EUROPEAN COMMISSION

Directorate-General for Health & Consumers

Scientific Committee on Consumer Safety

SCCS

OPINION ON

Basic Blue 99

COLIPA n° C59

Scientific Committees
on consumer safety
on emerging and newly identified health risks
on health and environmental risks

The SCCS adopted this opinion at its 12th plenary meeting

of 20 September 2011

About the Scientific Committees

Three independent non-food Scientific Committees provide the Commission with the scientific advice it needs when preparing policy and proposals relating to consumer safety, public health and the environment. The Committees also draw the Commission's attention to the new or emerging problems which may pose an actual or potential threat.
They are: the Scientific Committee on Consumer Safety (SCCS), the Scientific Committee on Health and Environmental Risks (SCHER) and the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) and are made up of external experts.

In addition, the Commission relies upon the work of the European Food Safety Authority (EFSA), the European Medicines Agency (EMA), the European Centre for Disease prevention and Control (ECDC) and the European Chemicals Agency (ECHA).

SCCS

The Committee shall provide opinions on questions concerning all types of health and safety risks (notably chemical, biological, mechanical and other physical risks) of non-food consumer products (for example: cosmetic products and their ingredients, toys, textiles, clothing, personal care and household products such as detergents, etc.) and services (for example: tattooing, artificial sun tanning, etc.).

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1. BACKGROUND

Submission I for Basic Blue 99 with the chemical name 3-[(4-amino-6-bromo-5,8-dihydro-1-hydroxy-8-imino-5-oxo-2-naphthalenyl)amino]-N,N,N-trimethyl benzenaminium chloride was submitted in August 1992 by COLIPA[1].

Submission II was submitted in March 2006.

According to the current submission II, Basic Blue 99 is used as a direct hair with a final concentration on the scalp up to 1.0%.

2. TERMS OF REFERENCE

Does the Scientific Committee on Consumer Safety (SCCS) consider the use of Basic Blue 99 safe for consumers, when used as a direct hair dye substance in hair dye formulations with a concentration on-head of maximum 1.0% taking into account the scientific data provided?

[1] COLIPA - European Cosmetics Toiletry and Perfumery Association

3. OPINION

3.1. Chemical and Physical Specifications

3.1.1. Chemical identity

3.1.1.1. Primary name and/or INCI name

Basic Blue 99 (INCI name)

3.1.1.2. Chemical names

Benzenaminium, 3-[(4-amino-6-bromo-5,8-dihydro-1-hydroxy-8-imino-5-oxo-2-naphthalenyl)amino]-N,N,N-trimethyl-, chloride (9CI)
3-[(4-amino-6-bromo-5,8-dihydro-1-hydroxy-8-imino-5-oxo-2-naphtyl)amino]-N,N,N-trimethylanilinium chloride (main component),

3.1.1.3. Trade names and abbreviations

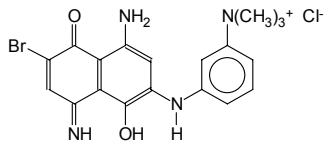
COLIPA C 059

Arianor Steel Blue
Arianor Steel Blue 306004
Basic Blue 99
C.I. 56059

3.1.1.4. CAS / EC number

CAS: 68123-13-7
EC: 268-544-3

3.1.1.5. Structural formula



3.1.1.6. Empirical formula

Formula: $C_{19}H_{20}BrN_4O_2^+ \times Cl^-$ (main component)

3.1.2. Physical form

Odourless black, fine powder

3.1.3. Molecular weight

Molecular weight: 451.75 (as methyl chloride)

3.1.4. Purity, composition and substance codes

3.1.5. Impurities / accompanying contaminants

3.1.6. Solubility

3.1.7. Partition coefficient (Log P_{ow})

Log P_{ow}: 1.88 (calculated Syracuse Vers. 1.66)

3.1.8. Additional physical and chemical specifications

Melting point:	> 200 °C (thermal decomposition)
Boiling point:	/
Flash point:	/
Vapour pressure:	/
Density:	/
Viscosity:	/
pKa:	/
Refractive index:	/
UV_Vis spectrum (200-800 nm):	/

