Restricted Substances Specification

990-00012-00-D
1.0 Introduction

1.1 Scope

At Google, our values reflect the fundamental importance of inclusion, openness, science, and commitment to the environment. Operating our business in an environmentally sustainable way has been a core value from the beginning. Our goal is to design, manufacture, and sell products that are safe, efficient, and sustainable. One of the ways we do this is by restricting chemicals of concern and work toward creating and integrating safer substitutes for them.

The Google Restricted Substances Specification describes our commitment towards the elimination of hazardous chemicals in all Google branded consumer products, accessories, manufacturing processes, and retail packaging. We want to ensure that once we eliminate a chemical of concern, it stays out. The restrictions in this specification are a compilation of international regulations and Google policies.

We require all suppliers to adhere to the restrictions and reporting requirements detailed in this specification for Google branded consumer hardware and it does not apply to the parts or products of other Google affiliates and subsidiaries such as Verily, Calico Labs, or Waymo. Supplier’s conformance with this specification does not relieve or diminish the supplier’s obligation to comply with all applicable laws. All restrictions, reporting requirements, and processes in the specification go into effect on the date of publication.

Questions regarding the Google Restricted Substances Specification should be directed to env-compliance@google.com.
1.2 Definitions

**Antimicrobial**: A substance or agent that kills microorganisms or stops their growth.

**Article**: The smallest discrete object whose shape, surface or design determines its function to a greater degree than its chemical composition (e.g., a plastic housing, stainless steel screw). (Note: See the most current guidance provided by the EU Chemicals Agency.)

**Assembly/Sub-Assembly**: A collection of articles composed of components and materials (e.g., a populated PCB, display assembly, connector, battery pack).

**Biocide**: See Antimicrobial.

**CAS**: Chemical Abstract Service registry number is an internationally recognized number to uniquely identify a chemical.

**EEE**: Electrical and electronic equipment.

**Endocrine Disrupting Chemical EDC**: Chemical that can interfere with the endocrine (hormone) system.

**Exemption**: The condition of not being subject to the requirement in the specification. Google authorizes exemptions on a limited basis where the substance is not regulated by law but Google has determined that it is not technically feasible or a compliant material is not readily available to meet the requirements of the intended application (see Waiver for temporary deviations).

**Full Material Disclosure (FMD)**: Sustainability initiative that requires vendors to provide the complete chemical composition of the parts and materials supplied to Google.

**Global Warming Potential**: The cumulative direct and indirect warming impacts integrated over a period of time from the emission of a unit of mass of gas relative to carbon dioxide, which is assigned a value of 1.

**Google Policy**: Google restrictions that go beyond regulatory requirements based on their hazard or toxicological profile, corporate initiative, or best practices.

**Homogeneous Material**: A material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed, disaggregated, or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding, and abrasive processes. The definition
is consistent with Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS 2). Examples of homogeneous materials include a plastic cover to a computer screen, a copper wire inside a cable, and the solder component of a solder joint. All EEE consist of many different homogeneous materials and the maximum concentration values are applied to each of the homogeneous materials individually.

**Intentionally Added:** The deliberate use of a substance in the formulation of a product, subpart, or material where the substance's continued presence is desired to provide a specific characteristic, appearance, or quality.

**Manufacturing Process Chemical:** Those chemicals that are used during the course of manufacturing a product and maintaining the related equipment but that are not integrated into the product (e.g., a cleaner, degreaser, machine cutting fluid). This does not include substances, materials, parts, or components that are specified for integration into the product (e.g., paints, inks, coatings).

**Non-detect/Not detectable:** Below the validated test method detection limit for a particular compound in a particular matrix.

**Organonitrogen Flame Retardant:** A chemical with a functional use of inhibiting or resisting the spread of fire and contains carbon and nitrogen.

**Organophosphorus Flame Retardant:** A chemical with a functional use of inhibiting or resisting the spread of fire and contains carbon and phosphorus.

**Packaging:** Materials used to protect the finished product during shipment to the end-customer.

**Per- and Polyfluoroalkyl Substances (PFAS):** Per- and Polyfluoroalkyl Substances (PFAS), synthetic organofluorine compounds that contain at least one perfluoroalkyl moiety.

**ppm:** Parts per million by weight of a substance, equivalent to 1 mg/kg or 0.0001% by weight. For manufacturing process chemicals with breathing zone limits expressed in ppm, it refers to parts of vapor or gas per million parts of contaminated air by volume at 25°C and 1 atmosphere.

**Prolonged Skin Contact:** Contact with the skin for potentially more than 10 minutes on three or more occasions or 30 minutes on one or more occasions within two weeks.

**Waiver:** A temporary, conditional, and time-bound approved deviation to a requirement.

**Volatile Organic Compound (VOC):** Organic compound with an initial boiling point of 250 °C at 101.3 kPa and participates in atmospheric photochemical reactions.
## 2.0 Restrictions for Products

The following restrictions apply to all homogenous materials in Google consumer products and accessories, or uncured formulations as designated.

