

Chemicals in Plastic:

Plastics are one of the most compounds we used in our daily life. We used it since a long time ago. Up till now, plastics are still being one of the most popular product in the market. Factories made plastics from a combination of chemicals component. We have a different kind of chemicals component that we use to make plastics. Some of them, are dangerous, and some of them don't. Knowing the chemicals components that factories used to make plastics would help you to decide which one of plastics that you would use. However, here are the list of chemicals in plastic and its dangers if we use it too much:

1. Phthalate

The first list of chemicals in plastic is Phthalate, the esters of phthalic acid. The main use of phthalate is as plasticizers, to increase flexibility, transparency, durability, and longevity. Factories made phthalate by reacting phthalic anhydride with alcohols. In 2010, there is still a lot of phthalate products in the market. However, recently the use of phthalates is decreasing due to growing environmental awareness of its dangers. Eventually, factories are limiting and stops using phthalate as plasticizers. Other sources of phthalates are milk, meats, and butter.

There is actually a lot of products that factories made from phthalates. Some of them are lubricants, glues, adhesives, detergents, children's toys, and more. In short, there are a lot of products between us that contains phthalates. Most of the phthalates use as a plasticizer, about 23% are in wire and cable production. About 70% of plasticizers produced in the world (in a total of 8.4 million tons) are phthalates.

General properties

Phthalate esters are actually a derivative of phthalic acid. When it is added to plastics, it will allow polyvinyl molecules to slide against one another. It has high solubility in oil, but low solubility in water and has a low volatility level. It takes a form of a liquid, which is colorless and odorless.

Danger

Phthalates, some of them (including DEHP) are known for their potential to act as endocrine disruptors. Many research has tried to find the long term effects of phthalates exposure. Some of them have found that phthalates may cause abnormalities in penis if a mother who has a newborn sons has a high level of phthalates (DEHP) in their blood.

Other research suggests that phthalates may also disrupt endocannabinoid system. They block cannabinoid receptor type 1 as an allosteric control antagonist. Other damage of phthalates may include metabolic interference, liver and testes damage, or hepatocarcinogenic.

2. Polycarbonate

A polycarbonate is a group of thermoplastic polymers. It is called polycarbonate because it contains carbonate groups in their chemical structures. Factories can make polycarbonate by reacting bisphenol A and phosgene COCl_2 . Using this reaction, factories made at least one billion kilograms annually. Another way of production includes transesterification of BPA and diphenyl carbonates.

We used polycarbonates in a wide range of applications. A major application of polycarbonate includes DVD, Blu-ray or compact disc production. Another application is in building high-stability capacitors, and another electrical component. In addition to that, companies also used polycarbonate in their the construction process. More application includes medical applications, aircraft production, phones, and others.

General properties

Polycarbonate has a high impact-resistance, but it has low scratch-resistance. Polycarbonate unique properties than many other kinds of glass are that it is better at transmitting light. Not only that, it is also transparent to visible light.

Large plastic deformation can be done to polycarbonate without breaking or cracking it. Therefore, it is possible to processed polycarbonate at room temperature.

Danger

Polycarbonate can become dangerous when it changed to BPA. The bad news is, polycarbonate will change to BPA if they are exposed to a high temperature (which is not really high, around 70-80-degree Celsius). That's why it is not safe to use polycarbonate in food storage.

3. Polyactic acid

Polyactic acid is plastic that is derived from biomass, such as sugar cane or corn starch. It is biodegradable and therefore better than most other plastics, which is mainly derived from distillation or polymerization of non-renewable reserves such as petroleum. It has relatively low-cost production, that's why polyactic acid might become an efficient alternative to other plastics. Application of polyactic acid range from bottles making to medical devices.

General properties

Polyactic acid is biodegradable with a chemical formula $(C_3H_4O_2)_n$. It has low glass transition temperature (between 43 to 62 degree Celsius). It has a relatively high melting point, which is 150-160 degrees Celsius. However, it can be heated, cooled, and reheated again up to their melting point without having significant degradation.

Danger

Polyactic acid can be toxic, if we inhaled or absorbed it through our eyes or skin. However, when in its solid form, PLA is not a toxic compound.