3.1.9. Homogeneity and Stability

General Comments to physico-chemical characterisation

Basic Blue 99 is a mixture of 23-32 substances of varying concentrations as demonstrated by the HPLC analysis of two batches RS2798801 and 74/75. (Figures 1-3)
The SCCS considers that the chemical characterization of all components of Basic Blue 99 on the basis of NMR and IR of the mixtures is not convincing.
The SCCS considers that the chemical characterization of individual components of Basic Blue 99 based on LC/MS analysis (UV-Vis spectrum and 1-4 molecular ions) is a poor chemical characterisation.
The HPLC peak area of the major component of Basic Blue 99 in the two batches, 36% and 49% (Tables 1 &2), is significantly different from each other. The HPLC peak areas of other components of Basic Blue 99, characterised by the study authors, are also very different (Tables 1&2) in the two batches. In addition, the LC/MS characterization of the Basic Blue 99 according to the study authors revealed that the isomeric composition of individual components of the two batches is also different (Tables 1 &2)
The physico-chemical property as well as biological activity of a mixture will depend upon the composition of the mixture. As the two batches of Basic Blue 99 were demonstrated to be a mixture ≥23 substances of varying composition (and varying isomeric composition), besides poor characterization of individual components, the safety of such a mixture cannot be assessed.

Figure 1: HPLC analysis of Basic Blue 99, Batch RS2798801 (ref.2)

Sample Amt: 486 mg/l
Run Type: Unknown

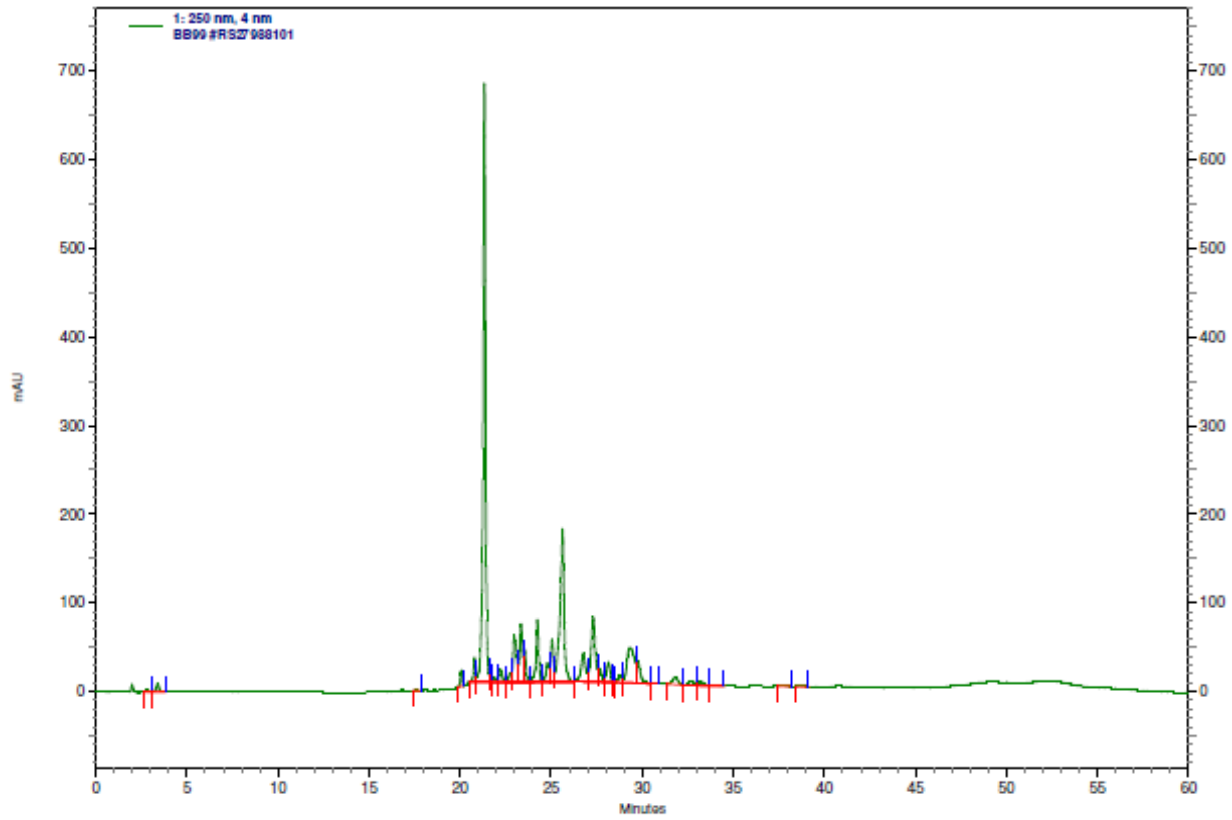


Figure 2: HPLC analysis of Basic Blue 99, Batch 74/75 (Ref. 3)

