

IN THIS ISSUE

1st Oct – 15th Oct 2014

Mission Swachh Bharat

OPERATION CLEAN-UP!!

Join the mission to clean our city
Collect plastic bottles and drop in the collection bag

Make your school win by contributing
the maximum number of Plastic Bottles!!

'Together... let's Make India Clean!'

An initiative by: **Bisleri** **Clean Mumbai Foundation**

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MISSION SWACHH BHARAT

OPERATION CLEAN- UP

Packaging Applications of PET

Beverages, soft drinks, fruit juices,
and mineral waters.

Especially suitable for carbonated
drinks, cooking & salad oils, sauces
& dressings.

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**Use of Plastics in
Contact with of Foodstuffs,
Pharmaceuticals
and
Drinking Water**

Name of the ENVIS Centre



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THE ENVIRONMENT**

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Area of Activity

**Capacity Enhancement Programme
on Management of Plastics, Polymer
Waste and Bio-Polymers, Impact of
Plastics on Eco-System**

OFFICE BEARERS



Mr. K. G. Ramanathan

President - GC

&

Head of Institution



Mr. S. K. Ray

Hon. Secretary /

Member - EC



Mr. P. P. Kharas

Hon. Treasurer /

Member - EC



Mr. Vijay Merchant

NGO - Project

Member - GC

ICPE-ENVIS Co-ordinator

Mr. T. K. Bandopadhyay

Sr. Technical Manager



Designed By

Mr. Sudheer Khurana

Sr. Programme Officer



Just as we like to live in clean homes, it would be so nice if our localities, streets, societies, parks, market area, railway and bus stations, hills and beaches remain as clean. But today when we look outside, everywhere - streets and drains in our towns and cities, we see litter all around us. Littering habits of general mass coupled with inadequate infrastructure for handling of Municipal Solid Waste in our country has created a pathetic situation resulting in problems of health, sanitation and environmental degradation. While many developed countries have attained the position of 'zero landfill' by addressing the Municipal Solid Waste (MSW) Management system appropriately by recycling, composting and recovery of the waste, in India almost 100% of MSW goes to landfill except very few pilot project areas.

For improving the situation, upon a public interest litigation file in 1996, seeking direction from the Hon'ble Supreme Court of India to the Union of India and the Urban Civic Bodies and the State Governments, for improving the Municipal Solid Waste Management expeditiously, the Hon'ble Supreme Court of India had constituted an Eight Member Committee under the Chairmanship of Shree Asim Barman, Municipality Commissioner of Calcutta Municipality Corporation, which submitted its Report on 'Solid Waste Management in Class I Cities in India' in 1999, examining almost every aspect of the overall issue and making valuable and practical suggestions for establishing an efficient MSW Management System in the country. Subsequently Government of India had Notified MSW (Management and Handling) Rule, 2000. However no significant improvement in MSW Management has been observed.

It is for the first time that the Prime Minister of the country has taken a great initiative towards 'Cleaning up the Country' by launching Swachh Bharat Aviyan - on 2nd October, 2014 with a goal to achieve the Clean India Status by 2nd October, 2019 - 150th Birth Anniversary of Mahatma Gandhi. ICPE, whose Agenda is Waste Management with special emphasis on Plastics Waste Management and which has been working since early 2000 for creating Awareness among the general mass on anti-littering and on practicing proper segregation of waste at source for its appropriate recycling and recovery, took the initiative to engage the student community in this cleaning up activity.

The programme has started in Mumbai with plan to spread it in other cities as well. A brief description of the programme has been given in this edition.

Plastics are one of the safest materials for packaging of Foodstuffs, Pharmaceuticals and Drinking Water as approved by the Regulatory Bodies of the country. However, some type of doubts have been created in the minds of some part of the society on the safety aspects of using plastics materials for use in contact with foodstuffs, pharmaceuticals and drinking water. A scientific analysis and deliberation has been carried out in this edition clarifying the doubts.

Data Bank updates the figures on consumption of plastics raw material in India with future projection.

Any comment may please be forwarded to the Editor.

Editor

Mr. T. K. Bandopadhyay

Subscription Information:

ENVIS is sent free of cost to all those interested in the information on Plastics and Environment.

Readers are welcome to send their suggestions, contributions, articles, case studies, and new developments for publication in the Newsletter to the ICPE-ENVIS address.

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MISSION SWACHH BHARAT OPERATION CLEAN- UP



प्रधान मंत्री
Prime Minister

25th September, 2014

Dear Friends,

I am sure you have heard time and again that cleanliness is next to Godliness. Alas, things are often different when it comes to putting this into practice.

On 2nd October we are launching Swachh Bharat Mission, a massive mass movement, that seeks to create a Clean India. Cleanliness was very close to Mahatma Gandhi's heart. A clean India is the best tribute we can pay to Bapu when we celebrate his 150th birth anniversary in 2019. Mahatma Gandhi devoted his life so that India attains 'Swarajya'. Now the time has come to devote ourselves towards 'Swachchhata' (cleanliness) of our motherland.

I urge every one of you to devote at least hundred hours every year, that is two hours every week towards cleanliness. We can't let India remain unclean any longer. On 2nd October I myself will set out with a broom and contribute towards this pious task.

Today, I appeal to everyone, particularly political and religious leadership, mayors, sarpanchs and captains of industry to plan and wholeheartedly engage in the task of cleaning your homes, work places, villages, cities and surroundings. I request your active support and participation in our collective quest to make a Swachh Bharat.