4. Polypropylene

Polypropylene is a thermoplastic from propylene monomers. It has a wide range of application including packaging for consumer products, automotive industry, textiles, and others. The global demand of polypropylene is about 45 million metric tons, and it is predicted that it will increase up to 62 million metric tons by 2020. The major use of polypropylene is in the packaging industry (about 30%). Electrical and equipment manufacturing comes in second as it takes about 13% of polypropylene productions.

General properties

Polypropylene has a tough chemical resistance. It has a chemical formula of $(C_3H_6)_n$. Polypropylene won't reacts with diluted bases and acids, which makes it a very good choice for containers of detergents, or others liquids. It also has a high elasticity and high fatigue resistance. Polypropylene will retain its shape even after a lot of bending or torsion, which is very valuable to make products such as living hinges. Another property of polypropylene is that it has a high resistance electricity.

Danger

Polypropylene resin code is 5, which means it is safe to use. However, you should be careful if you are using it near a fire, because polypropylene is highly flammable.

5. DEHP

Bis(2-ethylhexyl) phthalate, also famously known as DEHP is one of the most common phthalates plasticizers. It has suitable properties and also low cost which makes DEHP very economic plasticizers that factories can use. DEHP has been banned from plastic industries, but it is not known whether DEHP has gone completely

from plastics we know in our daily life. In 2010, DHP has 54% market share that makes it a high production volume chemical. According to research, in 199, the production of DEHP has touched 241 million pounds a year.

Usually, plastics may contain about 1% to 40% of DEHP. Other than being used as plasticizers, factories also use DEHP as dielectric fluid in capacitors, or as hydraulic fluid. In addition to that, factories use DEHP as glow sticks solvent. Other use of DEHP may include rainwear, shoes, shower curtains, and much more.

General properties

DEHP has a chemical formula of $C_{18}H_{34}O_4$, or $C_{24}H_{38}O_4$. This compound is colorless, soluble in oil but not soluble in water. It has 390.56 g/mol molar mass. It has a low melting point, even lower than water freezing point, which is -50-degree Celsius. However, it has a relatively high boiling point, which is 385-degree Celsius.

Danger

DEHP is a carcinogen, teratogen, and also an irritant for our body. Both women and man can get cancer because DEHP act as an endocrine disruptor. Which will have long lasting damage on human reproduction function, both for adult and children exposed to it.

When male children are exposed to phthalates in their prenatal development, they will have lower levels of reproductive function when they reach adolescent age. Another study found that DEHP may cause a reduction in sperm motility and chromatin integrity. In addition to that, DEHP may cause a decrease of penis width and other problems in newborn sons if their mothers have a high level of DEHP in their blood when they are pregnant.

A lot of people fear DEHP is because of its potential as a cancer agent. Even it is not yet conclusive, some studies already conclude that DEHP involvement in many molecular events are possibly causing cancer development. It includes increasing cell proliferation, causing oxidative damage to the cell, and also a selective clonal expansion of cells.

6. BPA

BPA, which is an acronym that stands for bisphenol A, is one of the chemicals that factories used to make plastics. We can find it in many plastic products, dental sealants, to the paper of cashier recipients. A lot of research has found that BPA is one of the most dangerous chemicals that can cause cancer to human.

General properties

BPA has an estrogen-like activity that makes it become a hormone disruptor. It can affect how estrogen or other hormones act in the human body.

Danger

BPA can cause cancer. In a woman, BPA is dangerous because it can mimic estrogen hormone and develop breast cancer. It is safer for a woman to reduce their exposure to BPA that can act like estrogen.

Another danger of BPA is that it can affect the brain development of babies. A study in 2011 found that pregnant women with high levels of BPA are more likely going to have daughters who are hyperactive, prone to depression and also has a higher level of anxiety.

More Harmful Chemicals in Plastics



Here are more list of chemicals in plastic:




1. The Hazards Lurking at Home
2. Oxybenzone
3. Fluoride
4. Parabens
5. Butylated Hydroxyanisole (BHA)
6. Perfluorooctanoic Acid (PFOA)
7. Perchlorate
8. Decabromodiphenyl Ether (DECA)
9. Asbestos



Meanwhile, there are many list of chemicals in plastic that is harmful for our body, and also bad for earth effect. To be wise, it's better to at least reduce the use of plastic in our daily life. Thus, we may replace plastic with another friendly product.

