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Volume 16

Some Aromatic Amines and Related Nitro Compounds (Hair Dyes, Colouring Agents and Miscellaneous Industrial Chemicals)

Hair Dyes

4-Amino-2-nitrophenol
2,4-Diaminoanisole (sulfate)
1,2-Diamino-4-nitrobenzene
2,4-Diaminotoluene
2,5-Diaminotoluene (sulfate)
meta-Phenylenediamine (hydrochloride)
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Colouring Agents

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Benzyl violet 4B
Blue VRS
Brilliant blue FCF diammonium and disodium salts
Fast green FCF
Guinea green B
Light green SF
Rhodamine B
Rhodamine 6G

Miscellaneous Industrial Chemicals

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Anthranilic Acid
Cinnamyl anthranilate
N,N-Diacetylbenzidine
4,4'-Diaminodiphenyl ether
3,3'-Dichloro-4,4'-diaminodiphenyl ether
2,4'-Diphenyldiamine
5-Nitroacenaphthene

N-Phenyl-2-naphthylamine
4,4'-Thiodianiline
ortho-Toluidine (hydrochloride)
2,4-Xylidine (hydrochloride)
2,5-Xylidine (hydrochloride)

Last updated: 26 March 1998

4-AMINO-2-NITROPHENOL

VOL.: 16 (1978) (p. 43)

CAS No.: 119-34-6

5. Summary of Data Reported and Evaluation

5.1 Animal data

In the only available study, 4-amino-2-nitrophenol mixed with CI Acid Black 107 (an azo-dye metal complex) was tested in mice by skin application. No data on 4-amino-2-nitrophenol alone were available. No evaluation of its carcinogenicity can be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered').

Subsequent evaluation: Suppl. 7 (1987) (p. 57: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 4-Hydroxy-3-nitroaniline
- 2-Nitro-4-aminophenol
- Furrine 57
- Furrine Brown PR
- Furrine Brown propyl
- *ortho*-Nitro-*para*-aminophenol

2,4-DIAMINOANISOLE (SULFATE)

VOL.: 16 (1978) (p. 51)

5. Summary of Data Reported and Evaluation

5.1 Animal data

2,4-Diaminoanisole sulfate present in a commercial hair-dye formulation or in an experimental formulation similar to those used as hair dyes was inadequately tested by skin application in mice and rats. No data on 2,4-diaminoanisole or its sulfate alone were available. No evaluation of the carcinogenicity of these compounds could be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered').

Subsequent evaluations: [Vol. 27 \(1982\)](#); Suppl. 7 (1987) (p. 61: **Group 2B**); [Vol. 79 \(2001\)](#)

For definition of Groups, see [Preamble Evaluation](#).

Last updated: 26 March 1998

1,2-DIAMINO-4-NITROBENZENE

VOL.: 16 (1978) (p. 63)

CAS No.: 99-56-9

Chem. Abstr. Name: 4-Nitro-1,2-benzenediamine

5. Summary of Data Reported and Evaluation

5.1 Animal data

In the only available study, a hair-dye formulation containing 1,2-diamino-4-nitrobenzene mixed with 1,4-diamino-2-nitrobenzene was tested in mice by skin application. No data on 1,2-diamino-4-nitrobenzene alone were available. No evaluation of the carcinogenicity of this compound can be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered').

Subsequent evaluation: Suppl. 7 (1987) (p. 61: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 2-Amino-4-nitroaniline
- 4-Nitro-1,2-diaminobenzene
- 4-Nitro-1,2-phenylenediamine
- 4-Nitro-*ortho*-phenylenediamine
- *para*-Nitro-*ortho*-phenylenediamine

2,4-Diaminotoluene

VOL.: 16 (1978) (p. 83)

CAS No.: 95-80-7

Chem. Abstr. Name: 4-Methyl-1,3-benzenediamine

5. Summary of Data Reported and Evaluation

5.1 Animal data

2,4-Diaminotoluene is carcinogenic in rats after its oral administration, producing hepatocellular carcinomas, and after its subcutaneous injection, inducing local sarcomas.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered').

Subsequent evaluation: Suppl. 7 (1987) (p. 61: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 3-Amino-*para*-toluidine
- 5-Amino-*ortho*-toluidine
- Azogen Developer H
- Benzofur NT
- Developer B
- 1,3-Diamino-4-methylbenzene
- 2,4-Diamino-1-methylbenzene
- Diaminotoluene
- 2,4-Diaminotoluol
- Eucanine GB
- Fouramine
- Fouramine J
- Furrine 94
- Furrine M
- 4-Methyl-*meta*-phenylenediamine
- Nako TMT
- MTD
- Pelagol Grey J
- Pelagol J
- Pontamine Developer TN
- Renal MD
- Tertral G
- Toluene-2,4-diamine
- 2,4-Toluenediamine
- *meta*-Toluenediamine
- 2,4-Toluylenediamine
- *meta*-Toluylenediamine
- Tolyene-2,4-diamine
- 2,4-Toluylenediamine

- 4-*meta*-Tolylenediamine
- *meta*-Tolylenediamine
- Zoba CM

Last updated: 26 March 1998

2,5-DIAMINOTOLUENE (SULFATE)

VOL.: 16 (1978) (p. 97)

2,5-Diaminotoluene

CAS No.: 95-70-5

Chem. Abstr. Name: 2-Methyl-1,4-benzenediamine

2,5-Diaminotoluene sulfate

CAS No.: 6369-59-1

Chem. Abstr. Name: 2-Methyl-1,4-benzenediamine sulfate

5. Summary of Data Reported and Evaluation

5.1 Animal data

2,5-Diaminotoluene sulfate in commercial hair-dye formulations, or in experimental mixtures similar to those used as hair dyes, was inadequately tested by skin application on mice and rats. No data on 2,5-diaminotoluene or 2,5-diaminotoluene sulfate alone were available. No evaluation of their carcinogenicity can be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered').