[Watch PM's call for Swacch Bharat](#)

[Read the message in
Hindi & other languages](#)

Yours,

Narendra Modi

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on Social Media



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the PM



Know
the PM



Good Governance With
Your Partnership



Cleanliness Drive – Swachh Bharat Abhiyan: A Report by ICPE ENVIS Centre



Government of India has launched the Swachh Bharat Abhiyan (Operation Clean- Up) across the country on the call of the Honourable Prime Minister of our country. The Prime Minister has given a call to all sections of the society to launch the Swachh Bharat Abhiyan keeping a target date of achieving the feat by 2nd October 2019, 150th Birth Anniversary of Mahatma Gandhi. The Cabinet Secretariat of Government of India in a communication conveyed that a nation-wide mass movement was required to bring about the lasting behavioural change among the general public to fulfill such goal. Government felt that apart from Government Organisations and Local Civic Bodies, all other organisations like educational institutes, hospitals, non- governmental organisations also need to join the campaign vigorously encouraging all citizens to join the programme actively. ENVIS Secretariat under the Ministry of Environment and Forests urged all ENVIS Centres of the country to actively participate in this nation-wide 'Operation Clean-up' programme on a structured manner.

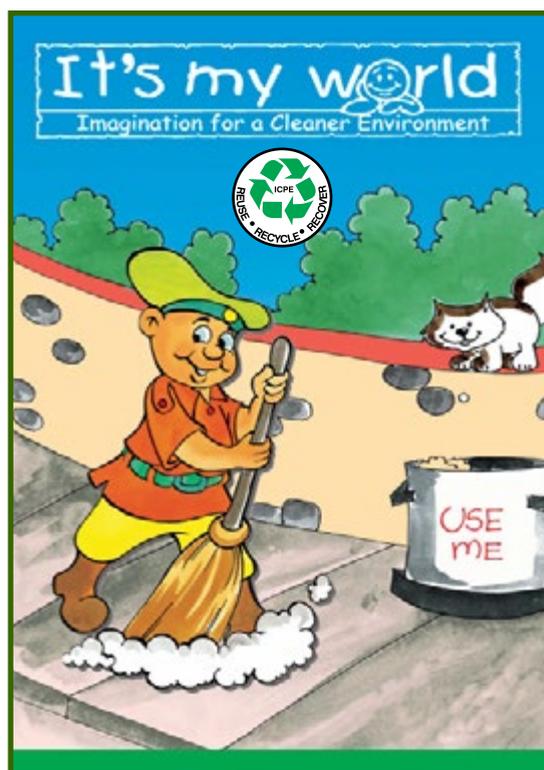
Indian Centre for Plastics in the Environment (ICPE) is engaged in creating this type of mass awareness among general public and especially among school and college students on anti-littering and for segregation of waste in to Dry and Wet at the source of waste generation and scientific disposal of the same. In this specific programme of Swachh Bharat Abhiyan, ICPE joined hands with Bisleri, leading manufacturers of packaged drinking water and food drinks and Clean Mumbai Foundation, a South Mumbai based NGO, which is devoted for cleaning related activities in the city, for creating mass awareness in more than 200 schools in Mumbai.

The programme was structurally launched with a Press Meet at Mumbai Maratha Patrakar Sangh (adjoining Press Club

of India), Azad Maidan, Mumbai on 1st October, 2014. Shri K. G. Ramanathan, President, Governing Council, ICPE and Shri Ramesh Chauhan, Chairman, Bisleri International Pvt Ltd, appraised the media on the importance of sensitising the young students about the cleanliness drive. Smt. Kunti Oza, Chairperson, Clean Mumbai Foundation also addressed the media. They invited media for wide publicity among the citizens at large on the anti-littering drive and maintaining a clean environment of the neighborhood for making the country Swachh.

Students were encouraged to join in a contest for collection of waste plastic bottles and depositing those in their respective schools for a period of 15 days. Prizes were declared for schools which would collect largest number of waste plastic bottles. Eligibility rider for entering the contest was that schools having clean toilets were only eligible for participation in this contest. Invitation letters to the schools were distributed and waste collection bags were distributed among the contesting schools. At the end of 15 days, organising team members visited each school and inspected the cleanliness of the toilets. After being satisfied of the cleanliness of the toilets of the contesting schools, the team collected the waste plastic bottles. The collected waste plastic bottles were subsequently handed over to the recyclers.

About 100 schools joined the contest and prizes were distributed among the top five schools, which collected highest quantity of waste plastic bottles. In a function held at Bisleri's Andheri office, prizes were distributed to the students in the presence of the school principals. Prizes were sponsored by ICPE and Bisleri. Similar programmes will be organised in the future also for engaging the school and college students in cleaning the environment.



Swachh Bharat Abhiyan - A Press Note

Swachh Bharat Abhiyan PET Collection Drive in Schools Press Note – 29th September, 2014

Putting our waste in a bin is the least we can do to keep our city clean, and the younger we develop this habit, the better it is. Keeping this philosophy in mind, Bisleri International, in association with Indian Centre for Plastic in the Environment, ICPE and Clean Mumbai Foundation is initiating a clean-up drive in schools across Mumbai.



