

# Plastic Wastes And Its Management

Prasenjit Adak

School of Chemical Engineering and Physical Sciences, Lovely Professional University, Phagwara, Punjab-144411

**Abstract:** Plastic wastes are one of the largest problems the world experiencing currently. They pose serious risks to human health, biodiversity and environment. One of the most effective ways to deal with this problem is to recycle the plastic wastes. Effective management of plastic wastes requires cooperation from all levels of society.

## Introduction

The population of the earth is ever-increasing. Among the numerous problems associated with escalating population, the increase in the total amount of the waste materials is arguably the most persistent. The modern busy lifestyle led to huge demand of disposable containers and products. Durability and ease of use make plastic a very attractive material for industrial and domestic use. A study conducted in 2005 by the United States Environmental protection Agency (USEPA) revealed that, the annual generation of Municipal Solid Waste (MSW) in The United States was nearly 246 million tons. Around 12% of the generated waste materials had plastics as their key component [1].

The accumulation of easily disposable materials in the environment resulted devastating consequences for both terrestrial and aquatic living beings. The toxic components of plastic such as, polycyclic aromatic hydrocarbons (PAHs) can cause significant damage to atmosphere, hydrosphere and lithosphere. The largest problem with plastic is its non-biodegradability. Plastics can persist in nature for even a thousand years. Therefore, they contribute in environmental degradation continuously for a long time. As the particles of plastics are found in wide size range, it can affect a broad range of organisms. Researchers have found the traces of plastics in even significantly small organisms such as planktons [2]. The uptake of plastics by planktons results in its integration in food chain. It even gets assimilated in human food chain through fishes.

Beside the damage to the ecosystem, the plastics can contaminate the freshwater reserve of the earth. Tiny particles of plastics from Municipal Solid Waste (MSW) can wash away with rainwater and contaminates the waterbodies. Very small particles can reach aquifer and pollute groundwater. The plastics can pollute the marine environment as well. The plastic bags and discarded fishing nets can significantly affect marine lifeforms. They may get entangled around the faces and necks of the aquatic animals such as, turtles, fishes, seals etc. As a result, the capability of the animals to breath, see or consume foods are hampered which ultimately leads to their death.

The management and disposal of plastic wastes can be challenging. Uncontrolled burning of plastic wastes leads to the emission of multiple toxic gases in environment. Inhalation of these gases may lead to significant degradation in human health. Dumping plastics in landfill area can cause leaching of toxic chemicals into

groundwater. Improper storage and management of plastic wastes may lead to its transportation with wind and interfere with the lives of plants, animals and even human beings.

Millions of dollars are used to clean the areas polluted with plastic wastes. Besides, as the volume of plastic wastes is increasing with every passing day, the requirement of disposal area is also increasing. On the other hand, due to the rapid development of man-made structures and infrastructures the land resource is already depleting. In this situation, the increasing demand of landfill area is causing further depletion of land resource. One of the effective solutions to this problem is to reuse or recycle the plastic-made products. This article discusses the importance of plastic reuse and recycling in protection of environment.

### **Origin of plastics**

Although there are numerous references in ancient texts that indicate the use of natural plastic materials, the invention of synthetic plastics is attributed to Alexander Parkes in 1862 [3]. The constituents of plastics are basically polymers. The first fully synthesized plastic material was Bakelite which used to be a popular insulating material in electrical sector. It was invented by Leo Baekeland in 1907 [4]. Later during the period of World War II, the use of synthetic plastics for military purpose increased many folds. In 1935, Wallace Carothers invented Nylon which had a diverse military application including the production of ropes, parachutes and wearable because of its light weight. Now a day, plastics are used in almost all aspects of life. Water bottles, cans, carton, furniture, kitchenware, fishing nets and carry bags are few of the examples of the widely varying use of plastics.

### **Types of commercially used plastics**

Plastics that are generally be used for commercial purpose can broadly be classified into two categories. Firstly, the thermoplastics can be recycled by melting them with heat. Polyethylene, polypropylene, polyamide, polyoxymethylene, polytetrafluorethylene, and polyethyleneterephthalate are the examples of this type of plastics. On the other hand, thermosetting plastics cannot be melted by applying heat as their molecular structure has strongly bonded crosslinks. Some examples of this type of plastics are epoxy resin, melamine, polyurethane, unsaturated polyester etc.

### **Management and disposal and recycling of plastic wastes**

Management of plastic waste requires involvement of people from all levels of society. Lack of environmental awareness and negligence of decision makers in different levels pose serious challenges in effective implementation of plastic waste management policies. Improper treatment of plastics may lead to deleterious consequences. Burning of plastics may emit dioxine and furan that has harmful effects on human beings. Disposal of plastic bags can reduce the porosity of the soil and affect plant growth and survival. Plastic bags affect the lives of domestic and wild animals negatively.

The present methods of plastic disposal (i.e., burning and burying) are not much cost-effective. However, there are several other management strategies to control plastic pollution. Using metal water bottle can reduce the requirement of buying disposable plastic water bottles. Repairing the plastic furniture or purchasing refurbished plastic products can reduce the need of buying new products and therefore decreasing the generation of plastic waste. Carrying reusable bags made of biodegradable materials such as jute and paper can reduce the use of polyethylene carry bags and avoid its harmful effects on environment. Additionally, the products with less packaging can be chosen instead of opting for products with multilayer plastic packaging. Besides, recycling of thermoplastics is very an attractive option for using the previously used materials for forming new products. Mechanical recycling of plastics involves the grinding of the plastics and forming new products from it. Marzouk et al. (2007) investigated the impacts of PET on the strength and density of concrete [5]. Feedstock recycling involves the conversion of plastic wastes into oil and producing new polymers [6]. Energy recovery is another option to recycle the plastic wastes. The plastic materials can be blended with other fuel types such as, biodiesel to utilize the energy stored in it [7].

## Conclusion

Plastics have become of utmost importance for the progress of human civilization. Numerous plastic products are being discarded as waste materials on daily basis and spread across the world. Severe plastic pollution threatens the existence of many terrestrial and aquatic animals. Therefore, in order to maintain the sustainability and integrity of the ecosystem sensible use of plastics and proper management and recycling is necessary.

## References

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