Subsequent evaluation: Suppl. 7 (1987) (p. 61: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for 2,5-Diaminotoluene

- 4-Amino-2-methylaniline
- 2-Methyl-*para*-phenylenediamine
- Toluene-2,5-diamine
- *para*-Toluenediamine
- Toluylene-2,5-diamine
- *para*-Tolylenediamine
- *para,meta*-Tolylenediamine

Synonyms for 2,5-Diaminotoluene sulfate

- Fouramine STD
 - 2-Methyl-*para*-phenylenediamine sulfate
 - Toluene-2,5-diamine sulfate
 - *para*-Toluenediamine sulfate
 - Toluylene 2,5-diamine sulfate
 - *para*-Tolylenediamine sulfate
 - *para*-Tolylenediamine sulfate
 - *para,meta*-Tolylenediamine sulfate
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Last updated: 26 March 1998

***meta*-PHENYLENEDIAMINE (HYDROCHLORIDE)**

VOL.: 16 (1978) (p. 111)

***meta*-Phenylenediamine**

CAS No.: 108-45-2

Chem. Abstr. Name: 1,3-Benzenediamine

***meta*-Phenylenediamine (hydrochloride)**

CAS No.: 541-69-5

Chem. Abstr. Name: 1,3-Benzenediamine hydrochloride

5. Summary of Data Reported and Evaluation

5.1 Animal data

meta-Phenylenediamine as a constituent of a hair-dye formulation was inadequately tested in mice by skin painting. *meta*-Phenylenediamine and its hydrochloride were inadequately tested in rats by subcutaneous injection. No evaluation of the carcinogenicity of this compound or of its hydrochloride can be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered').

Subsequent evaluation: Suppl. 7 (1987) (p. 70: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for *meta*-Phenylenediamine

- 3-Aminoaniline
- *meta*-Aminoaniline
- *meta*-Benzenediamine
- Developer C
- Developer H
- Developer M
- 1,3-Diaminobenzene
- *meta*-Diaminobenzene
- Direct Brown BR
- Direct Brown GG
- 1,3-Phenylenediamine

Synonyms for *meta*-Phenylenediamine (hydrochloride)

- 3-Aminoaniline dihydrochloride
- *meta*-Aminoaniline dihydrochloride
- *meta*-Benzenediamine dihydrochloride
- 1,3-Diaminobenzene dihydrochloride
- *meta*-Diaminobenzene dihydrochloride
- 1,3-Phenylenediamine dihydrochloride

Last updated: 26 March 1998

***para*-PHENYLENEDIAMINE (HYDROCHLORIDE)**

VOL.: 16 (1978) (p. 125)

***para*-Phenylenediamine**

CAS No.: 106-50-3

Chem. Abstr. Name: 1,4-Benzenediamine

***para*-Phenylenediamine hydrochloride**

CAS No.: 624-18-0

Chem. Abstr. Name: 1,4-Benzenediamine dihydrochloride

5. Summary of Data Reported and Evaluation

5.1 Animal data

para-Phenylenediamine has been inadequately tested in mice by skin application and in rats by oral and subcutaneous administration. Studies in mice in which *para*-phenylenediamine as a constituent of hair-dye preparations was tested by skin application cannot be evaluated. No evaluation of the carcinogenicity of this compound can be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group (see, however, 'General Remarks on the Substances Considered', in this volume).

Subsequent evaluation: Suppl. 7 (1987) (p. 70: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for *para*-Phenylenediamine

- 4-Aminoaniline
- *para*-Aminoaniline
- BASF Ursol D
- *para*-Benzenediamine
- Benzofur D
- Developer PF
- 1,4-Diaminobenzene
- *para*-Diaminobenzene
- Durafur Black R
- Fouramine D
- Furrine 1
- Furrine D
- Fur Black 41867
- Fur Brown 41866
- Furro D
- Fur Yellow
- Futramine D
- Nako H
- Orsin
- Pelagol D
- Pelagol DR

- Pelagol Grey D
- Peltol D
- 1,4-Phenylenediamine
- Renal PF
- Santoflex LC
- Tertral D
- Ursol D
- Zoba Black D

Synonyms for *para*-Phenylenediamine hydrochloride

- 4-Aminoaniline dihydrochloride
- *para*-Aminoaniline dihydrochloride
- *para*-Benzenediamine dihydrochloride
- 1,4-Diaminobenzene dihydrochloride
- *para*-Diaminobenzene dihydrochloride
- Durafur Black FC
- Furrine 64
- Furrine DS
- Pelagol CD
- Pelagol Grey CD
- 1,4-Phenylenediamine dihydrochloride
- *para*-Phenylenediamine dihydrochloride

Last updated: 26 March 1998

ACRIDINE ORANGE

VOL.: 16 (1978) (p. 145)

