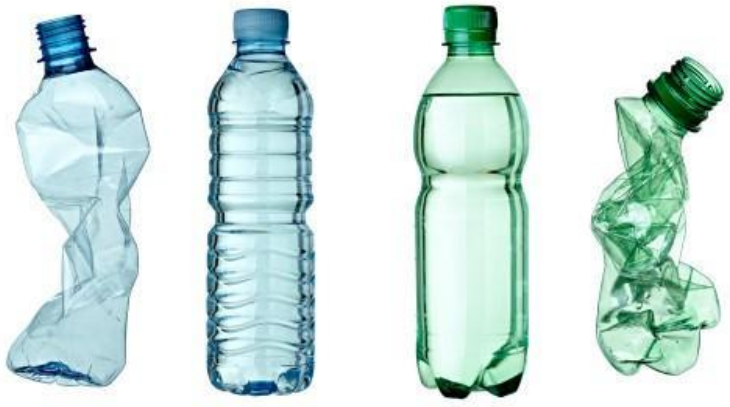
PLASTICS

Polyethylene Terephthalate (PET or PETE or Polyester)



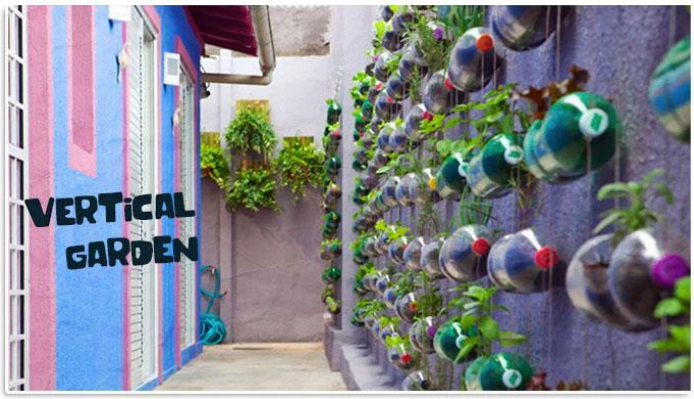
- PET is also known as a wrinkle-free fiber.
- Polyester is made by **reacting terephthalic acid, a petroleum derivative, with ethylene glycol, another petroleum derivative.**
- PET contains antimony trioxide—a matter that is considered as a carcinogen—capable of causing cancer in a living tissue.
- The size of bottles made by PET range from very small bottles to large carboys.

Uses

- PET is mostly used for food and drink packaging purposes due to its strong ability to prevent oxygen from getting in and spoiling the product inside.
- It also helps to keep the carbon dioxide in carbonated drinks from getting out.

Methods to recycle/reuse PET

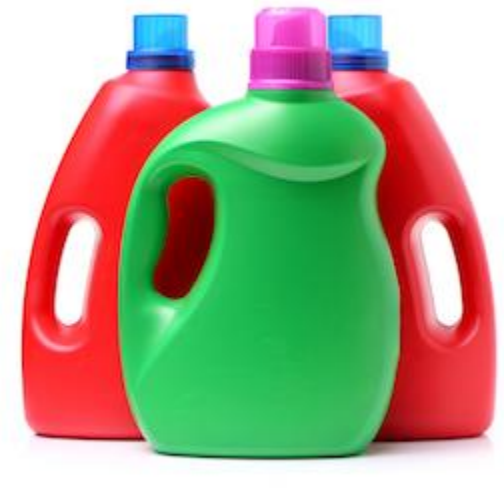
- Reuse Soda Bottles by Creating a Vertical Garden.



- Reuse Plastic Bottles to Make a DIY Sprinkler.

- Recycle Empty 2-Liter Bottles Into DIY Water Filters.
- Upcycle Laundry Detergent Bottles Into a Watering Can.

High-Density Polyethylene (HDPE)



- HDPE has long virtually unbranched polymer chains which makes them really dense and thus, stronger and thicker from PET.
- It is made from the polymerization of ethylene. HDPE is manufactured at low temperatures and pressures, using **Ziegler-Natta and metallocene catalysts or activated chromium oxide.**
- It can be recycled.HDPE is relatively more stable than PET.
- It is considered as a safer option for food and drinks use.
- But it can leach estrogen-mimicking additive chemicals that could disrupt a human's hormonal system when exposed to ultraviolet light.

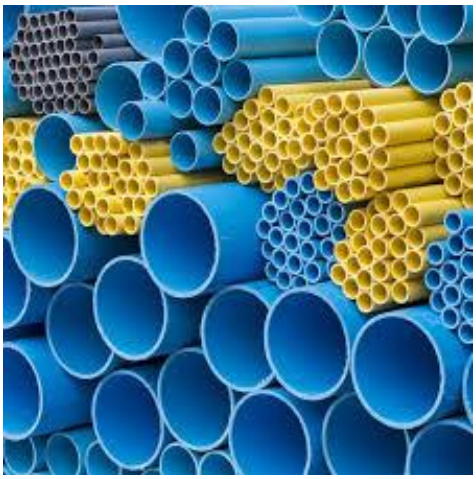
Uses

- HDPE is commonly used as the grocery bag, opaque milk container, juice container, shampoo bottles, and medicine bottle.

