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A Review: Recycling of Plastic Waste Generated from Food Packaging

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ABSTRACT

Plastic waste generated from food packaging is in the form of films, thermocol dishes, coverings, pouches, water bags, carry bags, beverages packaging like bottles, oil cans, milk packaging etc contributed to major damage to the environment. This review paper suggests the different methods for recovery and reusing of plastic waste generated from the food packaging.
Keyword- plastic waste, food packaging waste, PET waste, polystyrene waste, waste management

1. INTRODUCTION

The estimated world population by year 2100 would be around 11 billion. The food requirements to support this large a population and their activities come for the most part, directly or indirectly, from daily photosynthesis action of Earth and Sun. Any how to live on this earth we require a food and water. But this daily need would cause difficulties in living if we would not be able to reprocess the wastages generated by ourselves for packaging of these food items.

The wide range of availability of plastics and its properties like ease of forming, heat sealability, barrier, flexibility, impact strength, light weight, reduced package size, and low cost would certainly attract one towards for the packaging of food. But with above some advantages there is major disadvantage with plastic is its non destroyable life.

There are some practices which are frequently used from long ago to destroy the plastic wastes. These are as follow -

1. Land filling: digging earth and filling plastic into it.
2. Incineration: Burning plastic waste
3. Littering: Throw the plastic into the sea

But all above processes which we use for destroying plastics are not sufficient alone to destroy it 100 %. Because land filling of plastic would cause deterioration of land as well as plastic requires hundreds of years to degrade. Incineration or burning would release huge amount of CO_2 which will affect the environment and pouring in sea means nothing but harming the beauty of nature. So it is advisable to better the recycling or reusing the waste plastic generated from food packaging rather than destroying it.

2. METHODS OF RECYCLING PLASTIC WASTE GENERATED FROM FOOD PACKAGING

2.1 Recycling of Food Packaging Films

We see now a day lots of foods like potato chips, kurkures, dry nuts, fursans, sweets, fruits, vegetables, drinking water, milk, meat etc get packed it pouches, wrappers, transparent of coloured films. These films are generally made of polymer called as polyethylene. Plastic films for packaging food are very efficient at performing their function, but are inherently difficult to recycle as they are typically manufactured from multiple layers of different polymers and come into contact with food. Multilayer film may be of two or three layers which enhance the barrier properties and hence food gets preserved for long term. But the recycling of these kinds of films becomes difficult as compare to single layer film. Although multilayer films get separated by chemical solvent dipping process or thermomechanical process. After separation the cleaning of all the waste plastic film is carried out. Then these films are get melted and homogenise in agglomerated. The prepared homogenous plastic dough is the extruded in the extruder in the form of long strands which are then further cut in the form of pellets which is called as pelletizer.

The prepared pellets are further used for making films or other plastic items in combination with virgin plastic or pure plastic.

Fig 1: Plastic packaging films

2.2 Recycling of Food Packaging Plastic Containers and Disposable Cups

Polystyrene foam containers have been used for fast-food packaging and hot drink cups because it is lightweight, sanitary, recyclable, and insulates to keep foods hot while being cool to touch. Most polystyrene foam food-service products have never contained chlorofluorocarbons that have been associated with the depletion of the ozone layer as well as these are FDA approved. Other material used as food container of lunch box or we can say "Tiffin" box is nothing but the Polypropylene.

Fig 2: Plastic food containers & cups

The major issue in recycling of Polystyrene is its collection and its cleanliness. The huge effort is need to be taken for its collection, sorting from other material as well as chemical treatment for its cleaning. Once it get cleaned, the heated mass of polystyrene is compacted in the metal box in oven and after some time the blocks are manufactured as sheets or slabs. These sheets are further use for the light weight packaging. The Polypropylene recycling is easier as compare to Polystyrene recycling. The waste polypropylene food containers are get cleaned and then crushed into small pieces with the help of grinder. Afterward these small pieces are mixed with virgin polypropylene and used in injection moulding machine for manufacturing other products.

2.3 Recycling Of Beverages

Fig 3: Plastic beverage packaging

The main contributory plastic material for beverage packaging is Polyethylene terephthalate (PET), which is mostly used for drinking water and cold drinks packaging. Other material which used for oil packaging is High density polyethylene (HDPE) and where PET also can be used. The recycling process for PET is slightly different than the rest of the materials we have seen so far. Here we can recover the monomer or reuse the grinded PET bottles.

By mechanical recycling we can grind the cleaned PET bottles in the form of flakes. Then we can extruded and reused as some other product. By chemical recycling such as hydrolysis or methanolysis we can recover the origin monomer such as terephthalic acid (TPA), ethylene glycol (EG) and dimethyl terephthalate (DMT). These monomers can further be reused for the production of pure PET polymer. Lastly PET can be used as source of energy. By incineration process one can generated high calorific value of energy which can be useful for thermal power stations to generate the electricity.

3. CONCLUSION

There are number of methods and vast range of plastic materials available for food packaging. Not only the methods seen in this review paper but the new methods for solving the problems of food packaging waste has been developed such as pyrolysis, photo-degradation etc. Researchers have taken many efforts to develop the biodegradable food packaging materials. These materials would take large share in market and can possibly replace the conventional materials to give the chance for better stabilization of environment

4. REFERENCE

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