CAS No.: 494-38-2

Chem. Abstr. Name: *N,N,N',N'*-Tetramethyl-3,6-acridinediamine

5. Summary of Data Reported and Evaluation

5.1 Animal data

Acridine orange has been tested in mice by skin application, in mice and rats by repeated subcutaneous injection and in mice by single intraperitoneal injection followed by skin application of croton oil. The available data are insufficient for an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 56: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Acridine Orange base
- Acridine Orange NO
- 3,6-Bis(dimethylamino)acridine
- 3,6-bis-diethylaminoacridine
- 3,6-Di(dimethylamino)acridine
- Brilliant Acridine Orange E
- Euchrysine
- Rhoduline Orange N
- Rhoduline Orange NO
- Waxoline Orange A

BENZYL VIOLET 4B

VOL.: 16 (1978) (p. 153)

CAS No.: 1694-09-3

Chem. Abstr. Name: *N*-(4-{[4-(Dimethylamino)phenyl][4-{ethyl[(3-sulfophenyl)methyl]amino}-phenyl]methylene}-2,5-cyclohexadien-1-ylidene)-*N*-ethyl-3-sulfobenzenemethanaminium hydroxide inner salt, sodium salt

5. Summary of Data Reported and Evaluation

5.1 Animal data

Benzyl violet 4B is carcinogenic in rats following its oral or subcutaneous administration: it produced mammary carcinomas and squamous-cell carcinomas of the skin after its oral administration to female rats and local fibrosarcomas following its subcutaneous injection in male and female rats. It also increased the incidence of benign mammary tumours in female rats following ambient exposure.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 58: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Acid violet 6B
- Acid Fast Violet 5BN
- Acid Violet
- Acid Violet 4BNS
- Acid Violet 5B
- Acid Violet 6B
- Acid Violet S
- Acilan Violet S4BN
- A. F. Violet No. 1
- Aizen Acid Violet 5BH
- Aizen Food Violet No. 1
- Benzyl Violet
- Benzyl Violet 3B
- Calcocid Violet 4BNS
- C.I. Acid Violet 49, sodium salt
- Cogilor Violet 411.12
- Coomassie Violet
- D and C Violet No. 1
- Dispersed Violet 12197
- Eriosin Violet 3B
- Fast Acid Violet 5BN
- FD and C Violet No. 1
- Formyl Violet S4BN
- Hidacid Wool Violet 5B
- Intracid Violet 4BNS
- Kiton Violet 4BNS

- Pergacid Violet 2B
- Pergacid Violet 3B
- Polaxal Violet 6B
- Solar Violet 5BN
- Tertracid Brilliant Violet 6B
- 11386 Violet
- Violet Acid 5B
- Violet 6B
- Violet No. 1
- Wool Violet 4BN
- Wool Violet 5BN

Last updated: 26 March 1998

BLUE VRS

VOL.: 16 (1978) (p. 163)

CAS No.: 129-17-9

Chem. Abstr. Name: *N*-(4-[[4-(Diethylamino)phenyl][2,4-disulfophenyl]methylene]-2,5-cyclohexadien-1-ylidene)-*N*-ethylethanaminium hydroxide inner salt, sodium salt

5. Summary of Data Reported and Evaluation

5.1 Animal data

Blue VRS is carcinogenic in rats following its subcutaneous or intramuscular injection; it produced sarcomas at the site of repeated injections.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 59: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Acid blue-1
- Anhydro-4,4'-bis(diethylamino)triphenylmethanol-2',4"-disulfonic acid, monosodium salt
- C.I. Acid Blue 1, sodium salt
- (4-[[α -(*para*-Diethylamino)phenyl]-2,4-disulfobenzylidene]-2,5- cyclohexadien-1-ylidene) diethylammonium hydroxide inner salt, sodium salt
- Acid Blue 1
- Acid Blue V
- Acid Brilliant Blue VF
- Acid Brilliant Sky Blue Z
- Acid Leather Blue V
- Aizen Brilliant Acid Pure Blue VS
- Alphazurine 2G
- Amacide Blue V
- Blue 1084
- 1085 Blue
- Brilliant Acid Blue A Export
- Brilliant Acid Blue V Extra
- Brilliant Acid Blue VS
- Brilliant Blue GS
- Bucacid Patent Blue VF
- Carmin Blue VS
- Carmine Blue VF
- Cosmetic Green Blue R25396
- Disulfine blue VN
- Disulphine Blue VN 150
- Dilsulphine VN
- Edicol Supra Blue VR
- Erio Brilliant Blue V

- Erioglaucine
- Erioglaucine supra
- Fenazo Blue XF
- Fenazo Blue XV
- Hexacol Blue VRS
- Hidacid Blue V
- Intracid Pure Blue V
- Kiton Pure Blue V
- Kiton Pure Blue V.FQ
- Leather Blue G
- Lissamine Turquoise VN
- Merantine Blue VF
- Patent Blue
- Patent Blue V
- Patent Blue VF
- Patent Blue VF-CF
- Patent Blue VF Special
- Patent Blue VS
- Pontacyl Brilliant Blue V
- Sodium Blue VRS
- Sodium Patent Blue V
- Sulfacid Brilliant Blue 6J
- Sulphan blue
- Sumitomo Patent Pure Blue VX
- Tertracid Carmine Blue V
- Xylene Blue VS

Note: Some confusion exists in the classification of literature for blue VRS: that concerning the dye patent blue V (C.I. 42051, Acid blue 3) has been classified under 'blue VRS'.