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS</th>
<th>Scope</th>
<th>Limit</th>
<th>Exemptions</th>
<th>Typical Uses</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony Trioxide</td>
<td>1309-64-4</td>
<td>All materials</td>
<td>1000 ppm</td>
<td>Glass and ceramics</td>
<td>Flame retardant, opacifying agent for glass / ceramics.</td>
<td>Google Policy</td>
</tr>
<tr>
<td>Arsenic and its compounds</td>
<td></td>
<td>Glass and Non-Metals</td>
<td>50 ppm</td>
<td>Semiconductor or substrates and dopants, and optical lenses (e.g., GaAs semiconductors, LEDs)</td>
<td>Opacifying agent for glass / ceramics. Manufacture of semiconductors and printed circuit boards.</td>
<td>EC 1907/2006 and amendments (REACH) Google Policy</td>
</tr>
<tr>
<td>Asbestos and its compounds</td>
<td></td>
<td>Metals and Alloys</td>
<td>1000 ppm</td>
<td></td>
<td>Present in raw materials that are used for copper and lead refining.</td>
<td>EC 1907/2006 and amendments (REACH) Google Policy</td>
</tr>
<tr>
<td>Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene (BNST)</td>
<td>68921-45-9</td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td></td>
<td>Antioxidant in lubricants.</td>
<td>Canadian Environmental Protection Act, 1999</td>
</tr>
<tr>
<td>Beryllium and its compounds</td>
<td></td>
<td>All materials</td>
<td>1000 ppm</td>
<td></td>
<td>Beryllium-copper alloys in contacts of electrical connectors and EMI springs. Beryllium oxide insulator in radio transceiver modules.</td>
<td>Google Policy IEEE 1680.1</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>Solvents in paints, primers, coatings, inks, lubricants and adhesives</td>
<td>100 ppm in the wet formulation</td>
<td></td>
<td>Solvents in paints, primers, coatings, inks, and adhesives.</td>
<td>Google Policy Canadian Environmental Protection Act, 1999</td>
</tr>
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<td>Substance Name</td>
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<td>Exemptions</td>
<td>Typical Uses</td>
<td>Reference</td>
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</tbody>
</table>
| Bromine (Br) and its compounds                     | Includes but is not limited to: 7726-95-6 | All materials                | 900 ppm Br 1500 ppm Br + Cl  | Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted.  
- Bromine used in pigments in display and camera color filters  
- Plastics, elastomers, and textiles where bromine originates from pigments/dyes  | Adhesives, coatings, colorants, pigments, paints, solder flux. | UL 110  
IEEE 1680.1  
Google Policy  
Swedish Act 2016:1067                                           |
| Brominated Flame Retardants (BFRs)                  | Includes but is not limited to those found in Appendix A | All materials | Shall not be used  
Note: Demonstrated bromine levels < 900 ppm can be used to indicate the material does not contain a BFR |  | Google Policy | |
| Cadmium and its compounds                           | Includes but is not limited to: 7440-43-9 | Battery cells and packs      | 10 ppm                       | Electrodes of nickel-cadmium batteries.  | Google approved RoHS exemptions. See Table 2.1. | Korean Quality Management and Safety Control of Industrial Products Act 2011/65/EU  
2013/56/EU  
IEEE 1680.1  
Taiwan BSMI RoHS  
China RoHS 2 - GB/T 26572                                          |
| Chlorinated Paraffins, Short Chain (SCCP)           | 85535-84-8  
85535-85-9 | All SCCPs (C10 - C13)  
All MCCPs (C14 - C17) | Shall not be used  
(SCCP < 30 ppm)  
(MCCP < 100 ppm) |  | Lubricants and coolants in metal cutting and metal forming operations and as secondary plasticizers and flame retardants in plastics. | EC 1907/2006 and amendments (REACH)  
US EPA SNUR 2070-AJ73  
Stockholm Convention |
<table>
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<th>Reference</th>
</tr>
</thead>
</table>
| Chlorine (Cl) and its compounds                          | Includes but is not limited to: 7782-50-5 | All materials                | 900 ppm Cl 1500 ppm Br + Cl | Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted: -Chlorine used in pigments in display and camera color filters -Plastics, elastomers, and textiles where chlorine originates from pigments/dyes -Chlorine as a process residual (e.g. NaCl, catalysts) | Wire and cable insulation/jacket, plastic and rubber parts, plastic parts of electrical components, adhesives, coatings, paints, tubing, conformal coatings, solder flux. | UL 110  
Google Policy  
Swedish Act 2016:1067 |
| Chlorinated Flame Retardants (CFRs)                      | Includes but is not limited to those found in Appendix A | All materials                | Shall not be used Note: Demonstrated chlorine levels < 900 ppm can be used to indicate the material does not contain a CFR | Plastic, elastomers, rubbers, adhesives.                                                      | Google Policy                      |
| Chlorinated Organic Solvents                             | See Appendix A       | Solvents in paints, primers, coatings, inks, lubricants and adhesives | 1000 ppm in the ‘wet’, uncured formulation |                                                                                           | EC 1907/2006 and amendments (REACH)  
Google Policy  
Canadian Environmental Protection Act, 1999 |
| Chromium, hexavalent and its compounds (Cr(VI), Cr6+)    | Includes but not limited to: 18540-29-9 | Leather                      | 3 ppm                        | Leather processing and corrosion protection for metal parts and fasteners.      | EC 1907/2006 and amendments (REACH)  
Google Policy  
2011/65/EU  
Google Policy  
2011/65/EU |
| Dimethyl fumarate (DMFu)                                 | 624-49-7             | All materials                | 0.1 ppm                      | Fungicide and mold inhibitor used in leather, desiccant.                      | 2010/153/EC  
EC 1907/2006 and amendments (REACH)  
UL110 |
| Endangered Species of Flora and Fauna                    | Not applicable       | All materials                | Shall not be used             | Wood paneling, pallets, paper, packaging, veneers, coverings, and leather.    | US Lacey Act  
EU Timber Regulation |
<table>
<thead>
<tr>
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<th>Typical Uses</th>
<th>Reference</th>
</tr>
</thead>
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<tr>
<td>Formaldehyde</td>
<td>50-00-0</td>
<td>Textiles and Leather</td>
<td>75 ppm</td>
<td></td>
<td>Thermoset plastics (urea formaldehyde, melamine),</td>
<td>GB 18401 (China)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>adhesives for plywood and particleboard and</td>
<td>Germany ChemVerbotsV</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>fiberboard plywood, finishes to make fabrics</td>
<td>Taiwan CNS 15290</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>crease-resistant.</td>
<td>US 40 CFR 770.10 US</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>California Air Resources Board Japan Law 112</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Composite wood products</td>
<td>0.05 ppm (emission)</td>
<td></td>
<td></td>
<td>Google Policy</td>
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<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>300 ppm &lt;0.124 mg/ m³</td>
<td>(Release)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halogenated Diphenyl Methanes</td>
<td></td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td>Dielectric fluids in capacitors</td>
<td>Dielectric fluids in capacitors and transformers,</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Monomethyl tetrachloro diphenyl</td>
<td>76253-60-6</td>
<td></td>
<td></td>
<td>and transformers, heat transfer</td>
<td>heat transfer fluids, hydraulic fluids, plasticizers,</td>
<td></td>
</tr>
<tr>
<td>methane</td>
<td></td>
<td></td>
<td></td>
<td>fluids, plasticizers, dye</td>
<td>dye solvents, germicides.</td>
<td></td>
</tr>
<tr>
<td>Monomethyl dichloro diphenyl methane</td>
<td>81161-70-8</td>
<td></td>
<td></td>
<td>solvents, germicides.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monomethyl dibromo diphenyl methane</td>
<td>99688-47-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexabromocyclododecane (HBCDD)</td>
<td></td>
<td>All materials</td>
<td>Shall not be used (&lt; 5 ppm)</td>
<td>Flame retardant.</td>
<td>Flame retardant.</td>
<td>EU 2016/293 amending</td>
</tr>
<tr>
<td>Hexabromocyclododecane</td>
<td>25637-99-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Annex I of EC 850/2004</td>
</tr>
<tr>
<td>1,2,5,6,9,10-Hexabromocyclododecane</td>
<td>3194-55-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Stockholm Convention</td>
</tr>
<tr>
<td>alpha-Hexabromocyclododecane</td>
<td>134237-50-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EU 2019/1021</td>
</tr>
<tr>
<td>beta-Hexabromocyclododecane</td>
<td>134237-51-7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gamma-Hexabromocyclododecane</td>
<td>134237-52-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead and its compounds</td>
<td></td>
<td>Battery Cells</td>
<td>40 ppm</td>
<td>Solder, coatings, glass, steel,</td>
<td>Solder, coatings, glass, steel, copper alloys,</td>
<td>2006/66/EC</td>
</tr>
<tr>
<td></td>
<td>Includes but not limited to:</td>
<td>Plastic and elastomeric materials, paints, inks, non-metallic and non-ceramic coatings</td>
<td>90 ppm total</td>
<td>copper alloys, aluminum alloys,</td>
<td>plastics, stabilizer, pigment, drying agent in</td>
<td>Consumer Product Safety Improvement Act of 2008 (CPSIA)</td>
</tr>
<tr>
<td></td>
<td>7439-92-1</td>
<td></td>
<td></td>
<td>plasticizers, dye solvents,</td>
<td>paints and coatings.</td>
<td>California Proposition 65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>1000 ppm</td>
<td>Google approved RoHS exemptions.</td>
<td>Compact fluorescent lights, switches, dyes.</td>
<td>2011/65/EU</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See Table 2.1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury and its compounds</td>
<td></td>
<td>Battery Cells</td>
<td>1 ppm</td>
<td></td>
<td></td>
<td>Taiwan Battery Laws</td>
</tr>
<tr>
<td></td>
<td>Includes but not limited to:</td>
<td>Plastic materials, paints, inks, non-metallic and non-ceramic coatings</td>
<td>60 ppm</td>
<td></td>
<td></td>
<td>Korea Battery Laws</td>
</tr>
<tr>
<td></td>
<td>7439-97-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>New York Env Law § 27-0719</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>1000 ppm</td>
<td></td>
<td></td>
<td>2006/66/EC</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Google Policy</td>
</tr>
<tr>
<td>Musk Xylene (5-tert-butyl-2,4,6-trinitro-m-xylene)</td>
<td>81-15-2</td>
<td>All materials</td>
<td>Non-detect (&lt;0.1 ppm)</td>
<td>Fragrance fixative.</td>
<td>Fragrance fixative.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Substance Name</td>
<td>CAS</td>
<td>Scope</td>
<td>Limit</td>
<td>Exemptions</td>
<td>Typical Uses</td>
<td>Reference</td>
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</tr>
<tr>
<td>Organotin (Organostannic) Compounds</td>
<td>See Appendix A</td>
<td>Textiles and Leather</td>
<td>1 ppm</td>
<td></td>
<td>Adhesive, paint, stabilizer, catalyst, and additive.</td>
<td>Taiwan CNS 15290</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>1000 ppm by weight of tin</td>
<td></td>
<td></td>
<td>EC 1907/2006 and amendments (REACH) 2009/425/EC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td></td>
<td></td>
<td>Canadian Environmental Protection Act, 1999</td>
</tr>
<tr>
<td>Ozone Depleting Chemicals (ODCs)</td>
<td>See Appendix A</td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td></td>
<td>Foaming agent, semiconductor manufacturing.</td>
<td>Montreal Protocol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td></td>
<td>US Clean Air Act</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td></td>
<td>Google Policy</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Sodium perchlorate</td>
<td>All materials</td>
<td>0.006 ppm</td>
<td></td>
<td>Coin / Button cell batteries.</td>
<td>CA DTSC Perchlorate Contamination Prevention Act (AB 826)</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Potassium perchlorate</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td></td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Ammonium perchlorate</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td></td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Lithium perchlorate</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Magnesium perchlorate</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Perfluorohexanoic Acid (PFHxA), its salts, and related substances</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td>Google Policy</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Perfluorohexane Sulphonate (PFHxS), its salts, and related substances</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td></td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td>Google Policy</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Perfluorooctanoic Acid (PFOA), its salts, and related substances</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.025 ppm)</td>
<td>≤ 1 µg/m² coated area</td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td>Norway FOR-2004-06-01-922</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Perfluorooctane Sulphonates (PFOS) and its derivatives</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.05 ppm)</td>
<td>≤ 1 µg/m² coated area</td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td>Canadian Environmental Protection Act, 1999</td>
</tr>
<tr>
<td>Perchlorates</td>
<td>Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-</td>
<td>All materials</td>
<td>Shall not be used (&lt; 0.05 ppm)</td>
<td>≤ 1 µg/m² coated area</td>
<td>Surfactant, impregnation agent in textiles, photolithographic chemicals.</td>
<td>EC 1907/2006 and amendments (REACH) Japanese Chemical Substances Control Law</td>
</tr>
<tr>
<td>Phenol isopropylated phosphate (3:1)</td>
<td>68937-41-7</td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td></td>
<td>Flame retardant in plastics, greases, coatings</td>
<td>US TSCA 40 CFR 751</td>
</tr>
<tr>
<td>Substance Name</td>
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<tr>
<td>Phthalates</td>
<td>See Appendix A</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td></td>
<td>Plasticizer</td>
<td>California Proposition 65 EC 1907/2006 and amendments (REACH) 2011/65/EU Google Policy</td>
</tr>
<tr>
<td>Polychlorinated Biphenyl (PBB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polybrominated biphenyls</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firemaster BP-6</td>
<td>67774-32-7</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flame retardant in plastics and printed circuit boards.</td>
<td></td>
<td>2011/65/EU</td>
</tr>
<tr>
<td>Hexabromobiphenyl</td>
<td>59536-65-1</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>2011/65/EU</td>
</tr>
<tr>
<td>Octabromobiphenyl</td>
<td>36355-01-8</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>2011/65/EU</td>
</tr>
<tr>
<td>Decabromobiphenyl</td>
<td>27858-07-7</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>2011/65/EU</td>
</tr>
<tr>
<td>Polybrominated Diphenyl Ether (PBDE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polybrominated diphenyl ether</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firemaster BP-6</td>
<td></td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>2011/65/EU</td>
</tr>
<tr>
<td>Pentabromodiphenylether</td>
<td>1163-19-5</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>Google Policy</td>
</tr>
<tr>
<td>Octabromodiphenylether</td>
<td>32534-81-9</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>Google Policy</td>
</tr>
<tr>
<td>Decabromodiphenylether</td>
<td>32536-52-0</td>
<td>All materials</td>
<td>1000 ppm sum total content</td>
<td>Flames retardant in plastics and printed circuit boards.</td>
<td></td>
<td>Google Policy</td>
</tr>
<tr>
<td>Polychlorinated Biphenyl (PCB)</td>
<td>1336-36-3</td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td>Capacitor, transformer, heat transfer fluids, lubricants.</td>
<td></td>
<td>EC 850/2004 Japan Chemical Substances Control Law</td>
</tr>
<tr>
<td>Polychlorinated Naphthalene (PCN)</td>
<td>70776-03-3</td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td>Lubricants, paint, capacitors, wood preservative.</td>
<td></td>
<td>Japanese Chemical Substances Control Law Google Policy</td>
</tr>
<tr>
<td>Polychlorinated Terphenyl (PCT)</td>
<td>61788-33-8</td>
<td>All materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td>Capacitor, transformer, heat transfer fluids, lubricants.</td>
<td></td>
<td>EC 1907/2006 and amendments (REACH) Google Policy</td>
</tr>
<tr>
<td>Polyvinyl Chloride (PVC) and its copolymers</td>
<td>9002-86-2</td>
<td>All materials</td>
<td>Shall not be used</td>
<td>Electrical insulator, wire insulation, cable jackets, tape, tubing, shock</td>
<td></td>
<td>Google Policy UL 110</td>
</tr>
<tr>
<td>Radioactive Substances</td>
<td>n/a</td>
<td>All materials</td>
<td>Ionizing radiation not detected above background levels</td>
<td>Ionization smoke sensors, phosphorescent inks.</td>
<td></td>
<td>EU-D 96/29/Euratom Japanese laws for the Regulation of Nuclear Source Material, Nuclear Fuel Material, and Reactors (1986)</td>
</tr>
</tbody>
</table>

Note: Demonstrated chlorine levels < 900 ppm can be used to indicate the material does not contain PVC.
<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS</th>
<th>Scope</th>
<th>Limit</th>
<th>Exemptions</th>
<th>Typical Uses</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrabromobisphenol-A (TBBPA)</td>
<td>79-94-7</td>
<td>All materials</td>
<td>Shall not be used</td>
<td>Note: Demonstrated bromine levels &lt; 900 ppm can be used to indicate the material does not contain TBBPA</td>
<td>Flame retardants in plastics, printed circuit boards, wire insulation, cable jacketing, tape, and tubing.</td>
<td>Google Policy Swedisch Act 2016:1067</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOCs)</td>
<td>Several</td>
<td>Adhesives</td>
<td>Must meet all applicable requirements and limits in China Standard GB 33372-2020</td>
<td>Exempted uses must be reviewed and approved by Google</td>
<td>Solvents</td>
<td>GB 33372-2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cleaners</td>
<td>Must meet all applicable requirements and limits in China Standard GB 38508-2020</td>
<td></td>
<td></td>
<td>GB 38508-2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inks</td>
<td>Must meet all applicable requirements and limits in China Standard GB 38507-2020</td>
<td></td>
<td></td>
<td>GB 38507-2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paints/ Coatings</td>
<td>Must meet all applicable requirements and limits in China standard GB 30981-2020</td>
<td></td>
<td></td>
<td>GB 30981-2020</td>
</tr>
</tbody>
</table>
### Table 2.1 Google Approved RoHS Exemptions

<table>
<thead>
<tr>
<th>Substance</th>
<th>Exemption</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadmium</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6(a)-I</td>
<td>Lead as an alloying element in steel for machining purposes containing up to 0.35% lead by weight and in batch hot dip galvanised steel components containing up to 0.2% lead by weight.</td>
</tr>
<tr>
<td></td>
<td>6(b)-I</td>
<td>Lead as an alloying element in aluminium containing up to 0.4 % lead by weight, provided it stems from lead-bearing aluminium scrap recycling.</td>
</tr>
<tr>
<td></td>
<td>6(b)-II</td>
<td>Lead as an alloying element in aluminium for machining purposes with a lead content up to 0.4% by weight.</td>
</tr>
<tr>
<td></td>
<td>6(c)</td>
<td>Copper alloy containing up to 4% lead by weight.</td>
</tr>
<tr>
<td></td>
<td>7(a)</td>
<td>Lead in high melting temperature type solders (i.e. lead-based alloys containing 85% by weight or more lead).</td>
</tr>
<tr>
<td></td>
<td>7(c)-I</td>
<td>Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.</td>
</tr>
<tr>
<td></td>
<td>7(c)-II</td>
<td>Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC.</td>
</tr>
<tr>
<td></td>
<td>13(a)</td>
<td>Lead in white glasses used for optical applications.</td>
</tr>
<tr>
<td></td>
<td>13(b)-I</td>
<td>Lead in ion-colored optical filter glass types.</td>
</tr>
<tr>
<td>Lead</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Hexavalent Chromium</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Polybrominated biphenyl (PBB)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Polybrominated diphenyl ether (PBDE)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Dibutyl phthalate (DBP)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Butyl benzyl phthalate (BBP)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Bis-(2-ethylhexyl) phthalate (DEHP)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Diisobutyl phthalate (DIBP)</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Note: This table of approved exemptions may be amended periodically as the EU Commission expires, renews and splits exemptions.
### Table 2.2 Google Approved Exemptions

<table>
<thead>
<tr>
<th>Substance</th>
<th>Exemption*</th>
<th>Exempted Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony Trioxide</td>
<td>SB-I</td>
<td>Glass and ceramics</td>
</tr>
<tr>
<td>Arsenic and its compounds</td>
<td>AS-I</td>
<td>Semiconductor or substrates and dopants, and optical lenses (e.g., GaAs semiconductors, LEDs)</td>
</tr>
<tr>
<td>Bromine (Br) and its compounds</td>
<td>BR-I</td>
<td>Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Bromine used in pigments in display and camera color filters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Plastics, elastomers, and textiles where bromine originates from pigments/dyes</td>
</tr>
<tr>
<td>Chlorine (Cl) and its compounds</td>
<td>CL-I</td>
<td>Notwithstanding conformance to all global regulations, product certifications (including UL110 and IEEE 1680.1), and market requirements, the following are exempted:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Chlorine used in pigments in display and camera color filters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Plastics, elastomers, and textiles where chlorine originates from pigments/dyes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Chlorine as a process residual (e.g, NaCl, catalysts)</td>
</tr>
</tbody>
</table>

*Note: The exemption codes given are internal references to be used when submitting a Google Supplier Declaration of Conformity (SDoC).*
3.0 Restrictions for Prolonged Skin Contact

The following additional restrictions apply to all homogenous materials in Google consumer products and accessories that are in prolonged skin contact applications. Restrictions in Section 2 also apply to materials used in prolonged skin contact applications. Examples of products that have materials in prolonged skin contact include phones, tablets, laptops, and wearables.