Inspired by Prime Minister Modi's Swachh Bharat Abhiyan, this drive is an attempt to contribute towards a cleaner India. The PM in his letter to India, compared cleanliness to Godliness, and Ramesh Chauhan, Chairman Bisleri International Pvt Ltd, has taken up the task to inculcate this spirit among school children in Mumbai. Spreading over two weeks from 1st to 15th of October, this drive attempts to cover over 200 schools in Mumbai. All participating schools will be given garbage bags and other necessary inputs for collecting plastic/PET bottles from across the city. The objective is to inculcate the value of keeping our surroundings clean, among school children. The school which collects the maximum number of PET/Plastic bottles will be duly recognized and suitably awarded. Our endeavour is to make some visible impact in the city of Mumbai by the end of this project. The aim is to involve at least 1000 students each in 200 schools around Mumbai, so that even if each student collects 2 plastic bottles, we have a total of 4 Lac bottles in 10 days. Being piloted in Mumbai, this drive will also be taken to other cities in the near future. Known as the biggest brand for packaged drinking water in the country, Bisleri has always been conscious of the nuisance PET bottles create, when not disposed properly. In the Chairman's words "If we don't take responsibility, the waste would just be lying around. So might as well do it for ourselves and the environment."



Members are addressing the Press. Clockwise From Left Top ; Shri K.G. Ramanathan, Shri Vijay Merchant, Shri Ramesh Chauhan & Smt. Kunti Oza

Cleanliness Drive – Swatchh Bharat Abhiyan Prize Distribution Function

The prize distribution ceremony was organized on 14th November, 2014 at 12.00 noon onwards at Hotel Parle International, Vile Parle (East), Mumbai. School teachers and the students of all the prize willing schools were invited to attend the function and receive their prizes.

The prizes were distributed by the Members of Contest Organizing Committee – Shri Ramesh Chauhan (Bisleri), Shri S.K. Ray (ICPE), Shri Vijay Merchant (ICPE) and Smt .Anjana Ghosh

(Bisleri). During the function, Shri Ramesh Chauhan of Bisleri International pledged the responsibility as a Manufacturer for ensuring the waste clean-up operation. He expressed his commitment for organising more such events in the future.

Shri Vijay Merchant, ICPE spoke about Plastics in daily life, importance of segregation of waste at source and recycling of plastics.



Mr. Ramesh Chauhan, Bisleri addressing the gathering of School Principals, Teachers and Students about PET Bottle Recycling and other Social Responsibilities activities of Bisleri.



At the Dias, Mr. Ramesh Chauhan, Chairman Bisleri (centre), Mr. Vijay Merchant – ICPE (left) and Mr. S. K. Ray – ICPE (Right)



Mr. Vijay Merchant, ICPE speaking about Plastics in daily life, importance of segregation and recycling of plastics.



Teacher from Christ Church School, Byculla – thanks giving and explaining the enthusiasm shown by the students in collecting 16,000 PET bottles.



Dr. Mili Shah, on importance of sanitation in School Toilets and how Ozone can help in keeping the Toilets sanitized.



Audience of Principals, Teachers and Students.

Prize Winners

Teacher from Christ Church School, Byculla – thanked the organisers of the event explaining the enthusiasm shown by the students in collecting 16,000 PET bottles.

Dr. Mili Shah, spoke on the importance of sanitation in School Toilets and how Ozone can help in keeping the Toilets sanitized. The students also were happy to participate in such an event and confirmed that they will keep the environment clean and safe.



Winning School Christ Church, Byculla, Mumbai



1st Runner Up Anjuman I-Islam High School, CST, Mumbai



2nd Runner Up : SIES High School, Matunga, Mumbai



1st Consolation Prize: St. Lawrence High School, Borivali , Mumbai



2nd Consolation Prize: Pawar Public School, Bhandup, Mumbai



Student from SIES School, Matunga, Mumbai - thanks giving speech

Plastics: A Product of Green Chemistry

Abstract of Deliberation in a Seminar Organised by Department of Chemicals & Petrochemicals Ministry of Chemicals & Fertilisers, Government of India

Jointly With

**The Dyestuffs Manufacturers Association of India (DMAI)
At Mumbai on 11 December 2014**

Tushar K Bandopadhyay

Due to its multifaceted benefits, use of plastics in variety of applications has been increasing at a galloping rate all around the world, including in India. Plastics contribute various benefits to the modern world from providing safe and hygienic packaging materials for food and pharmaceutical products, to conserving Land, Water, Forests and Energy resources to practically in all areas of our life. Important benefits of plastics include energy saving, lesser emissions of Volatile Organic Chemicals and other emissions to air and water and most importantly plastics are among the highest savers of Green House Gas emissions.

Civilisation brought about industrialization. As the civilization progressed, so did the needs of human race. Great inventions changed the world and accordingly changed our life style also. Industrialisation was rapid since the beginning of 19th century. The environmental effects of many inventions were far reaching. The development of industries has created an enormous impact on the environment to such an extent that it has become a concern to the very existence of the civilisation.

When we analyse different reasons for environmental pollution, we note that the following are the major ones –

- Air pollution due to various types of gaseous emissions (VOC's and HAPs) and Suspended Particulate Materials (SPM)
- Water and Soil pollution due to various types of effluents and disposals untreated from different industrial units / other operations
- Global Warming due to **CO₂e** emissions from various industrial operations
- Depletion of ozone layer caused by emissions of certain types of emissions to the upper atmosphere

Role of plastics in the environmental pollution

Air Pollution is considered the most serious concern, mainly in the highly populated / industrial areas. Emissions from vehicles and industries are among the major causes of air pollution. Production of plastics raw materials causes minimal effect on BOD and COD of water in comparison to alternative materials. For example, in comparison to paper industry, contribution to BOD and COD level by plastics are less than 10%. Various gaseous emissions during the manufacturing and usage stage is minimal compared to alternative materials. Table 1 and Table 2 below gives the analysis of the emissions of various gases for the manufacturing and transportation of the packaging materials – Plastic (PE) and Jute, required for packaging of 1 Lac MT of Atta (flour).