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BRILLIANT BLUE FCF DIAMMONIUM AND DISODIUM SALTS

VOL.: 16 (1978) (p. 171)

Brilliant Blue, diammonium salt

CAS No.: 2650-18-2

Chem. Abstr. Name: *N*-Ethyl-*N*-(4-[(4-{ethyl[(3-sulfophenyl)methyl]amino}phenyl)(2-sulfophenyl)-methylene]-2,5-cyclohexadien-1-ylidene)-3-sulfobenzenemethanaminium hydroxide inner salt, diammonium salt

Brilliant Blue, disodium salt

CAS No.: 3844-45-9

Chem. Abstr. Name: *N*-Ethyl-*N*-(4-[(4-{ethyl[(3-sulfophenyl)methyl]amino}phenyl)(2-sulfophenyl)methylene]-2,5-cyclohexadien-1-ylidene)-3-sulfobenzenemethanaminium hydroxide inner salt, disodium salt

5. Summary of Data Reported and Evaluation

5.1 Animal data

Brilliant blue FCF, disodium salt is carcinogenic in rats after its subcutaneous injection: it produced fibrosarcomas following repeated injections.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 59: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for Brilliant blue FCF, diammonium salt

- Acid blue 9
- C.I. Acid Blue 9, diammonium salt
- D and C Blue No. 4
- Ethyl({4-[*para*-ethyl(*meta*-sulfobenzyl)amino]- α -(*ortho*-sulfophenyl)benzylidene)-2,5-cyclohexadien-1-ylidene)-*meta*-sulfobenzyl-ammonium hydroxide inner salt, diammonium salt

Synonyms for Brilliant blue FCF, disodium salt

- Acid Sky Blue A
- Acilan Turquoise Blue AE
- A. F. Blue No. 1
- Aizen Brilliant Blue FCF
- Aizen Food Blue No. 1
- Alphazurine
- Alphazurine FG
- Alphazurine FGND
- Atracid Blue FG
- Amacid Blue FG Conc
- 1206 Blue
- 11388 Blue

- Blue Dye Number 1 food additive
- Brilliant Blue
- Brilliant Blue FCF
- Brilliant Blue Lake
- Bucacid Azure Blue
- Calcocid Blue EG
- Calcocid Blue 2G
- Canacert Brilliant Blue FCF
- C.I. Acid Blue 9, disodium salt
- Cogilor Blue 512.12
- Cosmetic Blue Lake
- D and C Blue No. 1
- D and C Blue No. 4
- Dispersed Blue 12195
- Disulphine lake Blue EG
- Dolkwal Brilliant Blue
- Edicol Blue CI 2
- Edicol Supra Blue E6
- Erioglaucine
- Erioglaucine A
- Erioglaucine E
- Erioglaucine G
- Eriosky Blue
- Ethyl(4-(para[ethyl(*meta*-sulfobenzyl)amino]- α -(*ortho*-sulfophenyl)benzylidene)-2,5-cyclohexadien-1-ylidene)(*meta*-sulfobenzyl) ammonium hydroxide inner salt, disodium salt
- FD and C Blue 1
- FD and C Blue No. 1
- FDC Blue No. 1
- Fenazo Blue XI
- Fenazo Blue XR
- Food Blue 1
- Hexacol Brilliant Blue A
- Hidacid Azure Blue
- Intracid Pure Blue L
- Kiton Blue AR
- Kiton Pure Blue L
- Maple Brilliant Blue FCF
- Merantine Blue EG
- Neptune Blue BRA
- Neptune Blue BRA Concentration
- Patent Blue AE
- Patent Blue 2Y
- Peacock Blue X-1756
- Usacert Blue No. 1
- Xylene Blue VSG

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FAST GREEN FCF

VOL.: 16 (1978) (p. 187)

CAS No.: 2353-45-9

Chem. Abstr. Name: *N*-Ethyl-*N*-(4-[(4-{ethyl[(3-sulfophenyl)methyl]amino}phenyl)-(4-hydroxy-2-sulfophenyl)methylene]-2,5-cyclohexadien-1-ylidene)-3-sulfobenzenemethanaminium hydroxide inner salt, disodium salt

5. Summary of Data Reported and Evaluation

5.1 Animal data

Fast green FCF has been tested in mice and rats by oral administration and in rats by subcutaneous injection. It was carcinogenic in rats, producing sarcomas at the site of repeated subcutaneous injections.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 63: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Aizen Food Green No. 3
- Disodium salt of 4-{[4-(*N*-ethyl-*para*-sulfobenzylamino)phenyl][4-hydroxy-2-sulfonium-phenyl]methylene}1-(*N*-ethyl-*N*-*para*-sulfobenzyl)- $\Delta^{2,5}$ -cyclohexadienimine
- Ethyl[4-(α -{*para*-[ethyl(*meta*-sulfobenzyl)-amino]phenyl}-4-hydroxy-3-sulfobenzylidene)-2,5-cyclohexadien-1-ylidene](*meta*-sulfobenzyl) ammonium hydroxide inner salt, disodium salt
- FD and C Green No. 3
- Green 1724
- Solid Green FCF

Last updated: 26 March 1998

GUINEA GREEN B

VOL.: 16 (1978) (p. 199)

CAS No.: 4680-78-8

Chem. Abstr. Name: *N*-Ethyl-*N*-(4-[(4-{ethyl[(3-sulfophenyl)methyl]- amino}phenyl)phenyl-methylene]-2,5-cyclohexadien-1-ylidene)-3- sulfobenzenemethanaminium hydroxide inner salt, sodium salt