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS</th>
<th>Scope</th>
<th>Limit</th>
<th>Exemptions</th>
<th>Typical Uses</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic and its compounds</td>
<td>Includes but not limited to: 7440-38-2</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm (extractable)</td>
<td></td>
<td>Opacifying agent for glass / ceramics. Manufacture of semiconductors and printed circuit boards.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>5 ppm</td>
<td></td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Benzotrichloride</td>
<td>98-07-7</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm</td>
<td></td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Benzyl chloride</td>
<td>100-44-7</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm</td>
<td></td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Bisphenol A (BPA)</td>
<td>80-05-7</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>50 ppm residual</td>
<td></td>
<td>Monomer in polycarbonate and related polymers.</td>
<td>Google Policy California Proposition 65 Canadian Environmental Protection Act, 1999</td>
</tr>
<tr>
<td>Cadmium and its compounds</td>
<td>Includes but is not limited to: 7440-43-9</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm (extractable)</td>
<td></td>
<td>Pigment or stabilizer in plastic/rubber parts used in electrical components, printed circuit boards, flexible printed circuits, adhesives, coatings, paints. Alloying element in copper parts.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Chromium, hexavalent and its compounds (Cr(VI), Cr6+)</td>
<td>Includes but not limited to: 18540-29-9</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm (extractable)</td>
<td></td>
<td>Leather processing and corrosion protection for metal parts and fasteners.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Lead and its compounds</td>
<td>Includes but not limited to: 7439-92-1</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm (extractable)</td>
<td></td>
<td>Solder, coatings, glass, steel, copper alloys, aluminium alloys, plastics, stabilizer, pigment, drying agent in paints and coatings.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>N-methyl-2-pyrrolidone (NMP)</td>
<td>872-50-4</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>3000 ppm</td>
<td></td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Substance Name</td>
<td>CAS</td>
<td>Scope</td>
<td>Limit</td>
<td>Exemptions</td>
<td>Typical Uses</td>
<td>Reference</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>---------------------</td>
<td>-----------------------------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>N,N-dimethylacetamide (DMAC)</td>
<td>127-19-5</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>3000 ppm</td>
<td>Solvent</td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>N,N-dimethylformamide (DMF)</td>
<td>68-12-2</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>3000 ppm</td>
<td>Solvent</td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Nickel and its compounds</td>
<td>7440-02-0</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>0.28 µg / cm² / week</td>
<td>Metal plating, alloying</td>
<td>Metal plating, alloying element in stainless steel.</td>
<td>EC 1907/2006 and amendments (REACH) UL 110</td>
</tr>
<tr>
<td>p-chlorobenzotrifluoride</td>
<td>5216-25-1</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm</td>
<td>Solvent</td>
<td>Solvent</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Polycyclic Aromatic Hydrocarbons (PAHs)</td>
<td>See Appendix A</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>1 ppm per individual PAH compound 10 ppm for sum of all listed PAHs</td>
<td>Plastics, dyes, carbon black.</td>
<td>Plastics, dyes, carbon black.</td>
<td>EC 1907/2006 and amendments (REACH) California Proposition 65 Google Policy</td>
</tr>
<tr>
<td>1,4,5,8-tetraaminoanthraquinone; C.I. Disperse Blue 1</td>
<td>2475-45-8</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>50 ppm</td>
<td>Dye</td>
<td>Dye</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Benzenamine, 4,4′-(4-iminocyclohexa-2,5-dienylidenedimethylene)dianiline hydrochloride; C.I. Basic Red 9</td>
<td>569-61-9</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>50 ppm</td>
<td>Dye</td>
<td>Dye</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>[4-[4,4′-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dienylidenedimethylammonium chloride; C.I. Basic Violet 3 with ≥ 0,1 % of Michler’s ketone]</td>
<td>548-62-9</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>50 ppm</td>
<td>Dye</td>
<td>Dye</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>4-chloro-o-toluidinum chloride</td>
<td>3165-93-3</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>30 ppm</td>
<td>Intermediate in dye production</td>
<td>Intermediate in dye production</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>2-Naphthylammoniacetate</td>
<td>553-00-4</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>30 ppm</td>
<td>Intermediate in dye production</td>
<td>Intermediate in dye production</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>4-methoxy-m-phenylene diammonium sulphate; 2,4-diamaionisole sulphate</td>
<td>39156-41-7</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>30 ppm</td>
<td>Intermediate in dye production</td>
<td>Intermediate in dye production</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>2,4,5-trimethylaniline hydrochloride</td>
<td>21436-97-5</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>30 ppm</td>
<td>Intermediate in dye production</td>
<td>Intermediate in dye production</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Quinoline</td>
<td>91-22-5</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>50 ppm</td>
<td>Intermediate in dye production</td>
<td>Intermediate in dye production</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
</tbody>
</table>
## 4.0 Restrictions for Packaging

The following restrictions apply to all homogenous materials in Google's retail packaging.

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS</th>
<th>Scope</th>
<th>Limit</th>
<th>Typical Uses</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic and its compounds</td>
<td>Includes but is not limited to: 7440-38-2</td>
<td>Wood products and pallets</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td>Wood preservative.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Bisphenol A (BPA)</td>
<td>80-05-7</td>
<td>Thermal Paper</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td>Google Policy</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Bromine and its compounds</td>
<td>Includes but is not limited to: 7726-95-6</td>
<td>All homogenous materials in packaging</td>
<td>900 ppm Br 1500 ppm Br + Cl</td>
<td>Google Policy</td>
<td></td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>7440-43-9</td>
<td>All homogenous materials in packaging</td>
<td>100 ppm (Cd + Cr-6 +Hg + Pb)</td>
<td>94/62/EC (Packaging Directive)</td>
<td>US Toxics Packaging Clearinghouse (TPCH)</td>
</tr>
<tr>
<td>Chlorine and its compounds</td>
<td>Includes but is not limited to: 7782-50-5</td>
<td>All homogenous materials in packaging</td>
<td>900 ppm Cl 1500 ppm Br + Cl</td>
<td>Google Policy</td>
<td></td>
</tr>
<tr>
<td>Chromium, hexavalent (Cr-VI, Cr6+)</td>
<td>18540-29-9</td>
<td>All homogenous materials in packaging</td>
<td>100 ppm (Cd + Cr-6 +Hg + Pb)</td>
<td>94/62/EC (Packaging Directive)</td>
<td>US Toxics Packaging Clearinghouse (TPCH)</td>
</tr>
<tr>
<td>Endangered Species of Flora and Fauna</td>
<td>Not Applicable</td>
<td>All homogeneous materials</td>
<td>Shall not be used</td>
<td>Wood paneling, pallets, paper, packaging, veneers, coverings, and leather</td>
<td>US Lacey Act EU Timber Regulation</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>50-00-0</td>
<td>Composite Wood Products</td>
<td>0.05 ppm (emission)</td>
<td>Thermoset plastics (urea formaldehyde, melamine), adhesives, finishes to make fabrics crease-resistant</td>
<td>GB 18401 (China) Germany ChemVerbotsV Taiwan CNS 15290 US 40 SFR 770.10 US California Air Resources Board Japan Law 112</td>
</tr>
<tr>
<td>Textiles and leather</td>
<td></td>
<td></td>
<td>75 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>7439-92-1</td>
<td>All homogenous materials in packaging</td>
<td>100 ppm (Cd + Cr-6 +Hg + Pb)</td>
<td>94/62/EC (Packaging Directive)</td>
<td>US Toxics Packaging Clearinghouse (TPCH)</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>7439-97-6</td>
<td>All homogenous materials in packaging</td>
<td>100 ppm (Cd + Cr-6 +Hg + Pb)</td>
<td>94/62/EC (Packaging Directive)</td>
<td>US Toxics Packaging Clearinghouse (TPCH)</td>
</tr>
<tr>
<td>Mineral Oils</td>
<td>Many</td>
<td>Inks used in packaging and paper printing</td>
<td>10000 ppm (uncured ink)</td>
<td>Solvent</td>
<td>France Decree No. 2020-1725</td>
</tr>
</tbody>
</table>
### 4.0 Restrictions for Packaging

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS</th>
<th>Scope</th>
<th>Limit</th>
<th>Typical Uses</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone Depleting Chemicals (ODCs)</td>
<td>See Appendix</td>
<td>All homogeneous materials</td>
<td>Non-detect (&lt; 0.1 ppm)</td>
<td></td>
<td>Montreal Protocol, US Clean Air Act, Google Policy</td>
</tr>
<tr>
<td>Polystyrene, Expanded (EPS)</td>
<td>9003-53-6</td>
<td>All homogenous materials in packaging</td>
<td>Shall not be used as packaging material in the primary product packaging</td>
<td>Packaging cushions.</td>
<td>South Korea Resource Recycling Act, Google Policy</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>9002-86-2</td>
<td>All homogenous materials in packaging</td>
<td>Shall not be used. Note: Demonstrated chlorine levels &lt; 900 ppm can be used to indicate the material does not contain PVC</td>
<td></td>
<td>Google Policy</td>
</tr>
</tbody>
</table>
5.0 Restrictions for Manufacturing Processes

The following manufacturing process chemical restrictions apply to supplier manufacturing operations as designated. Google acknowledges that restricted substances may be present as unintentional impurities. When impurities are present in excess of the stated content limit, exposure must comply with the established threshold limit value. Substances listed as "Restricted" may not be intentionally added outside of the exception(s) noted under Scope. The restrictions in this specification are a compilation of international regulations and Google policies, but not a comprehensive list of all potential hazardous ingredients. Supplier should assess and evaluate ingredients in their manufacturing process chemicals using a comprehensive chemical hazard assessment framework and proactively implement safer alternatives where possible.

