is therefore imperative to contact the actual recyclers to see what they are willing to accept, in what form and at what price before initiating any collection schemes.*

A list of currently known recyclers and the types of plastics that they normally recycle is obtainable from the Plastics Federation. Even if the plastics that have been collected are not mentioned it does no harm to contact a recycler as some of them may recycle some plastics that are not shown against their name. This is especially the case if reasonable and regular quantities of such plastics can be supplied.

Collectors

It is difficult to obtain details of collectors who are often fairly small operators within a small area. A list of currently known collectors is also obtainable for the Plastics Federation.

Because collectors usually do sorting and baling it is preferable that concerned householders supply their, if possible pre-sorted, plastics wastes to collectors.

If there is no known collector of plastics in an area, ask the local authority if they know of anybody doing any type of collection for recycling even if only collecting, say, paper. They may be interested in also handling plastics.

If no collectors or recyclers are available

Unfortunately the known collectors and recyclers are situated near large towns in Gauteng, KwaZulu Natal, and Eastern- and Western Cape. Large inland areas therefore have no such facilities. The delivery distances and costs from such areas to main centres are long and high. Such costs are usually higher than the low price that is paid for collected material.

All plastics are toxicologically completely innocuous if they are buried. Because of their inertness buried plastics cannot contaminate groundwater or the soil nor do they release any obnoxious gasses. There is therefore no environmental reason why plastics cannot be dumped on a properly operated garbage dump. By proper operation it is understood that all dumped material, not only plastics, should be covered with soil or rubble and compacted. If this is not done plastics, paper and aluminium foils can get blown around by the wind and will then form unsightly litter.



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Plastics should not be burnt. Like wood and paper they burn with a sooty flame and this contravenes any clean air regulations that might exist. PVC, PS and some of the lesser used plastics *could* evolve small amounts of toxic gasses and must therefore never be burnt in an enclosed space. When these gasses are burnt in the open air, they disperse and are not dangerous. Plastics, especially in large quantities, should however NEVER be burnt in the open.

The only safe and environmentally acceptable way of burning plastics is by the use of properly designed incinerators that use the energy of the burning plastics to generate power. These are very expensive and none are likely to be erected in the RSA for several years to come.

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