

CATEGORIES OF ADDITIVES AND TYPICAL EXAMPLES

Categories of additives, with typical examples of each. Because they are usually not chemically bound, additives often migrate out of a plastic product during use or after disposal.



INGREDIENT AND ROLE	ADDITIVE	EXPOSURE POTENTIAL	HEALTH IMPACT	REGULATORY STATUS
<p>MONOMERS</p> <p>The basis of the plastic polymer</p>	<p>BPA: monomer used in some polycarbonates</p>	<p>Direct consumer exposure to residual monomer in product</p>	<p>SVHC, toxic to reproduction, skin sensitising, endocrine disrupting</p>	<p>Voluntarily pulled from many uses due to public outcry; restricted from some uses in EU</p>
<p>BULK PROPERTY MODIFIERS</p> <p>Used as filler; adds strength; confers heat resistance; changes electrical properties</p>	<p>BPS: substitute for BPA in some polycarbonates</p>	<p>Direct consumer exposure to residual monomer in product</p>	<p>Endocrine disrupting; suspected to be toxic to reproduction</p>	<p>Some restrictions on cosmetics, thermal paper; other regulations being considered</p>
<p>STABILIZERS</p> <p>Protects against heat and light</p>	<p>Phthalates in PVC</p>	<p>Direct dermal exposure to consumers</p>	<p>BBP, DEHP, DBP, DIBP: toxic to reproduction, endocrine disrupting</p>	<p>Most important four phthalates (DEHP, BBP, DBP, DIBP) now require authorisation for use in EU</p>
<p>PERFORMANCE ENHANCING ADDITIVES</p> <p>Flame retardants; dispersing agents</p>	<p>Lead in PVC</p>	<p>Possible dermal exposure to consumers</p>	<p>Toxic to reproduction; potent neurotoxicant</p>	<p>Lead-added PVC currently allowed in recycling loops; COM re-evaluating</p>
	<p>Brominated flame retardants: used in many plastics</p>	<p>Exposure to users via migration, dust, diet</p> <p>Inhalation exposure to firefighters via toxic combustion products</p>	<p>Varied effects and inadequate data. Endocrine disruption, thyroid impacts, neurological development impacts are among the best understood</p>	<p>Several BFR's banned in Europe; some restrictions on others; many novel BFRs in use</p>

CURING AIDS AND BLOWING AGENTS	Pentane: used as blowing agent in foams	Exposure to workers; possible residual exposure to consumers	Inhalation hazard; high aquatic toxicity	Occupational standards for workers in place
Expansion of foams; thermosets; curing aids				
COLOURS AND PIGMENTS	Cadmium: used to add shine and weight to cheap jewelry	Children's exposure via mouthing/ chewing/swallowing	Carcinogenic; suspected reproductive toxicant	Commonly found in very cheap jewelry
Add and brighten colors				
COATINGS AND SEALANTS	PFAS: used for water- and stain resistance	Direct exposure via food contact materials; also contaminated drinking water	Numerous and varied: reproductive toxicity, cholesterol/lipid dysregulation, endocrine disruption	Two PFAS (of approx 4,700) have been banned in Europe and internationally; further EU regulations in discussion about possible regulation of the whole class
Water resistance; oil and stain resistance; seal against bacteria as well as taste and odor	BPA: used as a sealant in food contact materials	Direct consumer ingestion	(see above)	Varied regulation by member state, strongest in France; EU-wide limits on migration from food contact materials
ADHESIVES AND RESINS	Acrylates: used as adhesive in nail polish	Very high exposure to salon workers	Skin and eye sensitizer	Occupational limits on exposure in EU
INCINERATION BYPRODUCTS	Chlorinated dioxins and furans: produced by burning chlorinated plastics (e.g. PVC)	Worldwide migration and exposure via diet	Potent carcinogen and endocrine disruptor	Continuous monitoring and emission reduction, including emissions regulations on incinerators
May be created when burned				