5. Summary of Data Reported and Evaluation

5.1 Animal data

Guinea green B has been tested in mice and rats by oral administration and in rats by ambient exposure and subcutaneous injection. It was carcinogenic in rats, producing hepatic tumours after its oral administration, local sarcomas after its subcutaneous injection and benign mammary tumours following ambient exposure.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 64: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Acid green
- Acidal Green G
- Acid Green B
- Acid Green G
- Acid Green 2G
- Acid Green L
- Acid Green S
- Acid Leather Green F
- Acid Leather Green 3G
- Acilan Green B
- A.F. Green No. 1
- Amacid Green B
- Brilliant Green 3EMBL
- Bucacid Guinea Green BA
- Calcocid Green G
- C.I. Acid Green 3, sodium salt
- FD and C Green No. 1
- FD and C Green Number 1
- FDC Green 1
- Fenazo Green L
- Guinea green
- Hidacid Emerald Green
- Hispacid Green GB
- Intracid Green F
- Kiton Green F
- Kiton Green FC
- Leather Green B
- Lissamine Green G

- Merantine Green G
- Monosodium salt of 4-[4-(*N*-ethyl-*para*-sulfobenzylamino)diphenylmethylene]-[1-(*N*-ethyl-*N*-*para*-sulfoniumbenzyl)- $\Delta^{2,5}$ -cyclohexadienimine]
- Naphthalene Green G
- Naphthalene Lake Green G
- Naphthalene Leather Green G
- Neran Brilliant Green G
- Pontacyl Green BL
- Sulfacid Brilliant Green 1B
- Sulpho Green 2B
- Vondacid Green L

Last updated: 26 March 1998

LIGHT GREEN SF

VOL.: 16 (1978) (p. 209)

CAS No.: 5141-20-8

Chem. Abstr. Name: *N*-Ethyl-*N*-4-[[4-[(3-sulfophenyl)methyl]amino]-phenyl)-(4-sulfophenyl)-methylene]-2,5-cyclohexadien-1-ylidene}-3-sulfobenzenemethanaminium hydroxide inner salt, disodium salt

5.Summary of Data Reported and Evaluation

5.1 Animal data

Light green SF has been tested in mice and rats by oral administration and in rats by subcutaneous and intraperitoneal injection. It was carcinogenic in rats after its subcutaneous injection, producing local sarcomas.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 65: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Acidal Light Green SF
- Acid Brilliant Green SF
- Acid Green
- Acid Green A
- Acid Green G
- Acilan Green SFG
- A.F. Green No. 2
- Amacid Green G
- C.I. Acid Green 5, disodium salt
- D and C Green No. 4
- Disodium salt of 4-[[4-(*N*-ethyl-*para*-sulfobenzylamino)phenyl][4-sulfoniumbenzyl]-methylene](1-*N*-ethyl-*N*-*para*-sulfobenzyl)- $\Delta^{2,5}$ -cyclohexadienimine
- Ethyl(4-{*para*-[ethyl(*meta*-sulfobenzyl)amino]- α -(*para*-sulfophenyl)benzylidene}-2,5-cyclohexadien-1-ylidene)(*meta*-sulfobenzyl) ammonium hydroxide inner salt, disodium salt
- Fast Acid Green N
- FD and C Green No. 2
- Fenazo Green 7G
- Leather Green SF
- Light Green 2GN, Light Green Lake
- Light green SF yellowish
- Light Green Yellowish
- Lissamine Green SF
- Lissamine Lake Green SF
- Merantine Green SF
- Pencil Green SF
- Sulfo Green J
- Sumitomo Light Green SF Yellowish

- Wool Brilliant Green SF

Last updated: 26 March 1998

RHODAMINE B

VOL.: 16 (1978) (p. 221)

CAS No.: 81-88-9

Chem. Abstr. Name: *N*-[9-(2-Carboxyphenyl)-6-(diethylamino)-3*H*-xanthen-3-ylidene]-*N*-ethylethanaminium chloride

5. Summary of Data Reported and Evaluation

5.1 Animal data

Rhodamine B has been tested in mice and rats by subcutaneous injection and, in inadequate studies, by oral administration. It was carcinogenic in rats when injected subcutaneously, producing local sarcomas.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 71: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Acid Brilliant Pink B
- ADC Rhodamine B
- Aizen Rhodamine BH
- Aizen Rhodamine BHC
- Akiriku Rhodamine B
- Brilliant Pink B
- Calcozine Red BX
- Calcozine Rhodamine BL
- Calcozine Rhodamine BX
- Calcozine Rhodamine BXP
- [9-(*ortho*-Carboxyphenyl)-6-(diethylamino)-3*H*-xanthen-3-ylidene]diethyl ammonium chloride
- Cerise Toner X1127
- Certiqua Rhodamine
- Cogilor Red 321.10
- Cosmetic Brilliant Pink Bluish D conc
- D and C Red No. 19
- Diabasic Rhodamine B
- Edicol Supra Rose B
- Edicol Supra Rose BS
- Elcozine Rhodamine B
- Eriosin Rhodamine B
- 3-Ethochloride of 9-*ortho*-carboxyphenyl-6-diethylamino-3-ethylimino-3- isoxanthene
- FD and C Red No. 19
- Geranium Lake N
- Hexacol Rhodamine B Extra
- Ikada Rhodamine B
- Iragen Red L-U
- Mitsui Rhodamine BX
- 11411 Red