During production of Raw Material & the Product

Environmental Burden in kg	Jute Bag	Plastic Bag
Air Pollution		
CO	54.3	0.6
CO ₂	6610.2*	760*
SO _x	134.8	5.2
No _x	68.1*	4.8*
CH ₄	39.5	3.2
HCL	5.3	0
Dust	67.6	1.4
Water Pollution		
Suspended Solids	352.3	0.2
Chlorides	4535.5	0.1

Table - 1

During Transportation of Finished Product

Emission	Gm/km	Excess Emission for jute Bags	Plastic Bags
CO ₂	781*	11107.3*	Taken as Basis
CO	4.5	64.0	Taken as Basis
HC	1.1	15.6	Taken as Basis
NO _x	8*	113.8*	Taken as Basis
Particulates	0.36	5.1	Taken as Basis
Total Regulated Tailpipe Emission	13.96	198.5	Taken as Basis

Table - 2

Values are for Packaging of One Lac MT of Atta

Source – LCA Study Report by Centre for Polymer Science and Engineering, IIT - Delhi

Similarly, the emissions during production of equivalent quantities of Plastic Carry Bags and Paper Carry Bags have been given in Table 3.



LESS AIR & WATER POLLUTION caused by Plastics

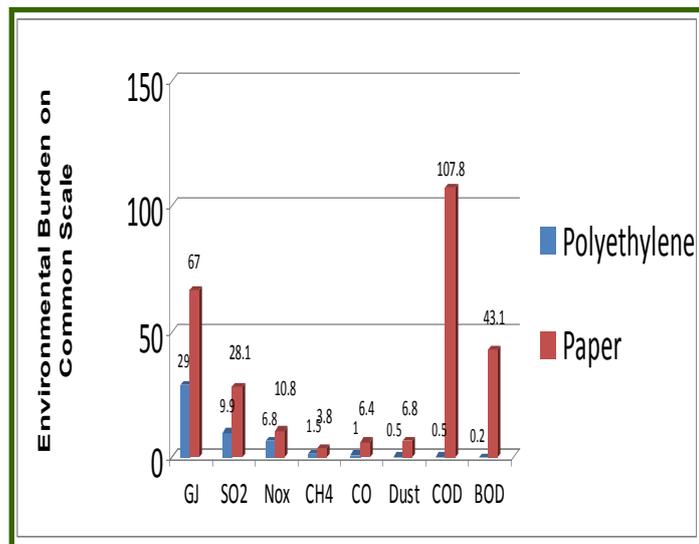


Table - 3

Source: Scott, G and Gilead, D., Editors, *Degradable Polymers, Principles and Application*, Chapman & Hall, London, 1995

Global Warming phenomenon is considered the single most serious environmental issue, the world is facing today. Melting of glaciers in the poles has increased during the last 100 years at a level, which, if not resisted, would cause an environmental catastrophe in the entire world in the coming years, initially beginning with the areas near the sea shore. Under the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC), after going through scientific findings has concluded that significant reduction in the Green House Emissions is essential to slow down the rate of growth in atmospheric concentrations of CO₂. The IPCC analysis highlights that to achieve emissions reductions on the scale necessary, political intervention is must. Studies have been made to assess the impact of GHG emissions in two scenarios to 2030, a Business-as-Usual scenario that is, by allowing today's industrial activities to continue without imposing any restrictions or without any modifications in the process, and an "abatement scenario", by imposing necessary restrictions to achieve the target result.

While world leaders are discussing on various measures to arrest the emissions of CO₂, a well researched carbon-Life Cycle Analysis (cLCA) conducted by McKinsey under the initiative of **International Council of Chemical Associations (ICCA)** and others, reveals that in 2005 the total GHG emission in the world was 46 G Tons CO₂e. Due to the Chemical Industries there was about 11% savings in the CO₂e emissions. Among the top 10 GHG emission savers, 4 are Plastics – Insulation, Packaging, Automobiles and Piping. These are the essential utilities we use in today's life. Plastics reduce the GHG emissions which not visible by naked eye.

WHY PLASTICS ? TOP GREENHOUSE GAS EMISSION SAVER

In 2005, Total Global Emissions was 40 GtCO₂e
It could have been 51.2 Gt CO₂e, but for the savings by Chemical Industry
Savings by Chemical Industry 11%

AMONG THE TOP 10 GREEN HOUSE GAS EMISSION SAVING SECTORS - 4 ARE PLASTICS

Insulation Materials, Packaging, Automobiles, Piping

PLASTICS SAVE GREEN HOUSE GAS EMISSIONS AND SAVE THE EARTH FROM GLOBAL WARMING

Source: McKinsey (LCA study for ICCA)

WHY PLASTICS ? GHG EMISSION SAVING BY PLASTICS PACKAGING

Comparing Segments: Carry Bags, Flexible Packaging, Rigid Packaging

Comparing Materials: Plastics (PE/PP/PVC/PS/EPS/PET) vs Glass / Thin Steel / Al, Corrugated Box / Paper, Card Board / Wood, Beverage Carton

TOTAL SAVING IN PACKAGING ≈ 220 MT CO₂ E

PLASTICS CARRY BAGS REDUCE GHG EMISSION

Source: McKinsey (LCA study for ICCA)

