Chemical Information Sheet
Version 3.0 | March 2021

AZO-AMINES & ARYLAMINE SALTS

Other Names See substance names below

CAS Number	Substance
101-14-4	4,4'-methylene-bis-(2-chloroaniline)
101-77-9	4,4'diaminodiphenylmethane
101-80-4	4,4'-oxydianiline

List continued in "Additional Information"

May Be Found In

- Textiles
- Leather
- Synthetic leather
- Plastics
- Paper

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

Dyes containing azo structures are a widely-used class of synthetic dyes and pigments. They may be used in the dyeing of a range of materials including textiles, leather, plastics and paper. Their uses in textiles include nylon, wool, silk, polyester, acetate, cotton, rayon, and linen.

However, the amine and aniline fragments listed in this document are not directly used in industry. Under the appropriate conditions, certain Azo Dyes can break down through a process called reductive cleavage, resulting in a chemical fragment listed in this document.

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

Why Certain Azo Dyes and Arylamine Salts are Restricted

- 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.
- The main sources of exposure to restricted azo dyes identified for both consumers and workers are oral ingestion, dermal absorption and inhalation.[1]
- 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.

Sourcing Compliant Materials from Your Suppliers

- Contact your suppliers and explain that you require their manufactured materials to be compliant with the current AFIRM RSL limits and contain no intentionally added restricted azo dyes.[2]
- 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 and the limit for cleavable aromatic amines is not exceeded.

- Share this information sheet with your material suppliers and instruct them to work with their dyestuff and chemical suppliers to source azo dye-compliant dyes and chemical formulations using guidance in the next section.

Sourcing Compliant Formulations from Your Chemical Suppliers

- Contact your dye and chemical suppliers and explain that you require dyes and chemical formulations with no intentionally added azo dyes that cleave restricted aromatic amines. The formulation should, under reductive conditions, not release more than the allowable ZDHC MRSL limit for each aromatic amine.[3]
- Have your dyestuff and chemical suppliers confirm that their chemical formulations meet the cleavable aromatic amine ZDHC MRSL limits with a certification or, if necessary, by providing a test report from a third-party testing laboratory.[3]
- Perform risk-based checks of your suppliers' dyes and chemical formulations by submitting samples to a third-party laboratory for testing to ensure the ZDHC MRSL limit for each restricted cleavable amine is not exceeded.[3]
- Share this guidance sheet with your dye and chemical suppliers and instruct them to provide compliant dyestuffs.
- For all formulations, request SDS documentation that meets current GHS requirements.
- 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).

Safer Alternatives

- Azo dyes that do not cleave to form restricted aromatic amines are available in full color ranges for textiles, leather, plastics and paper. Work with your chemical and dye suppliers to confirm that any chosen alternative is compliant with the limits stated above as well as any brand specific limits.

Additional Information

Continued list of CAS numbers and substance names from first page:

CAS Number	Substance	CAS Number	Substance
106-47-8	4-chloroaniline	**87-62-7**	2,6-xylidine
119-90-4	3,3'-dimethoxybenzidine	**90-04-0**	o-anisidine, 2-methoxyaniline
119-93-7	3,3'-dimethylbenzidine	**91-59-8**	2-naphthylamine
120-71-8	p-cresidine	**91-94-1**	3,3'-dichlorobenzidine
137-17-7	2,4,5-trimethylaniline	**92-67-1**	4-aminobiphenyl
139-65-1	4,4'-thiodianiline	**92-87-5**	Benzidine
60-09-3	p-aminoazobenzene	**95-53-4**	o-toluidine
615-05-4	2,4-diaminodiphenylmethane	**95-68-1**	2,4-Xylidine
838-88-0	4,4'-methylenedi-o-toluidine	**95-69-2**	4-chloro-o-toluidine
3165-93-3	4-Chloro-o-toluidinium chloride	**95-80-7**	2,4 toluenediamine
39156-41-7	4-methoxy-m-phenylene diammonium sulphate	**97-56-3**	o-aminoazotoluene
553-00-4	2-Naphthylammoniumacetate	**99-55-8**	2-amino-4-nitrotoluene
21436-97-5	2,4,5-Trimethylaniline hydrochloride		

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 Restricted Substances List (AFIRM RSL) http://afirm-group.com/afirm-rsl/

[3] ZDHC Manufacturing Restricted Substances List https://www.roadmaptozero.com/mrsl_online/