- Red No. 213
- Rheonine B
- Rhodamine
- Rhodamine B chloride
- Sicilian Cerise Toner A-7127
- Symulex Magenta F
- Symulex Pink F
- Symulex Rhodamine B Toner F
- Takaoka Rhodamine B
- Tetraethylrhodamine

Last updated: 26 March 1998

RHODAMINE 6G

VOL.: 16 (1978) (p. 233)

CAS No.: 989-38-8

Chem. Abstr. Name: 2-[6-(Ethylamino)-3-(ethylimino)-2,7-dimethyl-3*H*-xanthen-9-yl]benzoic acid ethyl ester, monohydrochloride

5. Summary of Data Reported and Evaluation

5.1 Animal data

Rhodamine 6G is carcinogenic in rats after its subcutaneous injection: it produces sarcomas. It has been inadequately tested in mice by oral administration.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 71: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Basic rhodamine yellow
- C.I. Basic Red 1, monohydrochloride
- *ortho*-[6-(Ethylamino)-3-(ethylimino)-2,7-dimethyl-3*H*-xanthen-9-yl]benzoic acid ethyl ester, monohydrochloride
- Basic Rhodamine Yellow
- Calcozine Red 6G
- Calcozine Rhodamine 6GX
- Elcozine Rhodamine 6GDN
- Eljon Pink Toner
- Fanal Pink GFK
- Fanal Red 25532
- Heliostable Brilliant Pink B extra
- Mitsui Rhodamine 6GCP
- Nyco Liquid Red GF
- Rhodamine 69DN Extra
- Rhodamine F4G
- Rhodamine F5G
- Rhodamine F5G chloride
- Rhodamine 6GB
- Rhodamine 6GBN
- Rhodamine 6GCP
- Rhodamine 4GD
- Rhodamine 6GD
- Rhodamine GDN
- Rhodamine 5GDN
- Rhodamine 6GDN
- Rhodamine 6GDN Extra
- Rhodamine 6GEx ethyl ester
- Rhodamine 6G Extra

- Rhodamine 6G Extra Base
- Rhodamine 4GH
- Rhodamine 6GH
- Rhodamine 5GL
- Rhodamine 6G lake
- Rhodamine 6GX
- Rhodamine 6JH
- Rhodamine 7JH
- Rhodamine Lake Red 6G
- Rhodamine Y 20-7425
- Rhodamine Zh
- Rhodamine 6ZH
- Rhodamine 6Zh-DN
- Silosuper Pink B

Last updated: 26 March 1998

5-AMINOACENAPHTHENE

VOL.: 16 (1978) (p. 243)

CAS No.: 4657-93-6

Chem. Abstr. Name: 1,2-Dihydro-5-acenaphthylenamine

5. Summary of Data Reported and Evaluation

5.1 Animal data

Data reported in an abstract indicate that 5-aminoacenaphthene increased the incidence of bladder carcinomas in mice following implantation of paraffin wax pellets containing this compound into the bladder and that it produced leukaemias following its intraperitoneal injection. No evaluation of the carcinogenicity of 5-aminoacenaphthene can be made on the basis of the available data.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 56: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonym

5-Acenaphthenamine

Last updated: 26 March 1998

para-AMINOBENZOIC ACID

VOL.: 16 (1978) (p. 249)

CAS No.: 150-13-0

Chem. Abstr. Name: 4-Aminobenzoic acid

5. Summary of Data Reported and Evaluation

5.1 Animal data

In the only study available, *para*-aminobenzoic acid was tested in mice by skin application; no carcinogenic effects were observed. The available data are insufficient for an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 56: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 1-Amino-4-carboxybenzene
- Anticanitic vitamin
- Anti-chromotrichia factor
- Bacterial vitamin H'
- 4-Carboxyaniline
- *para*-Carboxyaniline
- *para*-Carboxyphenylamine
- Chromotrichia factor
- PAB
- PABA
- Paraminol
- Paranate
- Trichochromogenic factor
- Vitamin B_x
- Vitamin H' Amben

ANTHRANILIC ACID

VOL.: 16 (1978) (p. 265)

CAS No.: 118-92-3

Chem. Abstr. Name: 2-Aminobenzoic acid

5. Summary of Data Reported and Evaluation

5.1 Animal data

Anthranilic acid has been tested in mice by bladder implantation. The available data do not allow an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 57: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for :

- *ortho*-Aminobenzoic acid
- 1-Amino-carboxybenzene
- 2-Carboxyaniline
- *ortho*-Carboxyaniline
- Vitamin L₁

CINNAMYL ANTHRANILATE

VOL.: 16 (1978) (p. 287)

5. Summary of Data Reported and Evaluation

5.1 Animal data

In the only available study, cinnamyl anthranilate increased the incidence of lung tumours in mice following its intraperitoneal injection. These data are insufficient for an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluations: [Vol. 31 \(1983\)](#); Suppl. 7 (1987) (p. 60: **Group 3**); [Vol. 77 \(2000\)](#)

For definition of Groups, see [Preamble Evaluation](#).