Ozone layer in the upper atmosphere of Earth has the valuable ability to block most of the Sun's ultraviolet rays and other harmful radiations, preventing those to reach Earth's surface. Depletion of Ozone layer due to certain chemicals is a serious concern for the living beings. Attention has already been drawn and measures taken to restrict the use of such chemicals in the chemical industry. These chemicals do not find application in the manufacture of Commodity Plastics. There are certain chemicals which have been identified as Ozone Depleting Substances (ODS). They cause depletion of Ozone layer. CFC (Chloro Fluoro Carbon) is one of them. CFC-11 has been used as blowing agent in certain uses of plastics to give foamy structure. Hydrocarbons, specifically cyclopentane has replaced CFC-11 as blowing agent. Other ODS substances are Halons and Methyl Chloroform (MCF). These do not find applications in the manufacture of commodity plastics

ENERGY SAVING

Plastics consume least energy for conversion in to final product. Any process which requires less energy is always categorized as environment friendly.

Material	Energy Requirement KWH / Kg
Aluminum	74.1
Steel	13.9
Glass	7.9
Paper	7.1

Plastics 3.1

Source: Scott, G and Gilead, D., editors, *Degradable Polymers, Principles and Application*, Chapman & Hall, London, 1995





Plastics are 100% recyclable by one method or other. Mechanical Recycling is the most adopted method world wide due to the ease of processing and the higher value addition. However multilayered plastics films and mixed plastics waste cannot be recycled by normal MR process. These can be recycled by recovering the energy through co-processing in the Cement Kilns or by converting to Light Diesel Oil (LDO). ICPE has taken initiative for framing the Protocol in India for using all types of plastics waste in Cement Kiln jointly with ACC Ltd.

Although plastics are employed in myriad applications where they actually conserve natural resources, there are some issues which have been surrounding the material ever since its growth rate increased. These issues mostly relate to the management of waste created by plastics products after its use, mostly in the packaging applications. Apart from the issue waste management, there are some other issues / controversies relating to health, safety and toxicities of certain types of plastics products. The major issues related to plastics could be listed as below:

- Plastics Waste – land area
- Plastics Waste – in the sea water
- Vinyl Chloride Monomer and manufacturing of PVC
- Use of Phthalate Plasticisers in PVC
- Use of Polycarbonate as Baby Feeding Bottle

Most prominent among the above is the issue of waste management. The plastics waste management relates mainly to the waste generated by packaging – the single largest application sector in plastics. The cause is mainly littering habit and inadequate infrastructure for waste management activity and absence of proper recycling facilities preferably closer to the place of generation of waste.

Plastics are 100% recyclable by one technology or other. The Flow Chart of Plastics Recovery as per International Standard ISO: 15270 is given here:

The issue of plastics waste in sea water is yet to be resolved. According to the UN's Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), land based sources account for 80% of marine pollution, rest being from the ships. Although there is conflicting figures on the volume of marine plastics waste pollution, however there is no denying that the problem is definitely serious. More and more attention and efforts are required to address the issue.

Issue of residual vinyl chloride monomer content in PVC has been resolved. Effective RVCM is now in ppb level, completely safe for use in pharmaceutical applications. On issue of Phthalates, research work world wide has resulted in clearing at least four types of phthalates out of controversy. There is however restrictions for use of phthalates in toys for use by children below 3 years. Many countries have imposed restrictions on use of Polycarbonate Baby Feeding Bottles due to the 'Bisphenol A' issue although the alleged 'migration' of the basic raw material to the product being packed, beyond the permissible level has not been exclusively proved.

Use of pigments in plastics used in contact with foodstuffs, pharmaceuticals and drinking water must be in accordance with laid down specifications given in Standards. In India, BIS specification in IS: 9833 governs this application. Attention has also been focused on the use of pigments in plastics in the non-food applications also especially for toys for children below 2 – 3 years age. These are safe code of practice for the industry.

It is clear that plastics protect the environment by conserving precious natural resources and energy. More awareness drives and improvements in developing infrastructure for handling waste especially for the flexible packaging waste is required.

BMC WAKES UP TO RECYCLING WASTE, DESIGNS REVENUE MODEL *Will sell solid waste to scrap dealers, share revenue with ragpickers*

MUMBAI: The plastic, paper, glass items you discard are likely to be tapped as a revenue source by the Brihanmumbai Municipal Corporation (BMC). By March 2016, it plans to come up with a system to sell dry waste for recycling, with help from ragpicker organisations. The money earned will be shared equally by the BMC and the ragpickers.

At present, ragpickers – both registered and unregistered – earn their daily bread by selling around 900 tonnes of dry waste they collect and sort to recycling units in the city. After putting in six to seven hours of work daily, they earn between Rs50 and Rs250, by sorting the waste into categories such as glass, cardboard, thin paper and plastic, and selling them to scrap dealers at Re1 to Rs5 per kg. The BMC is hoping to make the process more organised, thereby increasing the waste collection, improving segregation, and hence increasing the revenue.

“There is a value to waste. We plan to achieve 100% segregation at source by March 2016. After this, we will work out how the earnings can be shared. But, we will need to first increase the generation of dry waste and provide adequate infrastructure to

ragpickers,” said Prakash Patil, deputy municipal commissioner. In 2000, the BMC gave identity cards to more than 5,000 ragpickers from across five non-government organisations, which had been fighting for their rights. As many as 32 dry-waste sorting centres were set up, but half of them are now defunct.

