Dyes – Azo (Forming Restricted Amines)

Other Names:	Common cleaved aromatic amines from azo dyes

CAS Number	Substance
101-14-4	4,4′-methylene-bis-(2-chloro-aniline)
101-77-9	4,4′-methylenedianiline
101-80-4	4,4′-oxydianiline

List continued in “Additional Information”

May Be Found In:
- Textiles
- Leather
- Synthetic leather
- Plastics
- Paper
- Furs

The azo structure is a molecular structure contained in many dyes. Some Azo Dyes have the potential to release carcinogenic aromatic amine(s) when reductive cleavage occurs.

Uses in the Supply Chain

Azo dyes represent by far the most important class of textile dyes. Dyes containing azo structures are a widely-used class of synthetic dyes and pigments. Azo dyes are used in dyeing textile fibres, particularly cotton but also silk, wool, viscose and synthetic fibres, including leather, plastics and paper. They provide clear, strong colours, are considered easy to use, and are relatively cheap. There are approximately 2000 Azo dyes on the market.

Attention should be drawn to the fact that:

Not all azo dyes are able to form aromatic amine (or arryl amines), which are considered substances of high concern through a chemical reaction known as reductive cleavage.

The amine and aniline fragments listed in this document are not directly used in the industry.

A large number of dyes are readily available that will not release the amine or aniline fragments listed in this document.

Why Dyes – Azo (Forming Restricted Amines) are Restricted

- Legislation around the world restricts the use of azo dyes that may release the listed aromatic amines in the production of apparel, footwear and accessories. Within the EU, the treatment of certain textile and leather articles with azo dyes that can release carcinogenic aromatic amines has been prohibited, see Directive 2002/61/EC.
- Above certain levels, long-term exposure to the listed aromatic amines formed as a result of reductive cleavage of some azo dyes may result in the development of particular cancers.
- Some of the aromatic amines are considered to be capable of producing allergies on skin contact, irritating the eyes, and being toxic by inhalation and oral ingestion. These are the main exposure pathways for both consumers and workers.[1]
- Some of the aromatic amines have been considered toxic or very toxic to aquatic organisms and capable of causing long-term adverse effects in the aquatic environment.

Sourcing Compliant Materials from Your Suppliers

- Explain that you require materials to be compliant with current AFIRM RSL limits.[2]
- Request suppliers to submit a confirmation of material compliance and/or a test report from a third-party laboratory. When materials are received, consider performing random, risk-based testing to ensure current AFIRM RSL limits are met.
- Share this guidance sheet with your material suppliers. Using the guidance in the next section, instruct them to work with their chemical suppliers to source dyes and chemical formulations that comply with these requirements. If needed, highlight the existence of harmful substances in materials via chemical management trainings from the ZDHC Academy, existing guidelines, and laws.
- Make sure all your suppliers have a solid chemical management system in place.

Sourcing Compliant Formulations from Your Chemical Formulators

- Explain to chemicals suppliers that you dyes and chemical formulations with no intentionally added azo dyes that cleave restricted aromatic amines. Under reductive conditions, a formulation should not release more than levels stipulated in the ZDHC MRSL, for each aromatic amine.
  - Search for formulations on the ZDHC Gateway Chemical Module. If your preferred formulations are not listed, encourage providers to register their formulations.
  - Ask for a ZDHC ChemCheck report.
- For all formulations, request SDS documentation to ensure none of the CAS Numbers above are listed as ingredients.

Safer Alternatives

Azo dyes that do not cleave to form restricted aromatic amines are available in full colour ranges for all given applications such as textiles, leather, plastics and paper. Work with your chemical and dye suppliers to confirm any chosen alternatives comply with the limits stated above and any brand specific limits.

Additional Information

List of chemical names and CAS Numbers:

CAS Number	Substance
101-14-4	4,4’-methylene-bis-(2-chloro-aniline)
101-77-9	4,4’-methylenedianiline
101-80-4	4,4’-oxydianiline
106-47-8	4-chloroaniline
119-90-4	3,3’-dimethoxylbenzidine
119-93-7	3,3’-dimethylbenzidine
120-71-8	6-methoxy-m-toluidine
137-17-7	2,4,5-trimethylaniline
139-65-1	4,4’-thiodianiline
60-09-3	4-aminoazobenzene
615-05-4	4-methoxy-m-phenylenediamine
838-88-0	4,4’-methylenedi-o-toluidine
87-62-7	2,6-xylidine
90-04-0	o-anisidine
91-59-8	2-naphthylamine
91-94-1	3,3’-dichlorobenzidine
92-67-1	4-aminodiphenyl
92-87-5	Benzidine
95-53-4	o-toluidine
95-68-1	2,4-Xylidine
95-69-2	4-chloro-o-toluidine
95-80-7	4-methyl-m-phenylenediamine
97-56-3	o-aminoazotoluene
99-55-8	5-nitro-o-toluidine
118685-33-9	Component 1: C39H23Cl- CrN7O12S 2Na
Not Allocated	Component 2: C46H-30CrN10O20S2 3Na

References

1 Opinion on Risk of Cancer Caused by Textiles and Leather Goods Coloured with Azo-dyes Expressed at the 7th Cstee Plenary Meeting, Brussels, 18 January 1999.

2 Apparel and Footwear International RSL Management Group (Ed.). (2018, January 31). Restricted Substances List (Rep.). Retrieved http://afirm-group.com/afirm-rsl/.

Disclaimer

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