Last updated: 26 March 1998

***N,N*-DIACETYL BENZIDINE**

VOL.: 16 (1978) (p. 293)

CAS No.: 613-35-4

Chem. Abstr. Name: *N,N*-(1,1'-Biphenyl)-4,4'-diylbisacetamide

5. Summary of Data Reported and Evaluation

5.1 Animal data

N,N'-Diacetylbenzidine is carcinogenic in rats after its oral, subcutaneous or intraperitoneal administration; it produced carcinomas of the liver, ear duct and mammary gland.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 61: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 4',4'''-Biacetanilide
- *N,N*-4,4'-Biphenylenebisacetamide
- 4,4'-Diacetamidobiphenyl
- Diacetylbenzidine
- 4,4'-Diacetylbenzidine

Last updated: 26 March 1998

4,4'-DIAMINODIPHENYL ETHER

VOL.: 16 (1978) (p. 301)

5. Summary of Data Reported and Evaluation¹

5.1 Animal data

4,4'-Diaminodiphenyl ether has been tested in rats and mice by oral and subcutaneous administration, producing tumours at various sites. The results suggest carcinogenic activity, but in the absence of contemporary controls, an evaluation of the carcinogenicity of this could not be made.

¹ Subsequent to the finalization of this evaluation by the Working Group in June 1977, the Secretariat became aware of a paper by Steinhoff (1977), in which a group of 20 male and 20 female Wistar rats received weekly s.c. injections of 100-300 mg/kg bw 4,4'-diaminodiphenyl ether in saline, up to a total dose of 14.4 g/kg bw, during 670 days. A group of 50 control rats received s.c. injections of saline alone for 907 days. Twenty-two (55%) treated rats died with malignant tumours, compared with 13 (26%) in controls. Benign tumours occurred in 22 treated rats and in 10 controls. Ten (25%) treated rats had malignant tumours of the liver (3 multiple), and 12 had benign liver tumours; no such tumours were found in controls.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluations: [Vol 29 \(1982\)](#); [Suppl. 7 \(1987\)](#) (p. 61: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Last updated: 26 March 1998

3,3'-DICHLORO-4,4'-DIAMINODIPHENYL ETHER

VOL.: 16 (1978) (p. 309)

CAS No.: 28434-86-8

Chem. Abstr. Name: 4,4'-Oxybis(2-chlorobenzenamine)

5. Summary of Data Reported and Evaluation

5.1 Animal data

3,3'-Dichloro-4,4'-diaminodiphenyl ether is carcinogenic in rats; it produced carcinomas of the ear duct after its subcutaneous injection.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 62: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Bis(4-amino-3-chlorophenyl)ether
- 4,4'-Oxybis(2-chloroaniline)

Last updated: 26 March 1998

2,4'-DIPHENYLDIAMINE

VOL.: 16 (1978) (p. 313)

CAS No.: 492-17-1

Chem. Abstr. Name: (1,1'-Biphenyl)-2,4'-diamine

5. Summary of Data Reported and Evaluation

5.1 Animal data

2,4'-Diphenyldiamine has been inadequately tested in rats and dogs by oral administration. No evaluation of the carcinogenicity of this compound can be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 63: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- *ortho,para'*-Bianiline
- 2,4'-Biphenyldiamine
- 2,4'-Diaminobiphenyl
- *ortho,para'*-Diaminobiphenyl
- 2,4'-Diaminodiphenyl
- *ortho,para'*-Dianiline
- Diphenylene

5-NITROACENAPHTHENE

VOL.: 16 (1978) (p. 319)

CAS No.: 602-87-9

Chem. Abstr. Name: 1,2-Dihydro-5-nitroacenaphthylene

5. Summary of Data Reported and Evaluation

5.1 Animal data

5-Nitroacenaphthene is carcinogenic in female rats and female hamsters following its oral administration; it produced mainly adenocarcinomas of the small intestine and mammary carcinomas in female but not in male rats and cholangiomas in female but not in male hamsters. In addition, it produced leukaemia and reticulum-cell sarcomas in mice following its intraperitoneal injection.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 67: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Synonym

- 5-Nitronaphthalene ethylene

Last updated: 26 March 1998

N-PHENYL-2-NAPHTHYLAMINE

VOL.: 16 (1978) (p. 325)

5. Summary of Data Reported and Evaluation¹

5.1 Animal data

N-Phenyl-2-naphthylamine has been tested in mice by oral and single subcutaneous administration and in a small number of dogs by oral administration. Results of the experiment by oral administration in mice indicate a statistically significant increase in the incidence of all tumours, and in particular of hepatomas, in males of one of the two tested strains. In addition, subcutaneous administration of this compound produced a significant increase in the total incidence of tumours in females of one strain and of hepatomas in males of the other strain. These findings suggest that the compound is carcinogenic but do not allow a conclusive evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

In one study, in one factory, of men with known exposure to *N*-phenyl-2-naphthylamine in rubber processing under controlled conditions, there was no indication of an excess incidence of bladder tumours. However, a broader study of rubber workers who had no exposure to 2-naphthylamine has shown an increased risk of bladder tumours. In the latter study, exposure was mixed but probably included exposure to *N*-phenyl-2-naphthylamine for many workers.

These findings do not permit an assessment of the presence or absence of an elevated risk for cancer of the urinary bladder in persons exposed to *N*-phenyl-2-naphthylamine.

¹ Subsequent to the finalization of this evaluation by the Working Group in June 1977, the Secretariat became aware of an abstract of a paper by Checkoway *et al.* (1977) describing a retrospective cohort mortality study of bladder cancers in 4 major US rubber companies between 1964-1973; however, the study cannot be evaluated on the basis of the data presented.

