

CHLOROBENZENES

Class or Substance Name

Chlorobenzenes (Chlorinated Benzenes)

Substance List by CAS Number

Chlorobenzenes are a group of twelve chemical substances, each consisting of a benzene ring with one or more hydrogen atoms replaced by chlorine atoms.

108-90-7	Monochlorobenzene (MCB)	108-70-3	1,3,5-trichlorobenzene (1,3,5-TCB)
95-50-1	1,2-dichlorobenzene (1,2-DCB)	634-66-2	1,2,3,4-tetrachlorobenzene (1,2,3,4-TeCB)
541-73-1	1,3-dichlorobenzene (1,3-DCB)	634-90-2	1,2,3,5-tetrachlorobenzene (1,2,3,5-TeCB)
106-46-7	1,4-dichlorobenzene (1,4-DCB)	95-94-3	1,2,4,5-tetrachlorobenzene (1,2,4,5-TeCB)
87-61-6	1,2,3-trichlorobenzene (1,2,3-TCB)	608-93-5	Pentachlorobenzene (PCB)
120-82-1	1,2,4-trichlorobenzene (1,2,4-TCB)	118-74-1	Hexachlorobenzene (HCB)

Description of Use in Apparel and Footwear

Chlorobenzenes are mainly used as intermediates in the synthesis of other chemicals and may be present as impurities in chemical formulations (for example, dyestuffs and biocides).

Chlorobenzenes can be used as dyeing carriers or leveling agents for dyeing, printing and coating of textile and leather materials including fibers, yarns and fabrics. They may also be used as deodorizers, fumigants, degreasers and defoliant.

Dichlorobenzenes are used as insecticides or as solvents for rubber, waxes or disinfection agents. Trichlorobenzenes are used as herbicides, insecticides or as solvents for dyestuffs and other chemical formulations with high melting points.

Legislation around the world restricts the use of some chlorobenzenes in the production of apparel, footwear and accessories. Leading apparel and footwear brands have banned the use of chlorobenzenes in production of their products.

Why are Chlorobenzenes Restricted?¹

- Some chlorobenzenes can be very toxic to aquatic organisms at certain concentrations and may cause long-term adverse effects in the aquatic environment above certain exposure levels.
- Above certain levels, long-term exposure to some chlorobenzenes may result in the development of particular cancers.
- Above certain exposure levels, some chlorobenzenes are toxic by inhalation or skin contact.

Guidance: Sourcing Chlorobenzene-Compliant Materials from Your Material Suppliers (Textiles, Components and Trim Parts)

- Contact your suppliers and explain that you require materials with no intentionally added chlorobenzenes. All materials should contain <1 ppm (0.0001%) of each chlorobenzene.²
 - This includes synthetic textiles and natural/synthetic leather with polymeric coatings or finishes, since chlorobenzenes may be used as a dyeing carrier or leveling agent in the dyeing, printing and coating of synthetic textile and leather materials.
 - Pay special attention to polyester and polyester-blend textiles since chlorobenzenes are often used in the dyeing of these materials.

CHLOROBENZENES MAY BE FOUND IN:

- Textiles and leather materials
- Dyeing carriers
- Dyestuffs
- Leveling agents
- Deodorizers
- Fumigants
- Degreasers
- Insecticides
- Herbicides
- Defoliant

¹ Classification and risk phrases according to European Union Council Directive 67/548/EEC or Directive 1999/45/EC.

² Limit taken from AFIRM Restricted Substances Guidance (<http://www.afirm-group.com/rsi-guidance/>). This is the lowest agreed upon limit on chlorobenzenes in products among AFIRM brands. Check with brands for their individual limits.

- Suppliers who use chlorobenzenes in production for other clients may have contaminated machinery that can introduce these substances into their manufactured materials. Work with suppliers who have phased out the use of chlorobenzenes for all clients.
- Share this information sheet with your material suppliers and instruct them to work with their chemical suppliers to source chlorobenzene-compliant chemical formulations using the guidance in the next section.
- Have your suppliers confirm that their manufactured materials meet the chlorobenzene <1 ppm limit with a certification or, if necessary, by providing a test report from a third-party laboratory.
- Perform risk-based checks of your suppliers' materials by submitting samples to a third-party laboratory for testing to ensure the chlorobenzene <1 ppm limit is not exceeded.

Guidance: Sourcing Chlorobenzene-Compliant Chemical Formulations from Your Chemical Suppliers

- Contact your chemical suppliers and explain that you require chemical formulations with no intentionally added chlorobenzenes. The sum of all chlorobenzenes and chlorotoluenes excluding 1,2-dichlorobenzene, CAS 95-50-1, in chemical formulations should be <200 ppm (0.02%).³
 - Due to its wide use as an intermediate in the manufacture of chemical substances, the limit for 1,2-dichlorobenzene in chemical formulations is <1000 ppm (0.1%). This limit is taken from the ZDHC Manufacturing Restricted Substances List (MRSL) and is the limit on unintended chlorobenzenes and chlorotoluenes in chemical formulations accepted by ZDHC member brands.³
 - Chlorotoluenes are grouped with chlorobenzenes on the MRSL due to chemical similarities. A separate guidance sheet for chlorotoluenes will be available at a later date.
 - Pay special attention to dyeing carrier or leveling agent suppliers who supply chemicals for the dyeing/printing/coating of textile and leather⁴ components including fibres, yarns and fabrics.
- Check the Material Safety Data Sheets (MSDS) of all chemical formulations to ensure that none of the chlorobenzene CAS Numbers above is listed as an ingredient.
- Have your chemical suppliers confirm that their chemical formulations meet the sum of all chlorobenzenes and chlorotoluenes (<200 ppm) and 1,2-dichlorobenzene (<1000 ppm) limits with a certification or, if necessary⁵, by providing a test report from a third-party testing laboratory.
- Perform risk-based checks of your chemical suppliers' formulations by submitting samples to a third-party laboratory for testing to ensure the sum of all chlorobenzenes and chlorotoluenes (<200 ppm) and 1,2-dichlorobenzene (<1000 ppm) limits are not exceeded.
- Discuss with your chemical supplier whether the below safer alternatives are suitable substitutes for your production needs.

Safer Chlorobenzene Alternatives

- Dyeing carriers composed of aromatic esters and substituted phenols.
 - Benzyl benzoate, CAS 120-51-4, is a good alternative dyeing carrier requiring no additional solvents for dilution. Any chosen alternative must be ZDHC MRSL compliant.

³ Limits taken from ZDHC Manufacturing Restricted Substances List (MRSL) (<http://www.roadmaptozero.com/df.php?file=pdf/MRSL.pdf>) and are the limits on unintended chlorobenzenes and chlorotoluenes in chemical formulations accepted by ZDHC member brands. Chlorotoluenes are grouped with chlorobenzenes on the MRSL due to chemical similarities. A separate guidance sheet for chlorotoluenes will be available at a later date.

⁴ The ZDHC MRSL does not apply to chemical formulations intended for leather processing at this time.

⁵ At a later date, ZDHC will publish guidance on when testing of chemical formulations is appropriate.