

# Key Chemicals of Concern in Food Packaging and Food Handling Equipment

EDF has identified chemicals in food packaging and food handling equipment where the potential health impacts from their migration into food raises serious concerns. These chemicals in virgin materials may also contaminate the recycling stream and undermine their recyclability. By ensuring future food packaging is free of these chemicals, companies can improve consumer trust while minimizing the impact of future regulations on their bottom line. In the tables below, we list key chemicals of concern in food packaging. Taking action today helps to protect consumer health now and in the future.

## Intentionally Added Ingredients

Chemical or class	CASRN	Health concerns	Authoritative citations	Role in virgin packaging
<b>Ortho-phthalates*</b>	Various	Endocrine disruption, developmental toxicity, reproductive toxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH Annex XVII</a> ; <a href="#">REACH SVHC</a> ; <a href="#">EU Priority ED</a> ; <a href="#">CSPC</a>	Primarily used in plastic but many other uses such as inks. High concern in virgin plastic and paper.
<b>PFAS (per- and poly-fluorinated alkyl substances)*</b>	Various	Developmental toxicity, Persistence and bioaccumulation	Varies	Grease-proofing agent in paper. High concern in virgin paper.
<i>Long-chain (8 or more carbons)</i>	<i>Various</i>	<i>Systemic, reproductive and developmental toxicity, Persistence and bioaccumulation</i>	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH SVHC</a> ; <a href="#">FDA</a> ; <a href="#">ATSDR</a> ; <a href="#">EPA Drinking Water</a> ; <a href="#">Washington State</a>	
<i>Short-chain (less than 8 carbons)</i>	<i>Various</i>	<i>Systemic, reproductive and developmental toxicity, Persistence, Highly mobile in water</i>	<a href="#">EU REACH SVHC</a> ; <a href="#">ATSDR (some chemicals)</a> ; <a href="#">Washington State</a>	
<b>Perchlorate</b>	14797-73-0	Endocrine disruption, developmental toxicity	<a href="#">EU REACH Annex VI</a> ; <a href="#">EPA Drinking Water</a>	Anti-static agent used in plastic for dry food packaging and handling equipment. High concern in virgin plastic. Moderate concern in virgin paper.
<b>Benzophenone</b>	119-61-9	Carcinogenicity	<a href="#">California Prop 65</a> ; <a href="#">EU Priority ED</a> ; <a href="#">IARC 2B</a> ; <a href="#">FDA</a>	Plasticizer in rubber articles intended for repeat use. High concern in virgin plastic and paper.

### Notes:

- **Ortho-phthalates:** Contamination of food is widespread. FDA is currently reviewing petitions to revoke their uses. Decision anticipated in 2019.
- **PFAS:** FDA banned use of long-chain PFAS in 2016 but uses may continue. State of Washington, concerned that paper and cardboard food packaging treated with PFAS may be [contaminating composting](#) and paper recycling processes post-consumer, has prohibited PFAS use effective in 2022, pending a safer alternatives assessment.
- **Perchlorate:** Food contamination is widespread. Young children's exposure increased after approval. FDA is currently considering whether to reverse its May 2017 decision allowing the use to continue. Decision anticipated in 2019.
- **Benzophenone:** In Oct. 2018, FDA banned use as a flavor and in food packaging effective Oct. 2020.