Subsequent evaluation: [Suppl. 7 \(1987\)](#)

Last updated: 26 March 1998

4,4'-Thiodianiline

VOL.: 16 (1978) (p. 343)

5. Summary of Data Reported and Evaluation

5.1 Animal data

4,4'-Thiodianiline is carcinogenic in rats after its oral administration; it produced an increased incidence of mammary carcinomas.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluations: [Vol. 27 \(1982\)](#); Suppl. 7 (1987) (p. 72: **Group 2B**)

For definition of Groups, see [Preamble Evaluation](#).

Last updated: 26 March 1998

***ortho*-TOLUIDINE (HYDROCHLORIDE)**

VOL.: 16 (1978) (p. 349)

5. Summary of Data Reported and Evaluation

5.1 Animal data

The data available to the Working Group concerning *ortho*-toluidine was from experiments that have been insufficiently described. Although tumours have been reported at various sites after administration of the compound by various routes, the inadequacy of reporting does not allow an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

The epidemiological studies available to the Working Group dealt with workers who had mixed exposures. The results of one study in Germany were equivocal. A second, in Switzerland, had negative results and was inadequate in terms of persons-years exposure. A third, probably representing a large proportion of all workers in the UK who were exposed to *ortho*-toluidine during the production process, demonstrated one observed case *versus* 0.52 expected. A fourth, in the USSR, appeared to involve occupational exposure specifically to toluidines; it was suggestive of a carcinogenic effect, but information was incomplete.

These findings, taken together, did not allow the Working Group to draw any firm conclusion about the carcinogenicity of *ortho*-toluidine to humans.

Subsequent evaluations: [Vol. 27 \(1982\)](#); [Suppl. 7 \(1987\)](#); [Vol. 77 \(2000\)](#)

2,4-XYLIDINE (HYDROCHLORIDE)

VOL.: 16 (1978) (p. 367)

2,4-Xylidine

CAS No.: 95-68-1

Chem. Abstr. Name: 2,4-Dimethylbenzenamine

2,4-Xylidine hydrochloride

CAS No.: 21436-96-4

Chem. Abstr. Name: 2,4-Dimethylbenzenamine hydrochloride

5. Summary of Data Reported and Evaluation

5.1 Animal data

Data reported in an abstract indicate that 2,4-xylidine produced an increased incidence of subcutaneous and liver tumours in rats following its oral administration. The inadequacy of reporting does not allow an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 74: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for 2,4-Xylidine

- 1-Amino-2,4-dimethylbenzene
- 4-Amino-1,3-dimethylbenzene
- 4-Amino-3-methyltoluene
- 4-Amino-1,3-xylene
- 2,4-Dimethyl aniline
- 2,4-Dimethylaniline
- 4-Methyl-*ortho*-toluidine
- 2-Methyl-*para*-toluidine
- *meta*-Xylidine

Synonyms for 2,4-Xylidine hydrochloride

- 1-Amino-2,4-dimethylbenzene hydrochloride
- 4-Amino-1,3-dimethylbenzene hydrochloride
- 4-Amino-3-methyltoluene hydrochloride
- 4-Amino-1,3-xylene hydrochloride
- 2,4 Dimethyl aniline hydrochloride
- 2,4-Dimethylaniline hydrochloride
- 4-Methyl-*ortho*-toluidine hydrochloride
- 2-Methyl-*para*-toluidine hydrochloride
- *meta*-Xylidine hydrochloride

Last updated: 26 March 1998

2,5-XYLIDINE (HYDROCHLORIDE)

VOL.: 16 (1978) (p. 377)

2,5-Xylidine

CAS No.: 95-78-3

Chem. Abstr. Name: 2,5-Dimethylbenzenamine

2,5-Xylidine hydrochloride

CAS No.: 51786-53-9

Chem. Abstr. Name: 2,5-Dimethylbenzenamine hydrochloride

5. Summary of Data Reported and Evaluation

5.1 Animal data

Data reported in an abstract indicate that 2,5-xylidine produced an increased incidence of subcutaneous and liver tumours in rats following its oral administration. The inadequacy of the reporting does not allow an evaluation of the carcinogenicity of this compound to be made.

5.2 Human data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 74: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms for 2,5-Xylidine

- 1-Amino-2,5-dimethylbenzene
- 3-Amino-1,4-dimethylbenzene
- 5-Amino-1,4-dimethylbenzene
- 2-Amino-4-methyltoluene
- 2-Amino-1,4-xylene
- 2,5-Dimethyl aniline
- 2,5-Dimethylaniline
- 3,5-Dimethylbenzenamine
- 5-Methyl-*ortho*-toluidine
- 6-Methyl-*meta*-toluidine
- *para*-Xylidine

Synonyms for 2,5-Xylidine hydrochloride

- 1-Amino-2,5-dimethylbenzene hydrochloride
- 3-Amino-1,4-dimethylbenzene hydrochloride
- 5-Amino-1,4-dimethylbenzene hydrochloride
- 2-amino-4-methyltoluene hydrochloride
- 2-Amino-1,4-xylene hydrochloride
- 2,5-Dimethyl aniline hydrochloride
- 2,5-Dimethylaniline hydrochloride
- 3,5-Dimethylbenzenamine hydrochloride

- 5-Methyl-*ortho*-toluidine hydrochloride
- 6-Methyl-*meta*-toluidine hydrochloride
- *para*-Xylidine hydrochloride

Last updated: 26 March 1998