<table>
<thead>
<tr>
<th>Manufacturing Process Chemicals</th>
<th>CAS</th>
<th>Scope</th>
<th>Conditions for use</th>
<th>Threshold Limit Value</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt; 0.1 ppm (0.32 mg/m$^3$)</td>
<td>NIOSH Google Policy</td>
</tr>
<tr>
<td>Bis (chloromethyl) ether</td>
<td>542-88-1</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;0.001 ppm (0.005 mg/m$^3$)</td>
<td>IARC Google Policy California OSHA PEL ACGIH</td>
</tr>
<tr>
<td>Chlorinated Organic Solvents</td>
<td>See Appendix A</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt; 0.05 ppm</td>
<td>Google Policy</td>
</tr>
<tr>
<td>N,N-Dimethylformamide</td>
<td>68-12-2</td>
<td>Supplier’s manufacturing operations except for controlled conditions where there are no known alternatives and approved by Google</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;5 ppm (15 mg/m$^3$)</td>
<td>Google Policy ACGIH EU REACH</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>100-41-4</td>
<td>Supplier’s manufacturing operations except for controlled conditions where there are no known alternatives and approved by Google.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;5 ppm (22 mg/m$^3$)</td>
<td>Google Policy California OSHA PEL</td>
</tr>
<tr>
<td>2-Ethoxyethanol</td>
<td>110-80-5</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;0.5 ppm (1.8 mg/m$^3$)</td>
<td>NIOSH Google Policy</td>
</tr>
<tr>
<td>2-Ethoxyethylacetate</td>
<td>111-15-9</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;0.5 ppm (2.7 mg/m$^3$)</td>
<td>NIOSH Google Policy</td>
</tr>
<tr>
<td>Manufacturing Process Chemicals</td>
<td>CAS</td>
<td>Scope</td>
<td>Conditions for use</td>
<td>Threshold Limit Value</td>
<td>Reference</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>----------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>n-Hexane</td>
<td>110-54-3</td>
<td>Supplier’s manufacturing operations including cleaning agents, degreasers and demolding solutions</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt; 28 ppm (100 mg/m³)</td>
<td>ACGIH, NIOSH, Google Policy</td>
</tr>
<tr>
<td>Methanol</td>
<td>67-56-1</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;200 ppm (260 mg/m³)</td>
<td>Google Policy, NIOSH, OSHA, California OSHA PEL, ACGIH</td>
</tr>
<tr>
<td>N-methylpyrrolidone (NMP)</td>
<td>872-50-4</td>
<td>Cleaning agents, degreasers and demolding solutions in Supplier’s manufacturing operations except for use as a photoresist stripper or other uses under controlled conditions and approved by Google.</td>
<td>Restricted</td>
<td>Breathing zone &lt; 1 ppm (4 mg/m³)</td>
<td>AIHA TWA, California OSHA PEL, Google Policy</td>
</tr>
<tr>
<td>Ozone Depleting Chemicals (ODCs)</td>
<td>See Appendix A</td>
<td>Supplier’s manufacturing operations.</td>
<td>No intentional use</td>
<td>Breathing zone &lt; 0.005 mg/m³</td>
<td>Montreal Protocol, US Clean Air Act</td>
</tr>
<tr>
<td>Perfluorooctane Sulfonates (PFOS) and PFOS salts</td>
<td>See Appendix A</td>
<td>Supplier’s manufacturing operations except for IC photolithography and photographic coating processes under controlled conditions and where there are no known alternatives</td>
<td>Restricted</td>
<td>Breathing zone &lt; 0.005 mg/m³</td>
<td>Stockholm Convention on Persistent Organic Pollutants, EU Regulation 850/2004 (as amended), Canada Regulation SOR/2008-177</td>
</tr>
<tr>
<td>n-Propyl Bromide (nPB)</td>
<td>106-94-5</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;0.1 ppm (0.5 mg/m³)</td>
<td>Google Policy, EU SVHC, OSHA, ACGIH</td>
</tr>
<tr>
<td>Sulfur Hexafluoride (SF6)</td>
<td>2551-62-4</td>
<td>Supplier’s manufacturing operations except for controlled conditions of IC manufacturing (e.g. etching, plasma cleaning) where there are no known alternatives.</td>
<td>Restricted</td>
<td>Breathing zone &lt; 1000 ppm (6000 mg/m³)</td>
<td>High GWP, California OSHA PEL, OSHA</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>Supplier’s manufacturing operations including, but not limited to, cleaning agents, degreasers and demolding solutions.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;10 ppm (37 mg/m³)</td>
<td>California OSHA PEL, Google Policy</td>
</tr>
<tr>
<td>Xylene and its isomers</td>
<td>1330-20-7</td>
<td>Supplier’s manufacturing operations except for controlled conditions where there are no known alternatives and approved by Google.</td>
<td>No intentional use (&lt;100 ppm content)</td>
<td>Breathing zone &lt;100 ppm (435 mg/m³)</td>
<td>Google Policy, ACGIH, California OSHA PEL</td>
</tr>
</tbody>
</table>
6.0 Reportable Substances

Suppliers are required to report the presence of chemicals of concern in all homogenous materials as detailed below. Suppliers shall report to the Environmental Compliance team at env-compliance@google.com and/or submission of Google Supplier Declaration of Conformity (SDoC).

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS</th>
<th>Reporting Limit</th>
<th>Scope</th>
<th>Typical Uses</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimicrobials and Biocides</td>
<td>n/a</td>
<td>Detectable levels</td>
<td>All homogenous materials</td>
<td>Antimicrobial additives in textiles and adhesives (e.g. silver-ion).</td>
<td>US EPA FIFRA EU BPR Regulation 528/2012</td>
</tr>
<tr>
<td>California Proposition 65 List of Chemicals</td>
<td><a href="https://oehha.ca.gov/proposition-65/proposition-65-list">https://oehha.ca.gov/proposition-65/proposition-65-list</a></td>
<td>Detectable levels</td>
<td>All homogenous materials</td>
<td>Various.</td>
<td>California Proposition 65</td>
</tr>
<tr>
<td>Cobalt and its compounds</td>
<td>Includes but not limited to: 7440-48-4</td>
<td>100 ppm</td>
<td>All homogenous materials</td>
<td>Metal alloys, batteries, catalysts, pigments, and coloring.</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Endocrine Disrupting Chemicals (EDCs)</td>
<td>Many</td>
<td>Detectable levels</td>
<td>All homogenous materials</td>
<td>Various.</td>
<td>Google Policy</td>
</tr>
<tr>
<td>IEC 62474 Declarable Substances</td>
<td><a href="https://std.iec.ch/iec62474">https://std.iec.ch/iec62474</a></td>
<td>Refer to the declarable substance list for applicable reporting limits</td>
<td>All homogenous materials</td>
<td>Various.</td>
<td>IEEE 1680.1 Google policy</td>
</tr>
<tr>
<td>Nanomaterials</td>
<td>Many</td>
<td>Detectable levels</td>
<td>Engineered materials that contain particles, in an unbound state or as an aggregate or an agglomerate, and where, for 50% or more of the particles in the number size distribution, one or more external dimensions are in the size range 1-100 nanometer (nm)</td>
<td>Various. Silver nanoparticles, carbon nanotubes and graphene, nanoscale cerium dioxide, nano titanium dioxide, nanoscale iron, and nanometer-size copper particles.</td>
<td>France Decree No. 2012-232 Environmental Code Article L. 523-4</td>
</tr>
<tr>
<td>Skin Sensitizing, Irritative, and/or Corrosive Substances</td>
<td>Many</td>
<td>Detectable levels</td>
<td>Parts and materials with direct and prolonged skin contact</td>
<td>Various.</td>
<td>EU CLP Regulation Google Policy</td>
</tr>
<tr>
<td>Per- and Polyfluoroalkyl Substances (PFAS)</td>
<td>Many</td>
<td>Detectable levels</td>
<td>All homogenous materials</td>
<td>Various.</td>
<td>Google Policy</td>
</tr>
<tr>
<td>Triphenyl Phosphate (TPhP)</td>
<td>115-86-6</td>
<td>1000 ppm</td>
<td>All homogenous materials</td>
<td>Flame Retardant</td>
<td>Google Policy</td>
</tr>
<tr>
<td>Washington State's List of Chemicals of High Concern to Children (CHCC)</td>
<td><a href="https://apps.leg.wa.gov/WAC/default.aspx?cite=173-334-130">https://apps.leg.wa.gov/WAC/default.aspx?cite=173-334-130</a></td>
<td>Detectable levels (&gt; 0.1 ppm) if used intentionally 100 ppm if present as a contaminant</td>
<td>All homogenous materials, regardless of whether the product or component containing the material is in scope of the Washington State Children's Safe Products Act.</td>
<td>Various. Washington State - Children’s Safe Products Act.</td>
<td></td>
</tr>
</tbody>
</table>
7.0 Future Phase-Out for Products

Google intends to phase out hazardous chemicals to protect human health and the environment. Suppliers shall report use to the Environmental Compliance team at env-compliance@google.com and/or submission of Google Supplier Declaration of Conformity (SDoC). The substances below are subject to future restriction and suppliers must take action to proactively identify suitable replacements.

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS</th>
<th>Scope</th>
<th>Priority</th>
<th>Limit</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol F</td>
<td>620-92-8</td>
<td>All homogenous materials</td>
<td>1</td>
<td>50 ppm residual</td>
<td>Google policy</td>
</tr>
<tr>
<td>Bisphenol S</td>
<td>80-09-1</td>
<td>All homogenous materials</td>
<td>1</td>
<td>50 ppm residual</td>
<td>Google policy</td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td>100-41-4</td>
<td>Solvents in paints, primers, coatings, inks, lubricants and adhesives</td>
<td>1</td>
<td>1000 ppm in the wet formulation</td>
<td>Google policy</td>
</tr>
<tr>
<td>Lead and its compounds</td>
<td>Includes but not limited to: 7439-92-1</td>
<td>Applications using EU RoHS exemptions</td>
<td>1</td>
<td>1000 ppm</td>
<td>Google policy</td>
</tr>
<tr>
<td>Organonitrogen Flame Retardants</td>
<td>Several</td>
<td>Electronic display (Screen area &gt; 15.5 square inches) enclosures and their stands</td>
<td>1</td>
<td>Shall not be used</td>
<td>NY State Senate Bill 4630, 2021 Google Policy</td>
</tr>
<tr>
<td>Organophosphorus Flame Retardants</td>
<td>Several</td>
<td>Electronic display (Screen area &gt; 15.5 square inches) enclosures and their stands</td>
<td>1</td>
<td>Shall not be used</td>
<td>NY State Senate Bill 4630, 2021 Google Policy</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>Solvents in paints, primers, coatings, inks, lubricants and adhesives</td>
<td>1</td>
<td>1000 ppm in the wet formulation</td>
<td>Google policy</td>
</tr>
<tr>
<td>REACH Candidate List of Substances of Very High Concern (SVHC)</td>
<td><a href="https://echa.europa.eu/candidate-list-table">https://echa.europa.eu/candidate-list-table</a></td>
<td>Articles as defined by REACH</td>
<td>2</td>
<td>1000 ppm at the article level (see note below)</td>
<td>IEEE 1680.1 UL 110 EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>REACH Authorized Substances (Annex XIV of EC 1907/2006)</td>
<td><a href="https://echa.europa.eu/authorisation-list">https://echa.europa.eu/authorisation-list</a></td>
<td>All homogenous materials</td>
<td>2</td>
<td>1000 ppm at the article level (see note below)</td>
<td>EC 1907/2006 and amendments (REACH)</td>
</tr>
<tr>
<td>Xylene and its isomers</td>
<td>1330-20-7</td>
<td>Solvents in paints, primers, coatings, inks, lubricants and adhesives</td>
<td>2</td>
<td>1000 ppm in the wet, uncured formulation</td>
<td>Google policy</td>
</tr>
<tr>
<td></td>
<td>95-47-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>108-38-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>106-42-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: “Article” is defined consistent with the most recent available ECHA guidance on substances in articles, [https://echa.europa.eu/guidance-documents/guidance-on-reach](https://echa.europa.eu/guidance-documents/guidance-on-reach).

Phase-out Priorities
Priority 1: Vendors must provide Google with phaseout timeline and alternatives assessment. See section 10.2.
Priority 2: Vendors to proactively work to identify suitable replacements. See section 10.2.
8.0 Future Phase Out for Manufacturing Process

Google intends to phase out hazardous chemicals to protect human health and the environment. The substances below are subject to future restriction. Suppliers must take action to report the current use in manufacturing of Google parts and components and proactively identify suitable replacements.

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS</th>
<th>Scope</th>
<th>Priority</th>
<th>Limit</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrofluorocarbons (HFCs)</td>
<td>See Appendix A</td>
<td>Supplier to evaluate whether alternatives are available for existing and new applications (e.g. refrigerant), to understand existing ban or restriction for some applications/jurisdictions, and to address concerns and associated business risks due to high potential to phase out/down or severely restrict use of the chemical in the future.</td>
<td>1</td>
<td>No intentional use</td>
<td>Montreal Protocol amendment to phase out stating 2019-2028 because High GWP, CA ARB to cut high GWP HFCs</td>
</tr>
<tr>
<td>Perfluorocarbons (PFCs)</td>
<td>See Appendix A</td>
<td>Supplier to evaluate whether alternatives are available for existing and new applications (e.g. solvents for electronics or metal cleaning), to understand existing ban or restriction for some applications/jurisdictions, and to address concerns and associated business risks due to high potential to phase out/down or severely restrict use in the future.</td>
<td>1</td>
<td>No intentional use</td>
<td>High GWP</td>
</tr>
</tbody>
</table>

Phase-out Priorities
Priority 1: Vendors must provide Google with phaseout timeline and alternatives assessment. See section 10.2.
Priority 2: Vendors to proactively work to identify suitable replacements. See section 10.2.
## 9.0 Supplier Demonstration of Conformance

Suppliers must submit test reports from certified labs at the homogeneous material level for the following substances:

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>Test Method</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic (As)</td>
<td>Total digestion followed by ICP-MS</td>
<td>Display, cover and enclosure glass</td>
</tr>
<tr>
<td>Beryllium (Be)</td>
<td>US EPA 3050B, US EPA 3052, Others approved by Google</td>
<td>Metals and alloys in the following part types: Springs, Connectors, Antennas, Pins (audio, charging, and pogo), and Switches Note: The manufacturer may submit a certified mill test certificate for the specific metal alloy in lieu of testing</td>
</tr>
<tr>
<td>Bisphenol A</td>
<td>Solvent extraction followed by LC-MS</td>
<td>External plastic materials with the potential for skin contact under normal use conditions.</td>
</tr>
<tr>
<td>Bromine Chlorine</td>
<td>EN 14582 or US EPA SW-846 5050/9056</td>
<td>All homogenous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>IEC 62321</td>
<td>All homogeneous materials</td>
</tr>
<tr>
<td>Hexavalent Chromium (Cr6+)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Polybrominated biphenyl (PBB)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Polybrominated diphenyl ether (PBDE)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Bis(2-ethylhexyl) phthalate (DEHP)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Benzyl butyl phthalate (BBP)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Dibutyl phthalate (DBP)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
<tr>
<td>Diisobutyl phthalate (DIBP)</td>
<td>IEC 62321</td>
<td>All homogeneous materials except metals, glass, and ceramics</td>
</tr>
</tbody>
</table>

### 9.1 Test Report Requirements

- Test reports must be at the homogenous material level.
- Test reports must be no more than 2 years old from the date submitted to Google or Google’s manufacturing partners. Test reports older than 2 years will be rejected.
- A nationally or internationally certified laboratory must issue the test report. Results from supplier-owned laboratories are acceptable if the lab is independently certified (e.g., ISO 17025).
- Test results based on X-ray Fluorescence Spectroscopy (XRF) are not acceptable.
- The most currently published revision of a test method specification is to be used.
- Test reports shall be provided at the suppliers expense.
9.2 Supplier Declarations of Conformity (SDoC)

Suppliers are required to submit declarations of conformity through a process defined by Google. This includes the requirement for suppliers to submit declarations and test reports to Google's manufacturing partners as requested.