These NGOs, therefore, feel the BMC should first prepare a plan to recognise the rights of and provide benefits to ragpickers. “Ragpickers must be given a monthly honorarium for their services. Free medical care, toilets, water supply and proper sheds must be provided. Identity cards must be duly authorised,” said Milind Arondekar, president, Aakar Mumbai, one of the NGOs working with ragpickers. Arondekar added this workforce should be completely integrated into the BMC’s waste management system. According to rough estimates, more than 15,000 ragpickers continue to work informally, without any recognition from the BMC. “The purpose of registering ragpickers was to form cooperatives and increase employment opportunities for them, as many women in this business are the sole breadwinners of their families. But this purpose has not been fulfilled,” said Arondekar.



Source: Hindustan Times, Dated: 23-12-2014

Use of Plastics in Contact with of Foodstuffs, Pharmaceuticals and Drinking Water

In recent months doubts have been raised by section of Indian society regarding the safety of using plastics containers in contact with food products, pharmaceutical formulations and drinking water. The reality is that plastics are safe for use in contact with Foodstuffs, Pharmaceuticals and Drinking water. This article explains the scientific facts on the subject.

1. For using any primary packaging material in direct contact with any food products, pharmaceuticals and drinking water, prior approval of the competent authority is mandatory by the packers / users on the safe use of such materials. The competent authority relies on the specific approvals conferred by scientific bodies based on National and International Standards. These Standards are devised based upon prolonged studies and research over a period of time and after due process of deliberations and validation in International / National Forums and thereafter adopted by the Government Authorities in the respective countries.

Commodity Plastics viz Poly Ethylene Terephthalate (PET), Polyethylene (PE), Polyvinyl Chloride (PVC), Polypropylene (PP) and Polystyrene (PS), all materials are approved for use in contact with food products, pharmaceuticals and drinking water as per National and International Standards and Specifications like Bureau of Indian Standards (BIS) in India and International Organisation for Standards (ISO) adopted in more than 150 countries Globally, including India. Positive Lists of Constituents of Plastics Materials in Contact with Foodstuffs, Pharmaceuticals and Drinking Water and the permissible limits are specified. References of such Standards are given below:

- A BIS Standards for Use of Plastics Materials in contact with Foodstuffs, Pharmaceuticals and Drinking Water are:

PET:	IS 12252: 1987 / 2005
PE:	IS 10146: 1982 / 2003
PVC:	IS 10151: 1982 / 2003
PP:	IS 10910: 1984 / 2003
PS:	IS 10142: 1999 / 2003

- B BIS Standards for Positive Lists of Constituents of Plastics in Contact with Foodstuffs, Pharmaceuticals and Drinking Water are:

PET:	IS 12229: 1987 / 2005
PE:	IS 10141: 1982 / 2001
PVC:	IS 10148: 1982 / 2003
PP:	IS 10909: 2001
PS:	IS 10149: 1982 / 2003

Other Plastics Materials have Specific Approvals

2. It is customary for any user / packer to get the particular packaging material proposed to be used for packaging the product manufactured by them, tested by the approved authority for its compliance with the specifications laid down in the Standards. In India, Central Food Technological

Research Institute (CFTRI), Mysore, is one of the premier CSIR institutions and a NABL Accredited Laboratory, which carry out tests and confer Test Certificates for PET and other plastics materials certifying their conformity to related Indian Standards. Salient points mentioned in the CFTRI Test Certificate is represented below:

Under 'Results and Discussions', CFTRI Report states that - "The migration values ranged from a minimum of 0.044 mg/dm² (0.44 ppm) in n-Heptane (38° C / 0.5h) to a maximum of 0.53 mg/dm² (5.3 ppm) in 3% Acetic Acid (121° C/2h) which are within the specified tolerance limits of 10 mg/dm² and 60 ppm as per IS: 12252-1987 (2005). Similarly the migration values ranged from a minimum of 0.004 mg/in² in n-Heptane (49° C/24h) to a maximum of 0.032 mg/in² in 95% Ethanol (49° C/24h) which are within the specified tolerance limits as per US-FDA:177-1630(2011)".

3. It is alleged that 'Antimony leaches from PET Bottles'

In this context, relevant clauses of the BIS Standard IS 12252:1987 (reaffirmed 2005) on PET are reproduced:

Quote

Clause 3. REQUIREMENTS

3.2 Other Ingredients – The material shall comply with the threshold limits of the manufacturing residues, polymerization ingredients and auxiliary items as prescribed in IS : 12229-1987 (Positive list of constituents of Polyalkylene Terephthalates (PET and PBT) for their safe use in contact with foodstuffs, pharmaceuticals and drinking water).

3.4 Overall Migration – The material shall comply with the overall migration limits of 60 mg/l, Max of stimulant and 10 mg/dm², Max of the surface of the material or article when tested by the method prescribed in IS: 9845-1986 (Method of analysis for the determination of specific and/or overall migration of constituents of plastic materials and articles intended to come into contact with foodstuffs (first revision).

Unquote

As per published test report- the overall migration at 45° C was found to be 0.239 ppm, at 25° C it was 0.094 ppm and at 15° C it was 0.044 ppm, whereas the allowable maximum limit of overall migration as per Indian Standard IS : 12252 – 1987 (Reaffirmed 2005) is 60 ppm. Within this, the Antimony migration was tested as 0.13 ppm. Hence the migration level of Antimony is absolutely within the permissible limit and safe. Not only that, the overall migration of all constituents taken together is very much within the permissible limit (permissible overall migration is 60 ppm and tested overall migration is 0.239 ppm, which is less than 0.4% of the threshold limit).

