



## AZO-AMINES & ARYLAMINE SALTS

**Other Names** NA, see substances below

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"

<b>May Be Found In</b>	<ul style="list-style-type: none"><li>▪ Textiles</li><li>▪ Leather</li><li>▪ Synthetic leather</li><li>▪ Plastics</li><li>▪ Paper</li></ul>
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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 that will not release the amine or aniline fragments listed in this document are readily available.

### Why Azo Dyes 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.<sup>1</sup>
- 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 materials with no intentionally added restricted azo dyes.
- 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.
- Perform risk-based checks of your suppliers' materials by submitting samples to a third-party laboratory for testing to ensure the limit for cleavable aromatic amines is not exceeded.

### Sourcing Compliant Formulations from Your Chemical Suppliers



## Chemical Information Document

Version 2.0 August 2019

- 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 150 ppm (0.015%) of each aromatic amine.<sup>2, 3</sup>
- Have your dyestuff and chemical suppliers confirm that their chemical formulations meet the cleavable aromatic amine (<150 ppm) limits with a certification or, if necessary, by providing a test report from a third-party testing laboratory.
- Perform risk-based checks of your suppliers' dyes and chemical formulations by submitting samples to a third-party laboratory for testing to ensure the < 150 ppm limit for each restricted cleavable amine is not exceeded.
- Share this guidance sheet with your dye and chemical suppliers and instruct them to provide compliant dyestuffs.

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### 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

Full list of chemical names and CAS numbers

CAS Number	Substance	CAS Number	Substance
101-14-4	4,4'-methylene-bis-(2-chloro-aniline)	87-62-7	2,6-xylydine
101-77-9	4,4'-methylenedianiline	90-04-0	o-anisidine
101-80-4	4,4'-oxydianiline	91-59-8	2-naphthylamine
106-47-8	4-chloroaniline	91-94-1	3,3'-dichlorobenzidine
119-90-4	3,3'-dimethoxybenzidine	92-67-1	4-aminodiphenyl
119-93-7	3,3'-dimethylbenzidine	92-87-5	Benzidine
120-71-8	6-methoxy-m-toluidine	95-53-4	o-toluidine
137-17-7	2,4,5-trimethylaniline	95-68-1	2,4-Xylydine
139-65-1	4,4'-thiodianiline	95-69-2	4-chloro-o-toluidine
60-09-3	4-aminoazobenzene	95-80-7	4-methyl-m-phenylenediamine
615-05-4	4-methoxy-m-phenylenediamine	97-56-3	o-aminoazotoluene
838-88-0	4,4'-methylenedi-o-toluidine	99-55-8	5-nitro-o-toluidine
3165-93-3	4-Chloro-o-toluidinium chloride	553-00-4	2-Naphthylammoniumacetate
39156-41-7	2,4-Diaminoanisole sulphate	21436-97-5	2,4,5-Trimethylaniline hydrochloride

### References

<sup>1</sup> Opinion on Risk of cancer caused by textiles and leather goods coloured with azo-dyes expressed at the 7th CSTE plenary meeting, Brussels, 18 January 1999.



Chemical Information Document

Version 2.0 August 2019

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<sup>2</sup> Online ZDHC Manufacturing Restricted Substances List (ZDHC e-MRSL) Version 1.1. (Retrieved April 2019)<sup>3</sup>  
[https://www.roadmaptozero.com/mrsl\\_online/](https://www.roadmaptozero.com/mrsl_online/)

<sup>3</sup> The following chemicals are not found in the ZDHC e-MRSL: 4-Chloro-o-toluidinium chloride, 2-Naphthylammoniumacetate, 2,4-Diaminoanisole sulphate, and 2,4,5-Trimethylaniline hydrochloride