9.3 Refresh Policy

Google may request updated test reports at its sole discretion, at the supplier's expense, as a demonstration of conformance. Test reports are valid for the life of the component provided that constituent materials have not changed. In this event, suppliers should be prepared to show evidence that constituent materials have not changed.

9.4 Data Retention Policy

All compliance documentation (e.g., test reports and declarations) must be retained by the supplier for a minimum of 10 years as part of the supplier's record-keeping process. Digital formats are acceptable unless otherwise noted. Suppliers are also expected to have compliance assurance processes and systems to control and maintain the data.

9.5 Waiver/Deviation Process

Suppliers must contact Google in writing if they are seeking a waiver or deviation to a requirement in this specification. The following information must be provided in the request:

1. The substance name
2. CAS number
3. The concentration of the substance in the homogenous material (ppm or weight percent)
4. The reason why a deviation is necessary
5. When the deviation will be resolved

Google will review the request and provide a decision by email. Suppliers can contact Google at env-compliance@google.com for more information.
10.0 Additional Requirements

10.1 Reformulation Notification

Suppliers are required to notify Google and obtain consent before reformulating or implementing any change that will affect the chemical composition (intentional or residual) of a material and its potential to comply with this specification.

10.2 Safer Chemistry / Alternatives Assessment

The restrictions in this specification are a compilation of international regulations and Google policies, but not a comprehensive list of all potential hazardous ingredients. Vendors should assess and evaluate ingredients in their material formulations using a comprehensive chemical hazard assessment framework and proactively implement safer alternatives where possible. In order to reduce the potential for regrettable substitutions when phasing out a chemical of concern, suppliers are required to perform an alternatives assessments using a comprehensive chemical hazard assessment framework such as the GreenScreen® for Safer Chemicals (https://www.greenscreenchemicals.org), the US EPA Safer Choice criteria (https://www.epa.gov/saferchoice), or ChemFORWARD® (https://www.chemforward.org/). The supplier should focus on selecting chemistry with inherently low hazard toxicological properties. The supplier shall conduct a hazard evaluation at its expense or obtain the evaluation from its sub-suppliers.

10.3 Full Material Disclosure (FMD)

Vendors are required to provide the complete chemical composition of materials used in Google products as part of the material and part qualification process. Submissions must be made using the Google Supplier Declaration of Conformity (SDoC) form or a preapproved industry standard format.
11.0 References


2010/153/EC: Prolonging the validity of Decision 2009/251/EC requiring Member States to ensure that products containing the biocide dimethylfumarate are not placed or made available on the market.


40 CFR 770.10 - Formaldehyde emission standards.

814.81 Ordinance of 18 May 2005 on the Reduction of Risks relating to the Use of Certain Particularly Dangerous Substances, Preparations and Articles (Chemical Risk Reduction Ordinance, ORRChem


ACGIH: American Conference of Governmental Industrial Hygienist (ACGIH), Guide to Occupational Exposure Values, 2013.

AIHA TWA: The AIHA Guideline Foundation Workplace Environmental Exposure Levels® (WEELs®) provide guidance for protecting most workers from adverse health effects related to occupational chemical exposures expressed as time-weighted average (TWA).

CA DTSC: California Department of Toxic Substances Control; Perchlorate Contamination Prevention Act of 2003, AB 826.

Cal OSHA: California Department of Public Health, Occupational Health Branch, PELs, Title 8, section 5155/AC-1.


ChemVerbotsV: Chemical Prohibition Ordinance, Germany.

Children's Safe Products Act (CSPA): Washington State's Children's Safe Products Act reporting List of Chemicals of High Concern to Children (CHCC), US.


CNS 15290 Safety of Textile Products (General Requirements). Taiwan.


Directive 2013/59/Euratom - protection against ionising radiation


EN 1811:2011: Reference test method for release of nickel from all post assemblies that are articles intended to come into direct and prolonged contact with the skin.


EU Timber Regulation: Regulation laying down the obligations of operators who place timber and timber products on the market: (EU) No. 995/2010.

(EU) 2015/863: Ammends EU RoHS directive 2011/65/EU to include restrictions on additional substances.

France Decree No. 2012-232, Environmental Code Article L. 523-4: Annual declaration of nanoparticles in substances

France Decree No. 2020-1725: Extended producer responsibility regulation that places additional requirements on the use of mineral oils in packaging.


GB 30981-2020: Limit of harmful substances of industrial protective coatings.

GB 33372-2020: Limit of volatile organic compounds content in adhesive.

GB 38507-2020: Limits of volatile organic compounds (VOCs) in printing ink.

GB 38508-2020: Limits for volatile organic compounds content in cleaning agents.


Japan Chemical Substances Control Law (CSCL): Japanese Chemical Substances Control Law (CSCL) and amendments, 2011.

Japan Law 112 - Act on Control of Household Products Containing Harmful Substances


New York Environmental Law § 27-0719 regarding Battery management and disposal.


Norway FOR-2004-06-01-922: Regulations relating to restrictions on the use of health hazardous chemicals and other products (Product Regulations).


REACH, Article 59 (10): Candidate List of substances of very high concern for Authorisation under REACH regulation.


Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products Text with EEA relevance

South Korea Resource Recycling Act

Sweden Law (2016: 1067) a tax on chemicals in certain electronics

Taiwan BSMI RoHS: CNS 15663 is the technique standards of Taiwan BSMI RoHS.

UL110 Standard for Sustainability for Mobile Phones, ed. 2: 2017

US Clean Air Act of 1963: An Act to improve, strengthen, and accelerate programs for the prevention and abatement of air pollution. 42 U.S. Code Chapter 85

US EPA 3050B: EPA method describing acid digestion of sediments, sludges, and soils.
US EPA 3052: EPA method describing microwave assisted acid digestion of siliceous and organically based matrices.

US EPA 5021A: Method to determine volatile organic compounds in soils and other solid matrices using equilibrium headspace analysis.

## 12.0 Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rev A</td>
<td>Initial release</td>
</tr>
<tr>
<td>Rev. B</td>
<td>Added in Table 1 restricted substances table: red phosphorus, Brominated/chlorinated flame retardants, poly vinyl chloride and all phthalates. Removal from reportable substances table: Brominated/chlorinated flame retardants, poly vinyl chloride and all phthalates.</td>
</tr>
<tr>
<td>Rev. C</td>
<td>New format. Updated and added definitions. Updated all references. Added product restrictions for antimony trioxide, arsenic, BNST, beryllium, benzene, BPA, elemental bromine and chlorine, chlorinated organic solvents, DMFu, endangered species, halogenated diphenyl methanes, musk xylene, organotins, PFOA, TBBPA, and REACH restricted substances. Expanded Azo dyes/colorants category to cover Aromatic amines, Azo colorants, and Azo dyes. Hexavalent Chromium - added limit for leather. Formaldehyde - Added limits for textiles, leather, composite wood products, and other materials. HBCDD - reduced limit from 1000 ppm to 100 ppm. Lead - removed subcategory for cable jacketing and added a lower limit for polymeric materials, paints, inks, and non-metallic and non-ceramic coatings. Mercury - added limit for batteries and a lower limit for plastic materials, paints, inks, and non-metallic and non-ceramic coatings. Nickel - changed limit from 1000 ppm content to a leach rate limit. Organotins - expanded scope of chemicals covered and updated limits. PFOS - added limits for textiles, mixtures / preparations, and all other materials. Phthalates - changed limit from 1000 ppm individual to 1000 ppm sum total content. PVC - updated limit to ‘non-use’ from 1000 ppm. Removed red phosphorus from product restrictions. Retired all Google approved exemptions for: all mercury exemptions, 5a, 5b, 7b, and 15. Added approved exemptions to align with recent EU Commission delegated directives. Packaging restrictions - Added new limits for arsenic, BPA, elemental bromine and chlorine, and PVC. Removed the separate section for non-electronic product restrictions. Reportable substances - added antimicrobials / biocides, California Proposition 65, cobalt and its compounds, nanomaterials, Washington State's List of Chemicals of High Concern to Children, and IEC 62474 substances of concern. Removed bismuth from reportables. The following previous reportables became newly restricted in this revision: antimony trioxide, arsenic and its compounds, beryllium and its compounds, BPA, PFOA, and TBBPA. Added new sections for manufacturing process chemical restrictions, future phase out for both products and manufacturing process chemicals, supplier demonstration of conformance, reformulation notification, alternatives assessment for safer chemistry, references, and appendix.</td>
</tr>
<tr>
<td>Rev. D</td>
<td>Updated and added definitions. Updated all references. Added product restrictions for PFHxA, PFHxS, Phenol isopropylated phosphate (3:1), and VOCs. Added limits for formaldehyde, PFOA, and PFOS. Added related substances to scope of PFOA and PFOS restriction. Removed EU RoHS exemptions 8b and 13(b)-II from Google Approved RoHS exemptions table. Created new table for Google approved exemptions and included entries for Antimony trioxide, As, Br, and Cl. Added new section for Restrictions in Wearable Products. Moved restrictions for BPA, Nickel leach, and PAHs and added new restrictions on several CMR substances to Restrictions in Wearables Products section. Added new packaging restriction for mineral oils. Added new Manufacturing Process restrictions for Bis (chloromethyl) ether, N,N-Dimethylformamide, Ethylbenzene, 2-Ethoxyethanol, 2-Ethoxyethylacetate, Methanol, n-Propyl Bromide (nPB), Xylene and its isomers, and deleted Beryllium and its compounds. Added reporting requirements for EDCs, PFAS, Skin sensitizing/irritative, and/or corrosive substances, and TPhP. Added lead and organonitrogen/ organophosphorus flame retardants as a priority 1 Future Phase out for products. Included SDoC as reporting method for disclosure to Google. Removed reporting requirement for Diphenylamine, substituted (SDPA). Narrowed scope for As and Be testing and added VOC test requirements in Demonstration of Compliance Section. Increased scope of Alternatives Assessment section to include vendor expectation of proactive formulation review and added Full Material Disclosure (FMD) requirement in Additional Requirements section.</td>
</tr>
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</table>
## Appendix A – Referenced Substances

