

## Lifestyle &amp; Culture

# Which plastics are harmful?



**PROF. RENALD  
BLUNDELL**



**EMMA CAMILLERI**

Plastics have become an integral part of our daily lives. They are utilised in a broad range of products and activities, including construction materials and food packaging. Some plastics are toxic and may be harmful to both the ecosystem and human health. The seven frequently used plastic types and their toxicity will be discussed in this article.

## Polyethylene Terephthalate (PET or PETE)

PET is a thermoplastic polymer that is commonly used in textiles and in the production of plastic bottles for water, soda and other beverages. It is a clear, lightweight and strong plastic that is resistant to impact and moisture and together with its satisfactory gas and aroma barrier properties, is suitable for food packaging applications. Although it is considered relatively safe, it can release antimony and phthalates, which can be harmful to our health. Regrettably, this plastic takes hundreds of years to decompose in landfills and throughout the process it releases toxic chemicals when incinerated, contributing to air pollution. Fortunately, PET is commonly recycled into products such as polyester fibres, which are used to make clothing, carpets and other textiles.

## High-Density Polyethylene (HDPE)

HDPE is a thermoplastic polymer that is commonly used in the production of plastic bags, bottles, containers, toys, furniture and construction materials due to it being a strong, lightweight and chemical and moisture resistant plastic. Although it is also considered safe, it can release chemicals that are harmful to one's health, especially when heated. Similarly, it takes decades to decompose and upon doing so it releases methane gas, contributing to climate change. HDPE is commonly recycled into products such as plastic lumber, which is used to make outdoor furniture, decking and playground equipment.

## Polyvinyl Chloride (PVC)

PVC is another thermoplastic polymer that is commonly used in the production of pipes, medical devices, toys, wire coatings and flooring due to its fire-resistant and electrical insulation properties. PVC can release toxic chemicals during production, use and disposal. These toxins, particularly phthalates, can in-



Photo: AI-generated images created by Prof. Blundell

terfere with our hormone levels leading to developmental problems. PVC is difficult to recycle and is usually not accepted by kerbside recycling programmes. However, some recycling facilities accept PVC and can process it into new products, such as pipes and flooring.

## Low-Density Polyethylene (LDPE)

LDPE is a thermoplastic polymer that is flexible and lightweight as well as resistant to impact, moisture and chemicals. As a result, it is commonly used in the production of plastic bags, packaging films and other applications that require flexibility. As a plastic, although it is considered safe, it can release toxic chemicals when heated. LDPE like other plastics, expels methane gas as it decomposes, contributing to climate change. LDPE is commonly recycled into products such as garbage bags, plastic lumber and irrigation tubing.

## Polypropylene (PP)

PP is a thermoplastic polymer that is commonly used in the production of food containers, straws and automotive parts due to its good heat resistance. It is considered safe and has a low toxicity level. However, it can leach chemicals that are harmful to our health when heated.

## Polystyrene (PS)

PS is a lightweight and rigid thermoplastic polymer that is commonly used in the production of foam cups, packaging materials and toys. It is considered toxic because it contains styrene, which can interfere with our hormone levels and cause cancer. PS can take hundreds of years to decompose in landfills and can also break down into small pieces, or microplastics, which can be ingested by wildlife and accumulate in the food chain.

## Other plastics

Other plastics, such as polycarbonate (PC), which is used in the production of water bottles and baby bottles and acrylonitrile butadiene styrene (ABS), which is used in the production of electronic components, are also considered toxic because they can leach chemicals that are harmful to our health. PC is strong and transparent while ABS is lightweight and has good impact resistance, making them suitable for specific applications.

## The detrimental effects these plastics have on one's health

The damaging effects of toxic plastics on our health can vary depending on the type of plastic and the extent of our exposure to them.

Many toxic plastics contain chemicals that can mimic hormones in our bodies and interfere with our endocrine system. This can lead to developmental and reproductive problems, including early puberty, infertility and hormone-related cancers. Furthermore, certain plastics like polystyrene and polycarbonate, have been linked to an increased risk of cancer. This is due to the presence of chemicals that are known as carcinogens.

Additionally, plastics like PVC can lead to neurological and behavioural problems including but not limited to impaired learning and memory, hyperactivity and attention deficit disorder. Toxic plastics can also cause or aggravate respiratory disorders since their production and disposal releases chemicals and particulate matter into the air, which can lead to respiratory problems such as asthma and bronchitis. Similarly, exposure to certain types of plastics, like phthalates, has been linked to an increased risk of cardiovascular diseases like hypertension.

## What alternatives can be used?

Plant-based plastics, such as polylactic acid (PLA), are made from renewable resources, such as cornstarch, sugarcane or potato starch. These plastics can be used for food-packaging, dispos-

able utensils and other single-use products. Similarly, glass which is an alternative substitute is durable and recyclable making it an ideal material for packaging food and beverages, as well as for home decor and construction materials. Metals like aluminium and steel can also be used for food-packaging, beverage cans and construction materials. Likewise, paper and cardboard are renewable and biodegradable materials that can be used for packaging, printing and stationery products too. Since they can be recycled multiple times, they are a sustainable alternative to single-use plastics.

Furthermore, natural fibres, such as cotton, hemp and jute, can be used to make reusable bags, clothing and home decor items. These materials are renewable and biodegradable too. Biodegradable plastics, like polycaprolactone (PCL), are also an appealing alternative since they can "break down" in the environment and reduce the amount of waste that ends up in landfills. These plastics can be used for food-packaging, disposable utensils and other single-use products.

## What can we do as a society?

As a society, there are several things we can do to reduce our dependence on single-use plastics and minimise their impact on the environment.

Firstly, we can reduce our plastic use by choosing reusable bags, bottles and containers instead of single-use plastic products. We can also choose products with minimal plastic packaging or packaging made from sustainable materials. Furthermore, we can properly dispose of plastic waste by recycling, composting or sending it to a landfill. Finally, educating others about the impact of plastic on the environment and ecosystem raises awareness and encourages one to reduce their plastic use.

In conclusion, plastics are an integral part of our daily lives, but being aware of their impact on the environment and health is vital. As a society, we can take several actions to reduce our reliance on single-use plastics and move towards a practice where sustainable alternatives become the mainstay, to prevent the negative consequences brought about by toxic plastics and create solutions that are better and healthier for ourselves, the ecosystem and future generations.

*Renald Blundell is a biochemist and biotechnologist with a special interest in Natural and Alternative Medicine. He is a professor at the Faculty of Medicine and Surgery, University of Malta*

*Emma Camilleri is currently a medical student at the University of Malta*