Recycling of HDPE

- Used HDPE bottle caps can be recycled into pens.
- First, the plastic is sorted and cleaned, to remove any unwanted debris. The plastic then needs to be homogenized, so that only HDPE will be processed.

Polyvinyl Chloride (PVC)



- PVC is the second most widely used plastic resin in the world.
- Before the manufacture and disposal process of PVC has been declared as the cause of serious health risks and environmental pollution issues.
- PVC is considered as the most hazardous plastic.
- PVC is also rarely accepted by recycling programs.
- This is why PVC is best to be avoided at all cost.
- The essential raw materials for PVC are **derived from salt and oil**. The electrolysis of salt water produces chlorine, which is combined with ethylene (obtained from oil) to form vinyl chloride monomer (VCM). The polymerisation of VCM to make poly-vinyl-chloride (PVC)

Uses

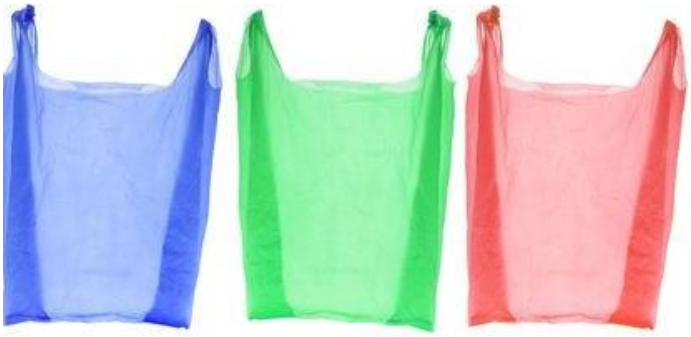
- PVC is typically used in toys, blister wrap, cling wrap,window frames, detergent bottles, loose-leaf binders, blood bags and medical tubing.
- It is also used in cable wires and insulation.

Methods to recycle PVC

- Mechanical recycling– which essentially involves **mechanical grinding of** the waste material to produce a granular product that can then be used in the production of new PVC products.

- Feedstock recycling – Chemical processes such as pyrolysis, hydrolysis and heating are used to convert the waste into its chemical components.

Low-Density Polyethylene (LDPE)



- This type of plastic has the simplest plastic polymer chemical structure, making it very easy and very cheap to process.
- LDPE is considered as a safer plastic option for food and drink use.
- Unfortunately, this type of plastic is quite difficult to recycle.
- LDPE is prepared from **gaseous ethylene under very high pressures** (up to about 350 megapascals, or 50,000 pounds per square inch) and high temperatures (up to about 350 °C [660 °F]) in the presence of oxide initiators.

Uses

- LDPE is mostly used for bags (grocery, dry cleaning, bread, frozen food bags, newspapers, garbage), plastic wraps; coatings for paper milk cartons and hot & cold beverage cups; some squeezable bottles (honey, mustard), food storage containers, container lids.
- Also used for wire and cable covering.

Methods to recycle/reuse LDPE

- **Curbside recycling:** Like HDPE plastics, many LDPE plastics are accepted through your local curbside recycling program. Just check with your recycling program office to ensure that this is true. Some, however, will accept things like milk cartons and food container lids, but they will not accept LDPE plastic bags so be sure to clarify when talking to them.
- **Grocery store drop-off programs:** Some supermarkets accept LDPE plastic bags for recycling. Check with your local grocery store to see if they have a program in your area.
- **Reuse:** In many cases, you can reuse old plastic food containers to store more food, use for kids drafts, store office supplies, and so on. If you can't recycle these plastics using either method above, look for a way to use it around your home so that you don't send them to the landfill.

Polypropylene (PP)

- It is stiffer and more resistant to heat
- Its strength quality is somewhere between LDPE and HDPE.
- PP isn’t quite recyclable and could also cause asthma and hormone disruption in humans.
- Polypropylene is **made from the polymerization of propylene gas in the presence of a catalyst system**, usually Ziegler-Natta or metallocene catalyst. ...

Uses

- PP is widely used for hot food containers.
- PP is used in thermal vests, and car parts, PP is also included in the disposable diaper and sanitary pad liners.

Recycling of PP

There are five steps in PP recycling, namely, collecting, sorting, cleaning, reprocessing, and producing new products.

Collecting:The polypropylene material must be separated from other types of plastic polymers. This is regularly achieved through a “sink-float' separation technique where polypropylene is separated based on its ability to float when other polymers will sink.