### A.1 Aromatic Amines, Azo Colorants and Azo Dyes

<table>
<thead>
<tr>
<th>CAS</th>
<th>Substance Name</th>
</tr>
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<tbody>
<tr>
<td>101-14-4</td>
<td>2,2’-dichloro-4,4’-methyleneedianiline (MOCA)</td>
</tr>
<tr>
<td>101-77-9</td>
<td>4,4’-Methyleneedianiline (MDA)</td>
</tr>
<tr>
<td>101-80-4</td>
<td>4,4’-Oxydianiline</td>
</tr>
<tr>
<td>106-47-8</td>
<td>4-Chloroaniline</td>
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<tr>
<td>119-90-4</td>
<td>3,3’-Dimethoxybenzidine</td>
</tr>
<tr>
<td>119-93-7</td>
<td>3,3’-Dimethylbenzidine</td>
</tr>
<tr>
<td>120-71-8</td>
<td>p-Cresidine</td>
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<tr>
<td>122-39-4</td>
<td>N,N-Diphenylamine</td>
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<tr>
<td>137-17-7</td>
<td>2,4,5-Trimethylaniline</td>
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<tr>
<td>139-65-1</td>
<td>4,4’-Thiodianiline</td>
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<tr>
<td>60-09-3</td>
<td>4-aminoazobenzene</td>
</tr>
<tr>
<td>615-05-4</td>
<td>2,4-Diaminoanisole</td>
</tr>
<tr>
<td>838-88-0</td>
<td>4,4’-methylenedi-o-toluidine</td>
</tr>
<tr>
<td>90-04-0</td>
<td>o-Anisidine</td>
</tr>
<tr>
<td>91-59-8</td>
<td>2-Naphthylamine</td>
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<tr>
<td>91-94-1</td>
<td>3,3’-Dichlorobenzidine</td>
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<tr>
<td>92-67-1</td>
<td>4-Biphenylamine</td>
</tr>
<tr>
<td>92-87-5</td>
<td>Benzidine</td>
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<tr>
<td>95-53-4</td>
<td>o-Toluidine</td>
</tr>
<tr>
<td>95-69-2</td>
<td>4-Chloro-o-toluidine</td>
</tr>
<tr>
<td>95-80-7</td>
<td>2,4-Diaminotoluene</td>
</tr>
<tr>
<td>97-56-3</td>
<td>o-Aminoazotoluene</td>
</tr>
<tr>
<td>99-55-8</td>
<td>2-Amino-4-nitrotoluene</td>
</tr>
<tr>
<td>95-68-1</td>
<td>2,4-Xylidine</td>
</tr>
<tr>
<td>87-62-7</td>
<td>2,6-Xylidine</td>
</tr>
<tr>
<td>531-85-1</td>
<td>[1,1’-Biphenyl]-4,4’-diamine, dihydrochloride (Benzidine)</td>
</tr>
<tr>
<td>573-58-0</td>
<td>1-Naphthalenesulfonic acid, 3,3’-[[1,1’-biphenyl]-4,4’-dilybis(azo)]bis[4-amino-, disodium salt. (C.I. Direct Red 28, C.I. #22120)]</td>
</tr>
<tr>
<td>1937-37-7</td>
<td>2,7-Naphthalenedisulfonic acid, 4-amino-3’-[4’-[2,4-diaminophenyl] azo][1,1’-biphenyl]-4-yl] azo]-5-hydroxy-6-(phenylazo)-, disodium salt. (C.I. Direct Black 38, C.I. #30235)</td>
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<tr>
<td>2302-97-8</td>
<td>1-Naphthalenesulfonic acid, 8,8’-[1,1’-biphenyl]-4,4’-dilybis(azo)]bis[7-hydroxy-, disodium salt. (C.I. Direct Red 44, C.I. #22500)</td>
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<tr>
<td>2429-73-4</td>
<td>2,7-Naphthalaminedisulfonic acid, 5-amino-3’-[4’-[7-amino-1-hydroxy-3-sulfo-2-naphthalenyl] azo][1,1’-biphenyl]-4-yl] azo]-4-hydroxy-, trisodium salt. (C.I. Direct Blue 2, C.I. #22590)</td>
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<tr>
<td>2429-79-0</td>
<td>Benzoic acid, 5’-[4’-[1-amino-4-sulfo-2-naphthalenyl] azo][1,1’-biphenyl]-4-yl] azo]-2- hydroxy-, disodium salt. (C.I. Direct Orange 8, C.I. #22130)</td>
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<tr>
<td>2429-81-4</td>
<td>Benzoic acid, 5’-[4’-[2,6-diamino-3’-[8-hydroxy-3,6-disulfo-7’-[4’-sulfo-1-naphthalenyl]azo]]-2-naphthalenyl]azo]-5- methylphenyl]azo][1,1’-biphenyl]-4-yl]azo]-2-hydroxy-, tetrasodium salt. (C.I. Direct Brown 31, C.I. #35660)</td>
</tr>
<tr>
<td>2429-82-5</td>
<td>Benzoic acid, 5’-[4’-[7-amino-1-hydroxy-3-sulfo-2-naphthalenyl]azo][1,1’-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 2, C.I. #22311)</td>
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<tr>
<td>2429-83-6</td>
<td>2,7-Naphthalaminedisulfonic acid, 4-amino-3’-[4’-[2,4-diamino-5-methylphenyl]azo][1,1’-biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)-, disodium salt. (Direct Black 4, C.I. #30245)</td>
</tr>
</tbody>
</table>
# A.1 Aromatic Amines, Azo Colorants and Azo Dyes (continued)

<table>
<thead>
<tr>
<th>CAS</th>
<th>Substance Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2429-84-7</td>
<td>Benzoic acid, 5[{4′-[(2-amino-8-hydroxy-6-sulfo-1-naphthalenyl)azo]1,1′-biphenyl}-4-yl]azo]-2-hydroxy, disodium salt. (C.I. Direct Red 1, C.I. #22310)</td>
</tr>
<tr>
<td>2586-58-5</td>
<td>Benzoic acid, 5[{4′-[[2,6-diamino-3-methyl-5-(4-sulfophenyl)azo]phenyl]azo[1,1′-biphenyl]-4-yl]azo]-2-hydroxy, disodium salt. (C.I. Direct Brown 1 2, C.I. #30110)</td>
</tr>
<tr>
<td>2602-46-2</td>
<td>2,7-Naphthalenedisulfonic acid, 3,3′-[{1,1′-biphenyl}-4,4′-diylbis(azo)]bis[5-amino-4-hydroxy-, tetrasodium salt. (C.I. Direct Blue 6, C.I. #22610)</td>
</tr>
<tr>
<td>2893-80-3</td>
<td>Benzoic acid, 5[{4′-[(2,4-dihydroxy-3-(4-sulfophenyl)azo]phenyl]azo[1,1′-biphenyl]-4-yl]azo]-2-hydroxy, disodium salt. (C.I. Direct Brown 6, C.I. #30140)</td>
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<tr>
<td>3530-19-6</td>
<td>1,3-Naphthalenedisulfonic acid, 8[{4′-[(4-ethoxyphenyl)azo]1,1′-biphenyl]-4-yl]azo]-7-hydroxy-, disodium salt. (C.I. Direct Red 37, C.I. #30280)</td>
</tr>
<tr>
<td>3567-65-5</td>
<td>1,3-Naphthalenedisulfonic acid, 7-hydroxy-8[{4′-[{4-{[(4-methylphenyl)sulfonyl]oxy]phenyl]azo[1,1′-biphenyl]-4-yl]azo]-6-(phenylazo)-, disodium salt. (C.I. Acid Red 85, C.I. #22245)</td>
</tr>
<tr>
<td>3626-28-6</td>
<td>2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3[{4-hydroxyphenyl]azo]-6-(phenylazo)-3[{4-nitrophenyl]azo]-, disodium salt. (C.I. Direct Green 1, C.I. #30280)</td>
</tr>
<tr>
<td>3811-71-0</td>
<td>Benzoic acid, 5[{4′-[(2,4-diamino-5-(4-sulfophenyl)azo]1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 1, C.I. #30045)</td>
</tr>
<tr>
<td>6358-80-1</td>
<td>2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-6[{4-{4-hydroxy-2-[(2-methylphenyl)amino]phenyl]azo]-3[{4-nitrophenyl]azo]-, disodium salt. (C.I. Direct Brown 6, C.I. #30295)</td>
</tr>
<tr>
<td>6360-29-8</td>
<td>2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-6[{4-[{[(4-methylphenyl)sulfonyl]oxy]]phenyl]azo]-[1,1′-biphenyl]-4-yl]azo]-6-(phenylazo)-, disodium salt. (C.I. Acid Black 94, C.I. #30336)</td>
</tr>
<tr>
<td>6360-54-9</td>
<td>Benzoic acid, 5[{4′-[[2,6-diamino-3-methyl-5-(4-sulfophenyl)azo]phenyl]azo[1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 27, C.I. #31725)</td>
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<tr>
<td>8014-91-3</td>
<td>1,3,6-Naphthalenetrisulfonic acid, 8-hydroxy-7[{4′-[(2-hydroxy-1-naphthalenyl)diazenyl]]phenyl]-azo]-6-(2-phenyldiazenyl)azo-2-hydroxybenzoato(4)-, disodium salt. (C.I. Direct Brown 95, C.I. #30145)</td>
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<tr>
<td>117-33-9</td>
<td>1,3-Naphthalenedisulfonic acid, 7-hydroxy-8[{2-[4-{4-hydroxyphenyl]diazenyl}]biphenyl]-4-yl]diazenyl]-, disodium salt. (C.I. Direct Brown 74, C.I. #36300)</td>
</tr>
<tr>
<td>65150-87-0</td>
<td>Cuprate(2-), [5-[{4′-[[2,6-dihydroxy-3-{2-hydroxy-5-sulfophenyl]azo}phenyl]azo]1,1′-biphenyl]-4-yl]azo]-2-hydroxy-, disodium salt. (C.I. Direct Brown 27, C.I. #31725)</td>
</tr>
<tr>
<td>72379-45-4</td>
<td>2,7-Naphthalenedisulfonic acid, 4-amino-5-hydroxy-3[{2-[2-(7-amino-1-hydroxy-3-sulfo-2-naphthalenyl)diazenyl]4-yl]diazenyl]-6-(2-phenyldiazenyl)-azo-2-hydroxybenzoato(4)-, disodium salt. (C.I. Direct Brown 95, C.I. #30145)</td>
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### A.2 Asbestos and its compounds

<table>
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<tr>
<th>CAS</th>
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<tbody>
<tr>
<td>1332-21-4</td>
<td>Asbestos</td>
</tr>
<tr>
<td>77536-66-4</td>
<td>Actinolite</td>
</tr>
<tr>
<td>12172-73-5</td>
<td>Amosite</td>
</tr>
<tr>
<td>77536-67-5</td>
<td>Anthophyllite</td>
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<tr>
<td>12001-29-5</td>
<td>Chrysotile</td>
</tr>
<tr>
<td>132207-32-0</td>
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<tr>
<td>12001-28-4</td>
<td>Crocidolite</td>
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<tr>
<td>77536-68-6</td>
<td>Tremolite</td>
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</table>

### A.3 Brominated Flame Retardants

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<tr>
<th>CAS</th>
<th>Substance Name</th>
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<tr>
<td>94334-64-2</td>
<td>TBBPA carbonate oligomer</td>
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<tr>
<td>21850-44-2</td>
<td>TBBPA-bis(2,3-dibromopropyl ether)</td>
</tr>
<tr>
<td>25327-89-3</td>
<td>TBBPA-bis(allyl ether)</td>
</tr>
<tr>
<td>4162-45-2</td>
<td>TBBPA-bis(2-hydroxyethyl ether)</td>
</tr>
<tr>
<td>13654-09-6</td>
<td>Decabromobiphenyl (DeBB)</td>
</tr>
<tr>
<td>632-79-1</td>
<td>Tetrabromophthalic anhydride (TBPA)</td>
</tr>
<tr>
<td>20566-35-2</td>
<td>TBPA diester/ether diol</td>
</tr>
<tr>
<td>32588-76-4</td>
<td>Ethylene bis(tetrabromophthalimide)</td>
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<tr>
<td>24407-32-7</td>
<td>3,4,5,6-Tetrabromophthalimide</td>
</tr>
<tr>
<td>25357-79-3</td>
<td>Disodium salt of tetrabromophthalate</td>
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<tr>
<td>25637-99-4</td>
<td>Hexabromocyclododecane (HBCD)</td>
</tr>
<tr>
<td>3322-93-8</td>
<td>Dibromoethyl dibromocyclohexane</td>
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<tr>
<td>52907-07-0</td>
<td>Ethylenebis(5,6-dibromonorbornane-2,3-dicarboximide)</td>
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<tr>
<td>3296-90-0</td>
<td>Dibromoneopentyl glycol (DBNPG)</td>
</tr>
<tr>
<td>36483-57-5</td>
<td>Tribromoneopentyl alcohol (TBNPA)</td>
</tr>
<tr>
<td>593-60-2</td>
<td>Vinyl bromide (VBr)</td>
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<tr>
<td>118-79-6</td>
<td>2,4,6-Tribromophenol (TBP)</td>
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<tr>
<td>37853-59-1</td>
<td>1,2-Bis(tribromophenoxy)ethane (HBPE)</td>
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<tr>
<td>3278-89-5</td>
<td>2,4,6-Tribromophenyl allyl ether (TBP-AE)</td>
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<tr>
<td>69882-11-7</td>
<td>Poly(dibromophenylene oxide) (PDBPO)</td>
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<tr>
<td>85-22-3</td>
<td>Pentabromoethylbenzene (SBEB)</td>
</tr>
<tr>
<td>58965-66-5</td>
<td>Tetradecabromo-1,4-diphenoxybenzene (TDBPB)</td>
</tr>
<tr>
<td>59447-55-1</td>
<td>Poly(pentabromobenzyl acrylate) (PBB-PA)</td>
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<tr>
<td>31780-26-4</td>
<td>Polydibromostyrene (PDBS)</td>
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<tr>
<td>88497-56-7</td>
<td>Brominated polystyrene (BrPS)</td>
</tr>
<tr>
<td>3194-57-8</td>
<td>Tetrabromocyclooctane</td>
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### A.4 Chlorinated Flame Retardants