## Residual Processing Aids

Chemical or class	CASRN	Health concerns	Authoritative citations	Role in virgin packaging
<b>Bisphenol A (BPA) and related compounds</b>	Various	Endocrine disruption, developmental and reproductive toxicity	Varies	Used to make: epoxy lining in metal cans, polycarbonate plastic, and ink.
<b>BPA*</b>	80-05-7	Endocrine disruption, Developmental toxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH SVHC</a> ; <a href="#">EU Priority ED</a> ;	High concern in virgin plastic, moderate in paper.
<b>Bisphenol B</b>	77-40-7	Endocrine disruption, Developmental toxicity	<a href="#">EU REACH SVHC</a> ; <a href="#">EU Priority ED</a>	
<b>Bisphenol F</b>	620-92-8	Endocrine disruption, Reproductive toxicity	<a href="#">IPCP 2018 EDC report</a>	
<b>Bisphenol S</b>	80-09-1	Endocrine disruption, Reproductive toxicity	<a href="#">IPCP 2018 EDC report</a>	
<b>Toluene*</b>	108-88-3	Reproductive and developmental toxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a>	Solvent often used in printing inks. High concern in virgin plastic and paper.
<b>Ethyl glycol (2-ethoxy ethanol)*</b>	110-80-5	Reproductive toxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH Annex XVII</a> ; <a href="#">REACH SVHC</a>	Solvent often used in printing inks. Moderate concern in virgin plastic and paper.
<b>Methyl glycol (2-methoxyethanol)*</b>	109-86-4	Reproductive toxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH Annex XVII</a> ; <a href="#">REACH SVHC</a>	Solvent often used in printing inks. Moderate concern in virgin plastic and paper.
<b>N-Methyl-2-pyrrolidone (NMP)</b>	872-50-4	Reproductive and developmental toxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH Annex XVII</a> ; <a href="#">REACH SVHC</a>	Solvent often used in printing inks. Moderate concern in virgin plastic and paper.

### Notes:

- **Bisphenol compounds:** FDA banned BPA use in baby bottles and as a coating of infant formula packaging [based on abandoned uses](#). BPS became a common replacement to BPA in packaging, but recent [studies](#) demonstrate similar health concerns to BPA.
- **NMP:** Banned by EPA in paint strippers sold for non-commercial use.

## Contaminants

Chemical or class	CASRN	Health concerns	Authoritative citations	Role in virgin packaging
<b>Heavy Metals</b>	Various	Carcinogenicity, neurotoxicity	Varies	Varies
<b>Lead*</b>	7439-92-1	Carcinogenicity, neurotoxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH SVHC</a> ; <a href="#">IARC 2A</a> ; <a href="#">FDA</a> ; <a href="#">CONEG</a> ; <a href="#">EPA Drinking Water</a> ; <a href="#">NTP ROC</a> ; <a href="#">EPA PBT</a>	Use banned. High concern in virgin plastic and paper.
<b>Arsenic</b>	7440-38-2	Carcinogenicity, neurotoxicity	<a href="#">California Prop 65</a> (inorganic arsenic); <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH SVHC</a> (some forms); <a href="#">IARC 1</a> ; <a href="#">FDA</a> (inorganic); <a href="#">EPA Drinking Water</a> ; <a href="#">NTP ROC</a>	Moderate concern in virgin plastic and paper.
<b>Cadmium*</b>	7440-43-9	Carcinogenicity, neurotoxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH SVHC</a> ; <a href="#">IARC 1</a> ; <a href="#">FDA</a> ; <a href="#">CONEG</a> ; <a href="#">EPA Drinking Water</a> ; <a href="#">NTP ROC</a>	Use banned in 18 states. Moderate concern in virgin plastic and paper.
<b>Chromium VI*</b>	18540-29-9	Carcinogenicity, neurotoxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">REACH SVHC</a> (some forms); <a href="#">CONEG</a> ; <a href="#">EPA Drinking Water</a> ; <a href="#">NTP ROC</a> ; <a href="#">NIOSH OC</a>	Use banned in 18 states. Moderate concern in virgin plastic and paper.
<b>Mercury*</b>	7439-97-6	Carcinogenicity, neurotoxicity	<a href="#">California Prop 65</a> ; <a href="#">EU REACH Annex VI</a> ; <a href="#">FDA</a> ; <a href="#">CONEG</a> ; <a href="#">EPA PBT</a>	Use banned in 18 states. Moderate concern in virgin plastic and paper.

### Notes:

- Heavy metals:** 18 states have set a 100 ppm limit for total concentration of lead, cadmium, chromium and mercury in packaging and components. Heavy metals shown to cause harm at very low-level exposures can result in significant toxicity, and some can build up in the body. [FDA's Toxic Elements Working Group](#), whose mission in part is to develop a strategy to prioritize and modernize activities with respect to food/toxic element combinations, is focused on children's exposure.

\* Starred chemicals are also recommended for minimization or phase out in "[Food Packaging Product Stewardship Considerations](#)," a set of best practices released by the [Food Safety Alliance for Packaging](#), a part of the Institute of Packaging Professionals, to reduce problematic chemicals in food packaging.