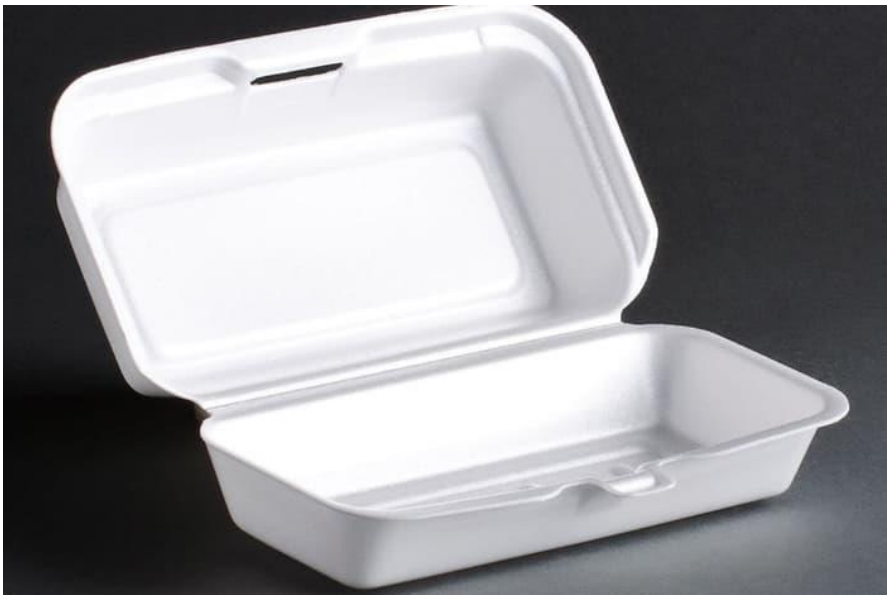
Sorting: Sorting is done manually or with machines using technology that recognises different sorts of plastic. Sorting machines are used to identify and separate large amounts of plastic. Advanced sorting machines come with infrared, x-ray or other cutting-edge sensors that can recognise a polymer's unique signature.

Cleaning: Surfaces which are only slightly dirty can be cleaned with a moistened cloth or sponge.Much dirtier parts can be cleaned using water with a neutral cleaner.

Reprocessing: In the reprocessing phase, cleaned PP products are fed into an extruder where it is melted at 4640F (2400C) and cut into granules.

And finally,the The pellets are ready to be used in the production of new products.

Polystyrene (PS)



- Polystyrene is made in a process known as **suspension polymerization**. After styrene is produced by combining ethylene and benzene, it is merged with water and a mucilaginous substance to form droplets of polystyrene.
- It is commonly **used** for food containers, egg cartons, disposable cups and bowls, packaging, and also bike helmets.
- When exposed with hot and oily food, PS could leach styrene that is considered as brain and nervous system toxicant. It could also affect genes, lungs, liver, and immune system.
- On top of all of those risks, PS has a low recycling rate because it is tough to recycle.

Methods to recycle polystyrene

- expanded polystyrene (or EPS), which can be immediately reused and is accepted by some local council plastic recycling schemes.
- There are three common methods for recycling of PP, known as granulation, compacting, and densifying.
- Melt granulation process:
  Melt granulation is the primary method for recovering PS foam, and most of the waste PS foam recovered by this method. Melt granulation recycle polystyrene material at the right circumstances can keep the material with better mechanical

properties, and the American DOW Chemical Company research shows that the use of polystyrene in a number of thermal processing, the average relative molecular mass reduced, a small amount of local molecular chain was broken. There remains 80% strength and elongation at break of 90% after more than five times of recycling.

Polystyrene foam waste sorting, crushing, washing, drying, degassing, extrusion, and granulation. Recycling production of pellets can be reprocessed and shaped into a variety of products.

Waste Styrofoam recycling once made plastic recycling business prohibit with the large volume and high transportation costs of PS foam.

- Compacting:
  Compacting polystyrene is actually the best way to **discard** it. Normal bins can fill up almost instantly with blocks of expanded polystyrene even though the material itself is almost weightless, whereas a compactor will compress polystyrene packaging into dense chunks that are much easier to collect.

- Densifying:
  Densifiers are **used to compact loose foam products into dense blocks for transportation or storage prior to recycling.**

Other Plastics

- Number 7 is for all plastics other than those identified by number 1-6 and also plastics that may be layered or mixed with other types of plastics, such as bioplastics.
- Polycarbonate (PC) is the most common plastic in this category, and isn't used as much in recent years due to it being associated with bisphenol A (BPA).
- PC is also known by various names: Lexan, Makrolon, and Makroclear.
- The BPA that contained inside PC have been linked to numerous health problems including chromosome damage in female ovaries, decreased sperm production in males, early onset of puberty, and various behavioural changes.
- Added with its very low recycle rate quality, PC is to be avoided at all cost.

Uses

- PC is typically used for baby bottles, sippy cups, water bottles, water gallon, metal food can liner, ketchup container, and dental sealants. Due to its toxicity, several countries have banned the use of PC for baby bottles and infant formula packaging.

Nearest plastic recycling centres

https://www.google.com/maps/place/Sri+Raja+Rajeswari+Green+Tech+Plastic+Grinding+Recycling+Company/@17.2606152,80.0874213,15.42z/data=!4m5!3m4!1s0x3a34f78c054468c3:0x85c5a7f4ac063b04!8m2!3d17.2631026!4d80.0878163

Articles used

- https://waste4change.com/blog/7-types-plastic-need-know/
- www.wikihow.com