<table>
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<tr>
<th>CAS</th>
<th>Substance Name</th>
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<tbody>
<tr>
<td>115-28-6</td>
<td>Chlorendic acid</td>
</tr>
<tr>
<td>115-96-8</td>
<td>Tris(2-chloroethyl)phosphate (TCEP)</td>
</tr>
<tr>
<td>13560-89-9</td>
<td>Dechlorane plus</td>
</tr>
<tr>
<td>13674-84-5</td>
<td>2-Propanol, 1-chloro-, 2,2',2''-phosphate (TCPP)</td>
</tr>
<tr>
<td>13674-87-8</td>
<td>tris (1,3-dichloro-2-propyl) phosphate (TDCPP)</td>
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</tbody>
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### A.5 Chlorinated Organic Solvents

**Chlorinated Methanes [6 items]**

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<th>CAS</th>
<th>Substance Name</th>
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<tbody>
<tr>
<td>75-27-4</td>
<td>Bromodichloromethane</td>
</tr>
<tr>
<td>56-23-5</td>
<td>Carbon tetrachloride</td>
</tr>
<tr>
<td>67-66-3</td>
<td>Chloroform</td>
</tr>
<tr>
<td>124-48-1</td>
<td>Dibromochloromethane</td>
</tr>
<tr>
<td>75-09-2</td>
<td>Methylene chloride</td>
</tr>
<tr>
<td>74-87-3</td>
<td>Methyl chloride</td>
</tr>
</tbody>
</table>

**Chlorinated Ethanes [9 items]**

<table>
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<tr>
<th>CAS</th>
<th>Substance Name</th>
</tr>
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<tbody>
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<td>Chloroethane</td>
</tr>
<tr>
<td>75-34-3</td>
<td>1,1-Dichloroethane</td>
</tr>
<tr>
<td>107-06-2</td>
<td>1,2-Dichloroethane</td>
</tr>
<tr>
<td>67-72-1</td>
<td>Hexachloroethane</td>
</tr>
<tr>
<td>76-01-7</td>
<td>Pentachloroethane</td>
</tr>
<tr>
<td>630-20-6</td>
<td>1,1,1,2-Tetrachloroethane</td>
</tr>
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<td>79-34-5</td>
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<td>1,1,1-Trichloroethane</td>
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**Chlorinated Ethylenes [5 items]**

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<td>1,1-Dichloroethylene</td>
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<td>cis-1,2-Dichloroethylene</td>
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A.6 Hydrofluorocarbons (HFCs)

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<td>HFC-23 (CHF3)</td>
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<td>HFC-125 (C2HF5)</td>
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<td>HFC-134 (CH2CHF2)</td>
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<td>HFC-143 (CH2CHF2)</td>
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<td>HFC-143a (C2H3F3)</td>
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<td>624-72-6</td>
<td>HFC-152 (CH2CHF2F)</td>
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<td>HFC-152a (C2H4F2)</td>
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<td>HFC-161 (CH3CH2F)</td>
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<td>HFC-236cb (CH2FCF2CF3)</td>
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<td>HFC-236ea (CHF2CHFCF3)</td>
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<td>HFC-236fa (C3H2F6)</td>
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<td>HFC-245ca (C3H3F5)</td>
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<td>HFC-245fa (CHF2CH2CF3)</td>
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<td>HFC-365mfc (CH3CF2CH2CF3)</td>
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A.7 Organotin (Organostannic) Compounds

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<td>Multiple</td>
<td>Monoctyltin (MOT) Compounds</td>
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<td>Multiple</td>
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<td>Multiple</td>
<td>Dioctyltin (DOT) Compounds</td>
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<td>Tributylin (TBT) Compounds</td>
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<td>Multiple</td>
<td>Tricyclohexyltin (TCyT) Compounds</td>
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<td>Multiple</td>
<td>Triphenyltin (TPhT) Compounds</td>
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A.8 Ozone Depleting Chemicals

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<td>Trichlorofluoromethane (CFC-11)</td>
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<td>75-71-8</td>
<td>Dichlorodifluoromethane (CFC-12)</td>
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<td>75-72-9</td>
<td>Chlorotrifluoromethane (CFC-13)</td>
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<td>Pentachlorofluoroethane (CFC-111)</td>
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<td>Tetrachlorodifluoroethane (CFC-112)</td>
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<td>Trichlorotrifluoroethane (CFC-113)</td>
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### A.8 Ozone Depleting Chemicals (CONTINUED)

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<th>CAS</th>
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## A.8 Ozone Depleting Chemicals (CONTINUED)

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<tr>
<td>128903-21-9</td>
<td>2,2-Dichloro-1,1,1,3,3-pentafluoropropane (HCFC-225aa)</td>
</tr>
<tr>
<td>422-48-0</td>
<td>2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC-225ba)</td>
</tr>
<tr>
<td>422-44-6</td>
<td>1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225bb)</td>
</tr>
<tr>
<td>422-56-0</td>
<td>3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)</td>
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<tr>
<td>507-55-1</td>
<td>1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)</td>
</tr>
<tr>
<td>13474-88-9</td>
<td>1,1-Dichloro-1,2,2,3,3-pentafluoropropane (HCFC-225cc)</td>
</tr>
<tr>
<td>431-86-7</td>
<td>1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC-225da)</td>
</tr>
<tr>
<td>136013-79-1</td>
<td>1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC-225ea)</td>
</tr>
<tr>
<td>111512-56-2</td>
<td>1,1-Dichloro-1,2,3,3,3-pentafluoropropane (HCFC-225eb)</td>
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<tr>
<td>134308-72-8</td>
<td>Chlorohexafluoropropane (HCFC-226)</td>
</tr>
<tr>
<td>431-87-8</td>
<td>2-Chloro-1,1,1,3,3,3-hexafluoro-propane (HCFC-226da)</td>
</tr>
<tr>
<td>134190-48-0</td>
<td>Pentachlorofluoropropane (HCFC-231)</td>
</tr>
<tr>
<td>421-94-3</td>
<td>1,1,1,2,3-pentachloro-2-fluoro-propane (HCFC-231bb)</td>
</tr>
<tr>
<td>134237-39-1</td>
<td>Tetrachlorodifluoropropane (HCFC-232)</td>
</tr>
<tr>
<td>460-89-9</td>
<td>1,1,1,3-Tetrachloro-3,3-difluoropropane (HCFC-232fc)</td>
</tr>
</tbody>
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## A.8 Ozone Depleting Chemicals (CONTINUED)

<table>
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<tr>
<th>CAS</th>
<th>Substance Name</th>
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<tbody>
<tr>
<td>134237-40-4</td>
<td>Trichlorotrifluoropropane (HCFC-233)</td>
</tr>
<tr>
<td>7125-84-0,</td>
<td>1,1,1-Trichloro-3,3,3-trifluoropropane (HCFC-233fb)</td>
</tr>
<tr>
<td>7125-83-9</td>
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<tr>
<td>127564-83-4</td>
<td>Dichlorotetrafluoropropane (HCFC-234)</td>
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<tr>
<td>425-94-5</td>
<td>1,2-Dichloro-1,2,3,3-tetrafluoropropane (HCFC-234)</td>
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<tr>
<td>134237-41-5</td>
<td>Chloropentafluoropropane (HCFC-235)</td>
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<tr>
<td>460-92-4</td>
<td>1-Chloro-1,1,3,3,3-pentafluoropropane (HCFC-235fa)</td>
</tr>
<tr>
<td>134190-49-1</td>
<td>Tetrachlorofluoropropane (HCFC-241)</td>
</tr>
<tr>
<td>666-27-3</td>
<td>1,1,2,3-Tetrahalo-1-fluoropropane (HCFC-241db)</td>
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<tr>
<td>134237-42-6</td>
<td>Trichlorodifluoropropane (HCFC-242)</td>
</tr>
<tr>
<td>460-63-9</td>
<td>1,3,3,Trichloro-1,1-difluoropropane (HCFC-242fa)</td>
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<tr>
<td>134237-43-7</td>
<td>Dichlorotrifluoropropane (HCFC-243)</td>
</tr>
<tr>
<td>7125-99-7</td>
<td>1,1-dichloro-1,2,2-trifluoropropane</td>
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<tr>
<td>338-75-0</td>
<td>2,3-dichloro-1,1,1-trifluoropropane</td>
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<tr>
<td>460-69-5</td>
<td>3,3-dichloro-1,1,1-trifluoropropane</td>
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<tr>
<td>134190-50-4</td>
<td>Chlorotetrafluoropropane (HCFC-244)</td>
</tr>
<tr>
<td>679-85-6</td>
<td>3-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244ca)</td>
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<tr>
<td>421-75-0</td>
<td>1-Chloro-1,1,2,2-tetrafluoropropane (HCFC-244cc)</td>
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<tr>
<td>134190-51-5</td>
<td>Trichlorofluoropropane (HCFC-251)</td>
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<tr>
<td>818-99-5</td>
<td>1,1,3-Trichloro-1-fluoropropane (HCFC-251fb)</td>
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<tr>
<td>421-41-0</td>
<td>1,1,2-Trichloro-1-fluoropropane (HCFC-251dc)</td>
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<td>134190-52-6</td>
<td>Dichlorodifluoropropane (HCFC-252)</td>
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<tr>
<td>819-00-1</td>
<td>1,3-Dichloro-1,1-difluoropropane (HCFC-252fb)</td>
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<tr>
<td>134237-44-8</td>
<td>Chlorotrifluoropropane (HCFC-253)</td>
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<tr>
<td>460-35-5</td>
<td>3-chloro-1,1,1-trifluoropropane (HCFC-253fb)</td>
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<tr>
<td>134237-45-9</td>
<td>Dichlorofluoropropane (HCFC-261)</td>
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<tr>
<td>7799-56-6</td>
<td>1,1-Dichloro-1-fluoropropane (HCFC-261fc)</td>
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<tr>
<td>420-97-3</td>
<td>1,2-Dichloro-2-fluoro-propane (HCFC-261ba)</td>
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<td>134190-53-7</td>
<td>Chlorodifluoropropane (HCFC-262)</td>
</tr>
<tr>
<td>420-99-5</td>
<td>1-Chloro-2,2-difluoropropane (HCFC-262ca)</td>
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<tr>
<td>102738-79-4</td>
<td>2-Chloro-1,3-difluoropropane (HCFC-262da)</td>
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<tr>
<td>421-02-3</td>
<td>1-Chloro-1,1-difluoropropane (HCFC-262fc)</td>
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<td>134190-54-8</td>
<td>Chlorofluoropropane (HCFC-271)</td>
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<tr>
<td>420-44-0</td>
<td>2-Chloro-2-fluoropropane (HCFC-271ba)</td>
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<tr>
<td>430-55-7</td>
<td>1-Chloro-1-fluoropropane (HCFC-271fb)</td>
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### A.9 Perfluorocarbons (PFCs)

<table>
<thead>
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<th>CAS</th>
<th>Substance Name</th>
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<tbody>
<tr>
<td>75-73-0</td>
<td>Tetrafluoromethane (CF4)</td>
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<tr>
<td>76-16-4</td>
<td>Hexafluoroethane (C2F6)</td>
</tr>
<tr>
<td>76-19-7</td>
<td>Octafluoropropane (C3F8)</td>
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<tr>
<td>355-25-9</td>
<td>Perfluorobutane (C4F10)</td>
</tr>
<tr>
<td>115-25-3</td>
<td>Perfluorocyclobutane (C4F8)</td>
</tr>
<tr>
<td>678-26-2</td>
<td>Perfluoropentane (C5F12)</td>
</tr>
<tr>
<td>355-42-0</td>
<td>Perfluorohexane (C6F14)</td>
</tr>
<tr>
<td>335-57-9</td>
<td>Perfluorohexane (C6F14)</td>
</tr>
<tr>
<td>307-34-6</td>
<td>Perfluoroctane (C8F18)</td>
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### A.10 Perfluorohexanoic Acid (PFHxA)