Thus it is clear mere presence of a material/some leaching, per se, is not a ground for banning the use of the same unless it exceeds the prescribed limits laid down in the BIS Standard.

4. This is very important that before casting any doubt over the safety aspect of a packaging material (PET and other Plastic Containers) which is used worldwide for the same purpose, proper verification of the scientific and status of the Plastic Containers in accordance with the Regulatory Standards prevailing in the country should be made. Simply because some degree of leaching of Antimony was demonstrated in some studies, no alarm button should be pressed cautioning people for desisting the use of plastic container for packaging of foodstuffs, pharmaceuticals and drinking water, if the leaching quantity is with the permissible limit as set by the Regulatory Authority.

5. There are allegations that Endocrine Disruptive Chemicals were reportedly found in the leachate of PET bottles. Whereas research reports released by International Body like ILSI (International Life Sciences Institute), Europe Packaging Material Task Force has concluded on the **Toxicological Status of PET Materials** as below:

- i. "No evidence of toxicity has been detected in feeding studies using animals. Negative results from Ames tests and studies into unscheduled DNA synthesis indicate that PET is not genotoxic. Similar studies conducted with monomers and typical PET intermediates also indicate that these materials are essentially non toxic and pose no threats to human health."
- ii. On Migration of PET Components, the Report says:

"Similar studies designed to detect metal additive migration (e.g. antimony catalyst) show only trace levels of antimony (less than 5 ppb). Oral toxicity studies using the extracted species have been completed and in all cases no adverse effects have been observed at exposures expected to occur from the use of PET packaging system."

iii. The Report makes a General Conclusion:

"General Toxicity and genotoxicity studies on PET, its monomers and typical intermediates indicate that this material does not pose a threat to human health. There is a significant body of evidence demonstrating that PET shows no estrogenic activity."

(Copy of Report of International Life Sciences Institute is available)

These conclusions are sufficient to show that PET Bottles are absolutely safe for use in contact with Foodstuffs, Pharmaceuticals and Drinking Water as per laid down Government Safety Regulations.

6. PET Bottles and other Plastics Containers conforming to the specifications laid down in Standards are used worldwide in contact with Foodstuffs, Pharmaceuticals and Drinking Water. The process of establishing these Standards took several years by the world scientific community including India. Scientific parameters of Indian Standards are similar to those used internationally.

7. It is alleged that 'Phthalate', especially DEHP leaches out from PET / plastic bottles.

This allegation is strongly rejected because 'Phthalate' including diethylhexyl phthalate (DEHP) is in no any way involved with the manufacturing of PET plastic material. Phthalates are not a part of the raw materials for the manufacture of PET neither is it generated any time during the manufacturing process of PET. PET does not and cannot release any type of Phthalate including DEHP due to any reaction or during migration. This allegation is defying the fundamentals of Chemistry by claiming that "Phthalates leach from PET/plastic bottles". Other common plastic containers most commonly used for packaging of liquid drug solutions are made of Polyethylene (PE) and Polypropylene (PP). These plastics also are not in any way linked to Phthalates.

Attention is drawn to the fact that some types of Phthalates are used as plasticizers for manufacture of Flexible Polyvinyl Chloride (PVC) compounds for making the product flexible. Flexible PVC applications include electrical cables, flexible pipes, upholstery and other calendered products, shoe soles and flexible films for different applications. There have been some controversies on the use of certain types of phthalates for making products intended for use in contact with food products. There are at least four types of phthalates which have been cleared by European Union for use in food contact product compound compounding. It is to be remembered that one of the most important and life saving applications of Flexible PVC product is "Blood Bag" used in the hospitals. For manufacturing Blood Bags, one type of Phthalate Plasticisers is used.

However, PVC is generally not used for making bottles for packaging of liquid pharmaceutical solutions or other food products because alternative plastics materials provide better result. Hence the issue of Phthalates should not be mixed up with plastics used for food contact applications.

8. While discussing the specific case of primary packaging of liquid pharmaceutical formulation for paediatric use, Polio Vaccination formulation is recognized as one of the largest single applications which are packed in Polyethylene (PE) Bottles. After a prolonged battle against the dreaded Polio disease over a period of several decades, India has ultimately been able to eradicate Polio from the country and achieved the distinction of 'Polio – Free' Country, as recognized by WHO! These polio vaccines packed in Plastic Containers made of PE, are in use since the 1970's! In fact the success of India in eradicating polio owes much to the development of hygienic, simple and economic Plastic Containers for delivering the vaccine. No scientifically researched document acceptable by International Scientific Forum is available, which says that PE is not suitable for use as primary packaging material for paediatric drugs.

Use of Plastics in Contact with of Foodstuffs, Pharmaceuticals and Drinking Water

Continue.....