Those are some of the chemicals inside a plastics. After you read this, please be careful in deciding which plastics do you want to use. Avoid plastics which contain BPA, DEHP, or other dangerous chemicals to make sure you have a healthy life in the future. Be careful!

Plastic Packaging Resins

Resin Codes	Descriptions	Properties	Product Applications	Products Made with Recycled Content*
 <p>PET</p>	<p>Polyethylene Terephthalate (PET, PETE). PET is clear, tough, and has good gas and moisture barrier properties. This resin is commonly used in beverage bottles and many injection-molded consumer product containers. Cleaned, recycled PET flakes and pellets are in great demand for spinning fiber for carpet yarns, producing fiberfill and geotextiles. Nickname: Polyester.</p>	<ul style="list-style-type: none"> • Clear and optically smooth surfaces for oriented films and bottles • Excellent barrier to oxygen, water, and carbon dioxide • High impact capability and shatter resistance • Excellent resistance to most solvents • Capability for hot-filling 	<p>Plastic bottles for soft drinks, water, juice, sports drinks, beer, mouthwash, catsup and salad dressing.</p> <p>Food jars for peanut butter, jelly, jam and pickles.</p> <p>Ovenable film and microwavable food trays.</p> <p>In addition to packaging, PET's major uses are textiles, monofilament, carpet, strapping, films, and engineering moldings.</p>	<p>Fiber for carpet, fleece jackets, comforter fill, and tote bags.</p> <p>Containers for food, beverages (bottles), and non-food items.</p> <p>Film and sheet.</p> <p>Strapping.</p>
 <p>HDPE</p>	<p>High Density Polyethylene (HDPE). HDPE is used to make many types of bottles. Unpigmented bottles are translucent, have good barrier properties and stiffness, and are well suited to packaging products with a short shelf life such as milk. Because HDPE has good chemical resistance, it is used for packaging many household and industrial chemicals such as detergents and bleach. Pigmented HDPE bottles have better stress crack resistance than unpigmented HDPE.</p>	<ul style="list-style-type: none"> • Excellent resistance to most solvents • Higher tensile strength compared to other forms of polyethylene • Relatively stiff material with useful temperature capabilities 	<p>Bottles for milk, water, juice, cosmetics, shampoo, dish and laundry detergents, and household cleaners.</p> <p>Bags for groceries and retail purchases.</p> <p>Cereal box liners.</p> <p>Reusable shipping containers.</p> <p>In addition to packaging, HDPE's major uses are in injection molding applications, extruded pipe and conduit, plastic wood composites, and wire and cable covering.</p>	<p>Bottles for non-food items, such as shampoo, conditioner, liquid laundry detergent, household cleaners, motor oil and antifreeze.</p> <p>Plastic lumber for outdoor decking, fencing and picnic tables.</p> <p>Pipe, floor tiles, buckets, crates, flower pots, garden edging, film and sheet, and recycling bins.</p>