<table>
<thead>
<tr>
<th>CAS</th>
<th>Substance Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>307-24-4</td>
<td>Perfluorohexanoic Acid</td>
</tr>
<tr>
<td>335-56-8</td>
<td>1-Bromoperfluorohexane</td>
</tr>
<tr>
<td>355-43-1</td>
<td>Perfluorohexyl Iodide</td>
</tr>
<tr>
<td>375-82-6</td>
<td>1H,1H-Perfluoro-1-Heptanol</td>
</tr>
<tr>
<td>647-42-7</td>
<td>2-(Perfluorohexyl)ethanol</td>
</tr>
<tr>
<td>2043-57-4</td>
<td>1,1,2,2,3,3,4,4,5,5,6,6-Tridecafluoro-8-iodooctane</td>
</tr>
<tr>
<td>2144-53-8</td>
<td>2-(Perfluorohexyl)ethyl methacrylate</td>
</tr>
<tr>
<td>17527-29-6</td>
<td>Perfluorohexylethyl acrylate</td>
</tr>
<tr>
<td>21615-47-4</td>
<td>Ammonium perfluorohexaoxate</td>
</tr>
<tr>
<td>25291-17-2</td>
<td>(Perfluorohexyl)ethylene</td>
</tr>
<tr>
<td>27619-89-2</td>
<td>3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoroctane-1-sulfonyl chloride</td>
</tr>
<tr>
<td>27619-97-2</td>
<td>6:2 Fluorotelomer sulfonate</td>
</tr>
<tr>
<td>34455-29-3</td>
<td>2-[dimethyl-[3-(3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoroctylsulfonylamino)propyl]azaniumyl] acetate</td>
</tr>
<tr>
<td>38550-34-4</td>
<td>1,1,1,2,2,3,3,4,4,5,5,6,6-Tridecafluoro-8-iodononane</td>
</tr>
<tr>
<td>38565-52-5</td>
<td>3-perfluorohexyl-1,2-epoxopropane</td>
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<tr>
<td>49859-70-3</td>
<td>2-[Methyl[(perfluorohexyl)ethy1sulfonylamino]ethyl 2-propenoate</td>
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<tr>
<td>51851-37-7</td>
<td>Perfluoroctyl triethoxysilane</td>
</tr>
<tr>
<td>59587-38-1</td>
<td>Potassium 3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoroctanesulphonate</td>
</tr>
<tr>
<td>68391-08-2</td>
<td>2-Perfluoroalkyl (C6-C12) ethanol</td>
</tr>
<tr>
<td>73609-36-6</td>
<td>Dichloromethyl(3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoroctyl)silane</td>
</tr>
<tr>
<td>78560-45-9</td>
<td>Trichloro(perfluorohexyl)ethyl)silane</td>
</tr>
<tr>
<td>80475-32-7</td>
<td>N-3-(Dimethylamino)propyl)-3,3,4,4,5,5,6,6,7,8,8,8-Tridecafluoroctanesulphonamide N-oxide</td>
</tr>
<tr>
<td>85857-16-5</td>
<td>1H,1H,2H,2H-Perfluoroctyltrimethoxysilane</td>
</tr>
<tr>
<td>85857-17-6</td>
<td>Dimethoxymethyl((perfluorohexyl)ethyl)silane</td>
</tr>
<tr>
<td>85995-91-1</td>
<td>Alkyl iodides, C8-14, γ-ω-perfluoro</td>
</tr>
<tr>
<td>90622-71-2</td>
<td>Alkyl iodides, C6-18, perfluoro</td>
</tr>
<tr>
<td>182176-52-9</td>
<td>Ethaneperoxic acid, reaction products with</td>
</tr>
<tr>
<td></td>
<td>3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-Heptadecafluoroctetyl thiocyanate and</td>
</tr>
<tr>
<td></td>
<td>3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluoroctetyl thiocyanate</td>
</tr>
<tr>
<td>132182-92-4</td>
<td>3-Methoxyperfluoro(2-methylpentane)</td>
</tr>
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</table>
A.11 Perfluorohexane Sulfonate (PFHxS)

<table>
<thead>
<tr>
<th>CAS</th>
<th>Substance Name</th>
</tr>
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<tbody>
<tr>
<td>355-46-4</td>
<td>Perfluorohexanesulfonic Acid</td>
</tr>
<tr>
<td>3871-99-6</td>
<td>Potassium perfluorohexanesulfonate</td>
</tr>
<tr>
<td>68259-08-5</td>
<td>Tridecafluoro-1-hexanesulfonic acid, ammonium salt</td>
</tr>
<tr>
<td>70225-16-0</td>
<td>Bis(2-hydroxyethyl)ammonium perfluorohexanesulfonate</td>
</tr>
</tbody>
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A.12 Perfluorooctanoic Acid (PFOA)

<table>
<thead>
<tr>
<th>CAS</th>
<th>Substance Name</th>
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</thead>
<tbody>
<tr>
<td>2395-00-8</td>
<td>PFOA Potassium Salt</td>
</tr>
<tr>
<td>3108-24-5</td>
<td>Ethyl PFOA</td>
</tr>
<tr>
<td>335-67-1</td>
<td>PFOA</td>
</tr>
<tr>
<td>335-66-0</td>
<td>Perfluorooctanoyl fluoride</td>
</tr>
<tr>
<td>335-93-3</td>
<td>PFOA Silver Salt</td>
</tr>
<tr>
<td>335-95-5</td>
<td>PFOA Sodium Salt</td>
</tr>
<tr>
<td>376-27-2</td>
<td>Methyl PFOA</td>
</tr>
<tr>
<td>3825-26-1</td>
<td>PFOA Ammonium Salt</td>
</tr>
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A.13 Perfluorooctane Sulfonates (PFOS)

<table>
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<th>CAS</th>
<th>Substance Name</th>
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<tbody>
<tr>
<td>144089-15-6</td>
<td>PFOS Tetraethylammonium salt</td>
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<tr>
<td>1691-99-2</td>
<td>N-ethylheptadecafluoro-n-(2-hydroxyethyl)octanesulphonamide</td>
</tr>
<tr>
<td>1763-23-1</td>
<td>Perfluorooctane sulfonic acid</td>
</tr>
<tr>
<td>2355-31-9</td>
<td>N-[heptadecafluoroctyl] sulfonyl]-n-methyl-glycine</td>
</tr>
<tr>
<td>24448-09-7</td>
<td>Heptadecafluoro-n-(2-hydroxyethyl)-n-methyloctanesulphonamide</td>
</tr>
<tr>
<td>251099-16-8</td>
<td>1-Decanaminium, N-decyl-N,N-dimethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonate</td>
</tr>
<tr>
<td>2795-39-3</td>
<td>Potassium perfluorooctanesulfonate</td>
</tr>
<tr>
<td>2806-24-8</td>
<td>Perfluorooctane sulfonamidoacetic acid</td>
</tr>
<tr>
<td>29081-56-9</td>
<td>Ammonium heptadecafluoroctanesulphonate</td>
</tr>
<tr>
<td>29457-72-5</td>
<td>Lithium perfluorooctane sulfonate</td>
</tr>
<tr>
<td>2991-50-6</td>
<td>N-ethyl-n-((heptadecafluoroctyl)sulfonyl)-glycine</td>
</tr>
<tr>
<td>307-35-7</td>
<td>Perfluorooctanesulfonyl fluoride</td>
</tr>
<tr>
<td>31506-32-8</td>
<td>Heptadecafluoro-N-methyloctanesulphonamide</td>
</tr>
<tr>
<td>4021-47-0</td>
<td>PFOS Sodium Salt</td>
</tr>
<tr>
<td>45298-90-6</td>
<td>PFOS Ion</td>
</tr>
<tr>
<td>56773-42-3</td>
<td>Tetraethylammonium perfluorooctanesulfonate</td>
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<tr>
<td>70225-39-5</td>
<td>diethanolamine perfluorooctanesulfonate</td>
</tr>
<tr>
<td>754-91-6</td>
<td>Perfluorooctanesulfonamide</td>
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### A.14 Phthalates

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<th>CAS</th>
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<tbody>
<tr>
<td>117-81-7</td>
<td>Diethylhexyl phthalate (DEHP)</td>
</tr>
<tr>
<td>117-82-8</td>
<td>Bis-(2-methoxyethyl) phthalate (DMEP)</td>
</tr>
<tr>
<td>117-84-0</td>
<td>Di-n-Octyl phthalate (DNOP)</td>
</tr>
<tr>
<td>131-11-3</td>
<td>Dimethyl phthalate (DMP)</td>
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<tr>
<td>131-16-8</td>
<td>Di-n-propylphthalate (DnPrP)</td>
</tr>
<tr>
<td>131-18-0</td>
<td>Di-n-pentyl phthalate (DnP)</td>
</tr>
<tr>
<td>26761-40-0</td>
<td>Di-isodecyl phthalate (DIDP)</td>
</tr>
<tr>
<td>27554-26-3</td>
<td>Di-isooctylphthalate (DIOp)</td>
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<tr>
<td>28553-12-0</td>
<td>Diisononyl phthalate (DINP)</td>
</tr>
<tr>
<td>605-50-5</td>
<td>Di-iso-pentyl phthalate (DIPP)</td>
</tr>
<tr>
<td>68515-42-4</td>
<td>1,2-Benzenedicarboxylic acid, di-C9-11-branched and linear alkyl esters (DHNUP)</td>
</tr>
<tr>
<td>68515-48-0</td>
<td>1,2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich</td>
</tr>
<tr>
<td>68515-49-1</td>
<td>1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich</td>
</tr>
<tr>
<td>68515-50-4</td>
<td>1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DHP)</td>
</tr>
<tr>
<td>68515-51-5</td>
<td>1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-Benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate</td>
</tr>
<tr>
<td>71850-09-4</td>
<td>1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)</td>
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<tr>
<td>776297-69-9</td>
<td>n-Pentyl-isopentyl phthalate (nPIPP)</td>
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<tr>
<td>84-61-7</td>
<td>Dicyclohexyl phthalate (DCP)</td>
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<tr>
<td>84-66-2</td>
<td>Diethyl phthalate (DEP)</td>
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<tr>
<td>84-69-5</td>
<td>Disobutyl phthalate (DIBP)</td>
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<tr>
<td>84-74-2</td>
<td>Dibutyl phthalate (DBP)</td>
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<tr>
<td>84-75-3</td>
<td>Di-n-hexyl phthalate (DnHP)</td>
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<tr>
<td>84-76-4</td>
<td>Di-n-nonylphthalate (DNP)</td>
</tr>
<tr>
<td>84777-06-0</td>
<td>1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (DPP)</td>
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<tr>
<td>85-68-7</td>
<td>Butylbenzyl phthalate (BBP)</td>
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### A.15 Polycyclic Aromatic Hydrocarbons (PAHs)

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<tbody>
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<td>83-32-9</td>
<td>Acenaphthene</td>
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<tr>
<td>208-96-8</td>
<td>Acenaphthylene</td>
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<tr>
<td>120-12-7</td>
<td>Anthracene</td>
</tr>
<tr>
<td>56-55-3</td>
<td>Benzo(a)anthracene</td>
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<tr>
<td>218-01-9</td>
<td>Benzo(a)phenanthrene (chrysene)</td>
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<tr>
<td>50-32-8</td>
<td>Benzo(a)pyrene</td>
</tr>
<tr>
<td>205-99-2</td>
<td>Benzo(b)fluoranthene</td>
</tr>
<tr>
<td>192-97-2</td>
<td>Benzo(e)pyrene</td>
</tr>
<tr>
<td>191-24-2</td>
<td>Benzo(g,h,i)perylene</td>
</tr>
<tr>
<td>205-82-3</td>
<td>Benzo(j)fluoranthene</td>
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<tr>
<td>207-08-9</td>
<td>Benzo(k)fluoranthene</td>
</tr>
<tr>
<td>206-44-0</td>
<td>Benzo(j,k)fluorene (Fluoranthene)</td>
</tr>
<tr>
<td>189-55-9</td>
<td>Benzo(r,s,t)pentaphene</td>
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<tr>
<td>226-36-8</td>
<td>Dibenz(a,h)acridine</td>
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<td>Dibenz(a,j)acridine</td>
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<td>Dibenzo(a,h)anthracene</td>
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<td>Dibenzo(a,e)fluoranthene</td>
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<td>192-65-4</td>
<td>Dibenzo(a,e)pyrene</td>
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<td>7H-Dibenzo(c,g)carbazole</td>
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<td>86-73-7</td>
<td>Fluorene</td>
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<td>Indeno(1,2,3-cd)pyrene</td>
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<td>3697-24-3</td>
<td>5-Methylchrysene</td>
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<td>Naphthalene</td>
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<td>Cyclopenta(c,d)pyrene</td>
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<tr>
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<td>1-methylpyrene</td>
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