



**KAINA**  
Let's Design

*“baby products are most vulnerable since customer often rely more on its colorful packaging design”*

## Plastic: Health Guide



**Kaina India**

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## Introduction —

Plastic plays important role in our day to day life. Majority of our household contains plastic parts in some way or the other. One of the most important thing to worry is “are all plastic safe?”. **Plastics are safe only for its applicability** and level of safety depends accordingly. In general, when we talk about the safety it implies possible health hazards associated with it. Let’s take an example: We use mineral water packed in a pet bottle when we travel. And, we also prefer it on normal days to carry/store water whenever it is necessary. However, we casually neglect the instruction for its disposal “Crush After Use”. Is it only a casual warning or is it a subtle message.

Coming on to baby products, we hardly understand the hidden message or its applicability or the potential risk associated with it. Baby products require careful examination before any purchase. Baby products are most vulnerable since customer often rely more on its colorful packaging design rather it applicability and the potential risk associated with it.

Many countries had strongly regulated the plastic products and its manufacturing process. Cheap supplies are often made bypassing the regulations to gain market access at low price. Chinese products are known for its price parity and product quality, however not all Chinese products are cheap and sub-par in terms of quality. There are some of the best plastic products that China makes for various companies.

## Biodegradation Process —

Biodegradation of plastic simply implies breaking down of chemical composition of which it is made of. Not all plastics are biodegradable. Non biodegradables consume significant amount of limited landfill reserved for growing population. This is one of the major problems that led to the search for alternatives like biodegradable plastics.

There are many advanced process being followed globally to breakdown the molecular composition of a plastic. For sake of simplicity in understanding, let us consider the generic process. Most of the solid waste (plastic) is disposed by burying deep inside a landfill for anaerobic degradation. However, in many cases aerobic composting is also done.

The plastic which occupy our living area undergoes many kind of degradation on its own. That is the reason why you observe yellow tint on your pet bottle after few days/months. Yellow tint indicates the degradation and calls for a dustbin immediately.

### Chemical Degradation:

- Oxidation
- Photo-degradation
- Thermal-degradation
- Hydrolysis

Microbial Degradation:

- Fungi Attack
- Bacterial Attack

Most of the natural-based polymers contain hydrolysable chains/constituents which are easily attacked by the acid and bases. Synthetic materials that follow the same trend are PU, PA, Polyester and Polyether etc.

Photo degradation affects polymers that are susceptible to attack by light. Presence of UV protection layers also affects the photo degradation. The additives that reduce polymer life must be controlled in order to prevent premature degradation of polymer. Cellulose based polymers are also degradable such as packaging material like blister sheets etc.

*Do we need to know all these stuffs?*

**The answer is, Yes.**

**SPI Codes —**

Society of Plastic Industries had made SPI coding mandatory for every plastic products to help in recycling process.

**“Consumer should take a note of the SPI codes whenever they buy a plastic product”**

SPI codes are important!



**bpa<sup>FREE</sup>** : Phthalates are the chemical plasticizers used in a plastic to soften the brittle plastic. Plasticizer helps plastic to take different shapes without breaking it. Phthalates are not chemically linked to the plastic and instead they are additives. Phthalates, usually leaks out of plastic into the food/air/liquid etc. continuously and enters the human food chain. BPA is also a plasticizers which stands for “Bisphenol-A”.

It's a common trait of baby/children to put things in their mouth and chew it. Constant monitoring is very difficult and plastic toys are most commonly object which are within the reach of children. Instead of monitoring the chewing habit, one should take care of the nearby object. Plastic that contains phthalates or BPA enters easily into the baby stomach after sucking/chewing of plastic that contains phthalates. The little quantity every day keeps on adding until the baby is critically ill or even suffers permanent injury.

Low cost teething object and baby feeder are generally made through improper manufacturing process and can have the risk of BPA unless specified with BPA<sup>FREE</sup> tag. Globally, the awareness about the nonsense of BPA has been initiated on a large scale and to the doctors as well. However, the unregulated markets might just let the products slip with BPA.

Phthalates are used in many products such as skin lotion that helps to penetrate the skins, helps fragrances to last longer, toys and household plastic equipment etc.

**Caution:**

In a study published in the February 2008 issue of the *Journal of Pediatrics*, researchers at the University of Washington's Seattle Children's Hospital and the University of Rochester found that babies whose mom had recently applied infant care products like baby lotion, shampoo, and powder were more likely to have phthalates in their urine than babies whose mom didn't use these products.

So far, the potential danger of phthalate is debated globally. The impact of phthalate has been noticed on the trials done on animals.

Impact of phthalate is very serious in nature; it affects the birth outcomes, fertility, birth weight and anatomical abnormalities related to the male genitalia and breast cancer. Studies are conducted to find relations between phthalates and asthma. Phthalates have been found to cause kidney and liver cancers in animal test.

**Precautions:**

- Do not buy the feeder bottle/ware bottle etc. that contains BPA.
- Avoid plastic bottles to contain milk etc. at high temperature, instead use glass.
- Do not microwave food in plastic. Heat increases the chemical leeching process.
- Avoid toys/teethers etc which are made of PVC.
- Look for the SPI Plastic code at the bottom of the product. 1, 2, 4 and 5 are considered Safe. Number #3, 6, 7 might leak phthalates and are Not Safe.
- Ensure products those numbered #3, 6 and 7 do not be chewed/consumed by your baby. Raincoats, water-bottle, school bag strapping clips might contain potential risk.
- Many canned bottles/jars, made of Aluminum/Steel, contain epoxy coating on inner surface which might cause BPA release onto the food items. Check for epoxy description for BPA<sup>FREE</sup> tag.