Resin Codes	Descriptions	Properties	Product Applications	Products Made with Recycled Content*
	<p>Polyvinyl Chloride (PVC, Vinyl). In addition to its stable physical properties, PVC has good chemical resistance, weatherability, flow characteristics and stable electrical properties. The diverse slate of vinyl products can be broadly divided into rigid and flexible materials.</p>	<ul style="list-style-type: none"> • High impact strength, brilliant clarity, excellent processing performance • Resistance to grease, oil and chemicals 	<p>Rigid packaging applications include blister packs and clamshells.</p> <p>Flexible packaging uses include bags for bedding and medical, shrink wrap, deli and meat wrap and tamper resistance.</p> <p>In addition to packaging, PVC's major uses are rigid applications such as pipe, siding, window frames, fencing, decking and railing. Flexible applications include medical products such as blood bags and medical tubing, wire and cable insulation, carpet backing, and flooring.</p>	<p>Pipe, decking, fencing, paneling, gutters, carpet backing, floor tiles and mats, resilient flooring, mud flaps, cassette trays, electrical boxes, cables, traffic cones, garden hose, and mobile home skirting.</p> <p>Packaging, film and sheet, and loose-leaf binders.</p>
	<p>Low Density Polyethylene (LDPE). LDPE is used predominately in film applications due to its toughness, flexibility and relative transparency, making it popular for use in applications where heat sealing is necessary. LDPE also is used to manufacture some flexible lids and bottles as well as in wire and cable applications.</p> <p>Includes Linear Low Density Polyethylene (LLDPE).</p>	<ul style="list-style-type: none"> • Excellent resistance to acids, bases and vegetable oils • Toughness, flexibility and relative transparency (good combination of properties for packaging applications requiring heat-sealing) 	<p>Bags for dry cleaning, newspapers, bread, frozen foods, fresh produce, and household garbage.</p> <p>Shrink wrap and stretch film.</p> <p>Coatings for paper milk cartons and hot and cold beverage cups.</p> <p>Container lids.</p> <p>Toys.</p> <p>Squeezable bottles (e.g., honey and mustard).</p> <p>In addition to packaging, LDPE's major uses are in injection molding applications, adhesives and sealants, and wire and cable coverings.</p>	<p>Shipping envelopes, garbage can liners, floor tile, paneling, furniture, film and sheet, compost bins, trash cans, landscape timber, and outdoor lumber.</p>
	<p>Polypropylene (PP). PP has good chemical resistance, is strong, and has a high melting point making it good for hot-fill liquids. This resin is found in flexible and rigid packaging, fibers, and large molded parts for automotive and consumer products.</p>	<ul style="list-style-type: none"> • Excellent optical clarity in biaxially oriented films and stretch blow molded containers • Low moisture vapor transmission • Inertness toward 	<p>Containers for yogurt, margarine, takeout meals, and deli foods.</p> <p>Medicine bottles.</p> <p>Bottle caps and closures.</p> <p>Bottles for catsup and syrup.</p> <p>In addition to packaging, PP's major uses are in fibers, appliances and</p>	<p>Automobile applications, such as battery cases, signal lights, battery cables, brooms and brushes, ice scrapers, oil funnels, and bicycle racks.</p> <p>Garden rakes, storage bins, shipping pallets, sheeting, trays.</p>

Resin Codes	Descriptions	Properties	Product Applications	Products Made with Recycled Content*
		acids, alkalis and most solvents	consumer products, including durable applications such as automotive and carpeting.	
	<p>Polystyrene (PS). PS is a versatile plastic that can be rigid or foamed. General purpose polystyrene is clear, hard and brittle. It has a relatively low melting point. Typical applications include protective packaging, foodservice packaging, bottles, and food containers.</p> <p>PS is often combined with rubber to make high impact polystyrene (HIPS) which is used for packaging and durable applications requiring toughness, but not clarity.</p>	<ul style="list-style-type: none"> • Excellent moisture barrier for short shelf life products • Excellent optical clarity in general purpose form • Significant stiffness in both foamed and rigid forms. • Low density and high stiffness in foamed applications • Low thermal conductivity and excellent insulation properties in foamed form 	<p>Food service items, such as cups, plates, bowls, cutlery, hinged takeout containers (clamshells), meat and poultry trays, and rigid food containers (e.g., yogurt). These items may be made with foamed or non-foamed PS.</p> <p>Protective foam packaging for furniture, electronics and other delicate items.</p> <p>Packing peanuts, known as “loose fill.”</p> <p>Compact disc cases and aspirin bottles.</p> <p>In addition to packaging, PS’s major uses are in agricultural trays, electronic housings, cable spools, building insulation, video cassette cartridges, coat hangers, and medical products and toys.</p>	<p>Thermal insulation, thermometers, light switch plates, vents, desk trays, rulers, and license plate frames.</p> <p>Cameras or video cassette casings.</p> <p>Foamed foodservice applications, such as egg shell cartons.</p> <p>Plastic mouldings (i.e., wood replacement products).</p> <p>Expandable polystyrene (EPS) foam protective packaging.</p>
	<p>Other. Use of this code indicates that a package is made with a resin other than the six listed above, or is made of more than one resin and used in a multi-layer combination.</p>	Dependent on resin or combination of resins	<p>Three- and five-gallon reusable water bottles, some citrus juice and catsup bottles.</p> <p>Oven-baking bags, barrier layers, and custom packaging.</p>	Bottles and plastic lumber applications.

***Recycling may not be available in all areas. Check to see if plastics recycling is available in your community.**

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