9. Intra Venous Liquid Bottles (I.V. Bottles) contain life saving drugs for patients of all ages including child, old and pregnant women and women in the reproductive age. In the 1970's, I.V. Bottles used to be made of Glass. However with the development of technology, Polyethylene (PE), which is a BIS approved material for such application, has replaced glass as the material of construction of I.V. Bottles.
10. Disposable Injection Syringes being used to inject life saving drugs to patients of all ages and all categories are made of Polypropylene (PP), a plastic material approved as per Standards.
11. As stated in above clauses, PET and other Plastics Materials like PE, PP etc are approved material for use in contact with Foodstuffs, Pharmaceuticals and Drinking Water. However, pharmaceutical companies, before selecting a particular grade of plastic container / material for the packaging of a specific type of drug formulation manufactured by them, conduct long term 'Stability Studies' as per test procedures laid down in various pharmacopeias like USP, IP or EP. Hence use of PET and other Plastics Materials for packaging of different types of drugs is based on science established by various scientific bodies and accepted by Regulatory Bodies across the world including India. These Standards and procedures have been established by continuous research work over years by the entire scientific community world over. In case of any doubt, these bodies are to be consulted for any clarification.
12. Doubts have been raised about the ability of PET / other Plastic Containers to withstand the robust environmental conditions and rough terrains of India. It is also alleged that in some parts of India temperature during the summer goes up to 48° C at which the leaching of the constituents may rise inside the bottles. The correct position is that as evidenced in the CFTRI Test Certificates, migration tests are carried out at higher than normal temperatures, some being even more than 100° C. Hence this doubt does not stand against the use of PET / Plastic Containers. Important applications like Intravenous Solutions packed in PE bottles are sterilized at 110° C for one hour. When the bottle is made of PP Copolymer, the sterilization temperature is 120° C for half an hour. We must remember that the storage conditions of any drug are clearly mentioned on the label of the bottle. Higher storage temperature would impair the drug quality itself.
13. Doubts have been raised that introduction of plastic bottles for the packaging of pharmaceutical formulations in place of glass bottles were made without proper studies. This doubt is completely baseless. From the early part of 1970's, there has been a steady shift towards the use of plastics replacing the conventional glass materials. Examples are well known:
 - I V Bottles
 - Disposable Syringes
 - Liquid Pharmaceutical Formulations

14. On Environmental issues, Plastics including PET are among the most environment friendly materials. When we compare the properties of PET / Plastic Containers with Glass, Aluminium etc. as packaging materials, we find that there is minimum impact on environment during entire life cycle of PET / Plastic Containers compared to alternatives.

The above issues have already been studied scientifically over years by the scientific community of the world and due approvals were conferred for usage of such plastic containers for use in contact with food stuffs, pharmaceuticals and drinking water. The National and International Standards have already been published, as referred in the earlier paragraphs. However, in case of any doubt by any corner of the society and in case anybody desires to conduct further studies on the subject matter, such study should be conducted in a National Lab / CSIR institution involving all stakeholders following the scientific route and recording the outcome in a transparent manner before arriving at any conclusion. Regulatory body like Bureau of Indian Standards has to be involved. Till such time, there must not be any ban on the use of PET/Plastic Containers for use in contact with any type of pharmaceutical formulations, which are already approved as per law.

ICPE will be ready to discuss the issue in detail and provide clarifications.



DATA SHEET

Demand & Supply of Commodity Plastics (India)

LDPE: India Demand Supply							LLDPE: India Demand Supply						
Producer	Actual		Projected				Producer	Actual		Projected			
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
(kt)							(kt)						
Capacity	205	205	205	205	605	605	Capacity	835	835	1110	1410	1960	1960
Prod/Cons	203	205	205	205	605	605	Prod/Cons	1004	1070	1220	1715	2265	2265
Imports	200	233	269	306	50	40	Imports	238	270	270	200	140	140
Exports	1	0	0	0	103	48	Exports	45	21	12	260	551	329
Consumption	405	438	474	511	552	597	Consumption	1198	1319	1478	1655	1854	2076
Cons Growth (%)		8.1%	8.2%	7.8%	8.0%	8.2%	Cons Growth (%)		10%	12%	12%	12%	12%

HDPE: India Demand Supply							PP: India Demand Supply						
Producer	Actual		Projected				Producer	Actual		Projected			
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
(kt)							(kt)						
Capacity	1825	1925	2370	3090	3090	3090	Capacity	4140	4495	4555	4555	4715	4715
Prod/Cons	1685	1690	1760	2685	2685	2685	Prod/Cons	3650	3945	4295	4340	4521	4596
Imports	241	280	260	180	160	160	Imports	193	200	200	160	260	564
Exports	225	148	33	700	485	272	Exports	848	870	797	395	217	145
Consumption	1657	1822	1987	2165	2360	2573	Consumption	2993	3275	3698	4105	4564	5015
Cons Growth (%)		10%	9%	9%	9%	9%	Cons Growth (%)		9%	13%	11%	11%	10%

PVC: India Demand Supply							PS: India Demand Supply						
Producer	Actual		Projected				Producer	Actual		Projected			
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
(kt)							(kt)						
Capacity	1330	1440	1590	1635	1635	1635	Capacity	472	472	472	472	472	472
Prod/Cons	1275	1380	1520	1560	1560	1560	Prod/Cons	305	388	415	450	450	450
Imports	813	738	810	1003	1260	1542	Imports	11	10	10	10	10	50
Exports							Exports	64	72	52	15	0	0
Consumption	2087	2118	2330	2563	2820	3102	Consumption	248	326	364	406	453	493
Cons Growth (%)		2%	10%	10%	10%	10%	Cons Growth (%)		31%	12%	12%	12%	9%



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Zero Waste Management Project at New Moti Baugh Colony, New Delhi



ICPE and an Organisation formed by Plastics Recyclers of Delhi - Green Planet Waste Management (Pvt) Ltd (GPWM), have jointly taken up a comprehensive waste management project in a medium size residential society – New Moti Baugh Colony, New Delhi, with the support and assistance of National Building Construction Corporation Ltd (NBCC), a Gol Enterprise, to treat all MSW including kitchen waste and plastics waste, within the society and not allowing any MSW to go to landfill. This is an example of De centralisation of management of MSW for making a Zero Landfill City / Country.