Let us look at the SPI numbers in detail:



SPI Code “1” or “PET” or “PETE” signifies that the product is made of polyethylene terephthalate.

Commonly used for ready-to-use food such as soft drink, water, butter can etc. Also used in detergent containers, carpets, furniture etc.

PET bottles are easily recycled into new bottles, polyester chords, filling material for carpet, sleeping bag etc. The PET bottles are least dangerous to the health and are considered “Safe”.

**Caution:**

PET jars are made for one time use. They release endocrine disrupting chemical called as acetaldehyde. Studies reveal that PET bottles releases harmful chemical when exposed to temperature abuse. PET bottles should not be cleaned using detergent as chemical leaching might occur.



SPI Code “2” or “HDPE” or “PE-HD” represents products made of high density polyethylene.

Used for making plastic bags, bottle caps, plastic chairs etc.

HDPE without colorant are recycled into a new bottle and colored HDPE are converted into hose pipes and toys etc.

**Caution:**

Additives such as coloring agents are not tested for their safety. However, HDPE are considered **Safe** as traces of health hazard have not been witnessed.



SPI Code “3” or “PVC” or “V” represents products made of polyvinyl chloride. They are not considered as safe.

Used for pool toys, curtains, water pipes, cooking-oil jars and doors etc.

PVC are least degradable plastics, it releases potentially harmful substance after disposal.

**Caution:**

- PVC is one of the most toxic plastic and should be avoided.
- Releases phthalates, carcinogens and dioxins etc. leading to reproductive problem, cancers, learning and behavioral problems in the children, birth defects and genetic changes etc.
- Enters the human food chain through improper disposal.
- Should be strictly avoided for food or water contact.



SPI Code “4” or “LDPE” or “PE-LD” represents products made of low density polyethylene.

Frequently used in grocery plastic bags, packaging materials, shopping bags and food wrappers etc. where food is in direct contact with it.

LDPEs are not usually recycled, but are re-used after minor processing.

**Caution:**

LDPEs are considered **Safe**. No known health issue have surfaced so far however, the color/prints etc. may contain toxic chemicals and food contact at elevated temperature should be avoided. LDPEs are chemically least reactive to your foods.



SPI Code “5” or “PP” represents products made of poly-propylene. It is thermally more stable and acts as a moisture barrier.

Usually used for plastic cups, baby bottles, medical equipment and plastic containers etc.

PP is not easily recycled and takes time in usual degradation process.

**Caution:**

PPs are thermally stable and does not distort easily when exposed to heat. Common application is in microwaves. However, many additives which are used nowadays have not been analyzed and use of PP in microwavable food is not appreciated globally. Generally, PPs are considered **Safe** for food applications.



SPI Code “6” or “PS” represents products made of poly-styrene. It can be hard or in form of foam. They are not considered as safe.

Used for DVD case, packaging foam, foam cups and ready-to-eat foods etc.

Recycling of PS is done on a minor scale in some country but economically process is costly.

**Caution:**

PS is **not** considered as safe. These products release toxic brominated flame retardant over their life-cycle. Styrene in it is released over its lifespan and tests on animal have revealed that it acts as neurotoxins. Fatigues, nervousness, sleep disorder, low platelets, hemoglobin reduction and cancers etc. are some of the reported anomalies from the animal test.

**Precautions:**

- Do not take the restaurant packaged food items in the foam plates/cups. Completely avoid disposable foam plates etc. instead use stainless steel or glass plates.
- Possibly use silver foil for ready-to-use packaged food.
- Hot foods/drinks in Styrofoam are potentially dangerous to your health.
- Global agencies are working on it regulate it, however low cost market supplies are flooded with disposable plates/cups of PS.



SPI Code “7” or “OTHER” are tricky composition as it may or may not be BPA<sup>FREE</sup>. It is commonly used to refer polycarbonate or PC, but PC is derived from BPA and hence it is not considered as safe. In general they indicate mixed resins.

They can be found in baby bottles, electrical application, CD/DVD cases etc.

#### Precautions:

- Do not use these plastics for food items, they may contain BPA.
- While purchasing toys etc with label “OTHER” or “7” one should check for BPA<sup>FREE</sup> tag.
- Cheap plastic toys are generally made of mixed resins or this grade and contact to baby/chewing etc. should be strictly avoided.



The symbol indicated “Food Grade” plastic which means they are safe to store food/liquid etc. As it has been said earlier, food items at high temperature should be avoided with direct contact of any plastic. Many colorants might leach out at elevated temperature and can be dangerous. In general, plastic products of SPI number #2, #4 and #5 are Safer. Scientist recommends avoiding plastic as long as possible for food items. There is no guarantee that harmful chemical will not leach out at elevated temperature.

#### Conclusion –

- SPI Codes are important to consider when the market is flooded with cheap plastic products.
- Some plastic grades are very dangerous and causes permanent health damages.
- If possible, avoid plastic for food at elevated temperature. Warm food/liquid can be poured on to plastic depending on the SPI code.
- Baby products are most common to cause chemical entering their body through chewing etc.
- Glass or Stainless Steel containers should be preferred to plastic in case of food at elevated temperature.

#### Bibliography:

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