Chemical Information Sheet
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MONOMERS – STYRENE AND VINYL CHLORIDE

Other Names	Styrene: Ethenylbenzene, vinylbenzene, phenylethene Vinyl Chloride: VCM, chloroethene

CAS Number	Substance
100-42-5	Styrene
75-01-4	Vinyl Chloride

May Be Found In	Styrene: Polystyrene, Acrylonitrile-butadiene-styrene (ABS) plastic, Styrene-butadiene rubber (SBR), styrene-divinylbenzene (S-DVB) Vinyl Chloride: Polyvinyl chloride (PVC), vinyl polymers, plastisol screen prints, plastic parts, coatings for leather, synthetic leather and textiles

Monomers are chemical precursors that link together to create polymer materials. Styrene and vinyl chloride are monomers that may be present in low concentrations in some polymer materials. The presence of these monomers can be related to the process controls during polymer production.

Uses in the Supply Chain

Styrene is a colorless liquid that evaporates easily which may be used to create polymers including polystyrene, ABS plastic, synthetic rubber (SBR) and other materials. Styrene can also be used in plastic packaging and electrical parts.

Vinyl Chloride is used in production of polyvinyl chloride (PVC) and vinyl polymers, which can be hard or flexible materials. PVC can be associated with plastisol screen prints, plastic parts, and a variety of coatings on leather, synthetic leather, and textiles.

Why Monomers Are Restricted

- Legislation in major markets globally restricts or regulates the presence of styrene and vinyl chloride in finished products or materials.
- Monomers can present a variety of worker and consumer risks, dependent upon the specific class of monomer and exposure pathway.
- Chemical hazard information for many chemicals can be found at the following external databases:
  - GESTIS Substance Database: Here (external link)
  - US National Library of Medicine: Here (external link)
  - US OSHA Occupational Chemical Database: Here (external link)

Sourcing Compliant Materials from Your Suppliers

- Contact your suppliers and explain that you require their manufactured materials to be compliant with current AFIRM RSL limits.[1]
- Require suppliers to submit a confirmation of material compliance or a test report from a third-party laboratory.
- When materials are received, consider performing risk-based testing to ensure the current AFIRM RSL limits are met.
- Share this information sheet with your material suppliers so they have full visibility and understand your sourcing requirements.
- Be aware that styrene may be added as a co-polymer to other polymer systems.

Sourcing Compliant Formulations from Your Chemical Suppliers

- For all formulations, request SDS documentation that meets current GHS requirements.
- Contact your suppliers and explain that you require formulations to be compliant with current ZDHC MRSL limits whenever applicable.[2]
- Discuss with your chemical supplier whether any safer alternatives are available that are suitable substitutes for your production needs.
- Prior to procuring any formulation, the chemical properties must be reviewed to ensure that proper protective equipment, chemical storage facilities, facility engineering controls, and associated treatment/disposal facilities are appropriate for the chemical(s).
- Ensure that any processing at your facility will not inadvertently create monomers due to processing under extreme heat, lighting, or other chemical intensive conditions.

Safer Alternatives

- In general, when styrene monomer or vinyl chloride monomer is used to create a polymer, the potential for a small amount of residual monomer is present. Process controls and robust engineering can limit the amount of monomer present in the finished material, so in this case, higher quality materials with non-detectable monomer levels are one type of safer alternative.
- There is also a large variety of polymer materials available that do not contain either of these monomers. Examples of polymers that do not contain styrene or vinyl chloride monomers are polypropylene, polyethylene, polyurethane, polycarbonate, and countless others.

Additional Information

Visit ECHA's Candidate List of substances of very high concern to view dossiers for many restricted substances https://echa.europa.eu/candidate-list-table.

Physical Properties:

- Styrene is a colorless liquid that evaporates easily. In its pure form, styrene has a sweet smell. Manufactured styrene may contain aldehydes, which give it a sharp, unpleasant odor.[3]
- Vinyl Chloride is a colorless gas at room temperature which has a mild, sweet odor at about 3,000 ppm.[4] Acute (short-term) exposure to high levels of vinyl chloride in air has resulted in central nervous system effects (CNS), such as dizziness, drowsiness, and headaches in humans.[5]

References

[1] Apparel and Footwear International RSL Management Group Restricted Substances List (AFIRM RSL) http://afirm-group.com/afirm-rsl/

[2] ZDHC Manufacturing Restricted Substances List (ZDHC MRSL) https://www.roadmaptozero.com/mrsl_online/

[3] Agency for Toxic Substances & Disease Registry: Public Health Statement for Styrene https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=419&toxid=74

[4] Agency for Toxic Substances & Disease Registry: Public Health Statement for Vinyl Chloride https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=280&toxid=51

[5] United States Environmental Protection Agency: Vinyl Chloride Hazard Summary https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/vinyl-chloride.pdf