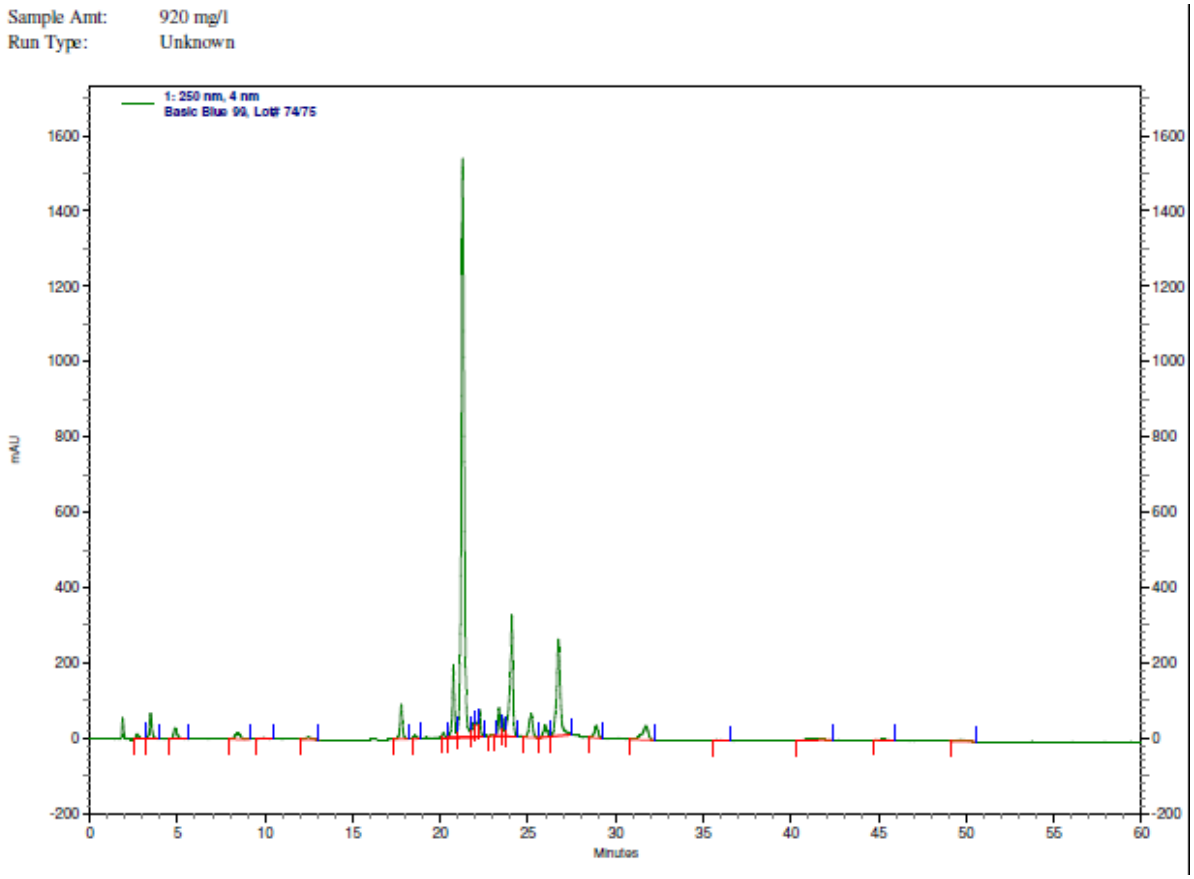


Figure 3: Comparison of HPLC chromatograms of Basic Blue 99, batches RS2798801 (upper) and 74/75 (lower)

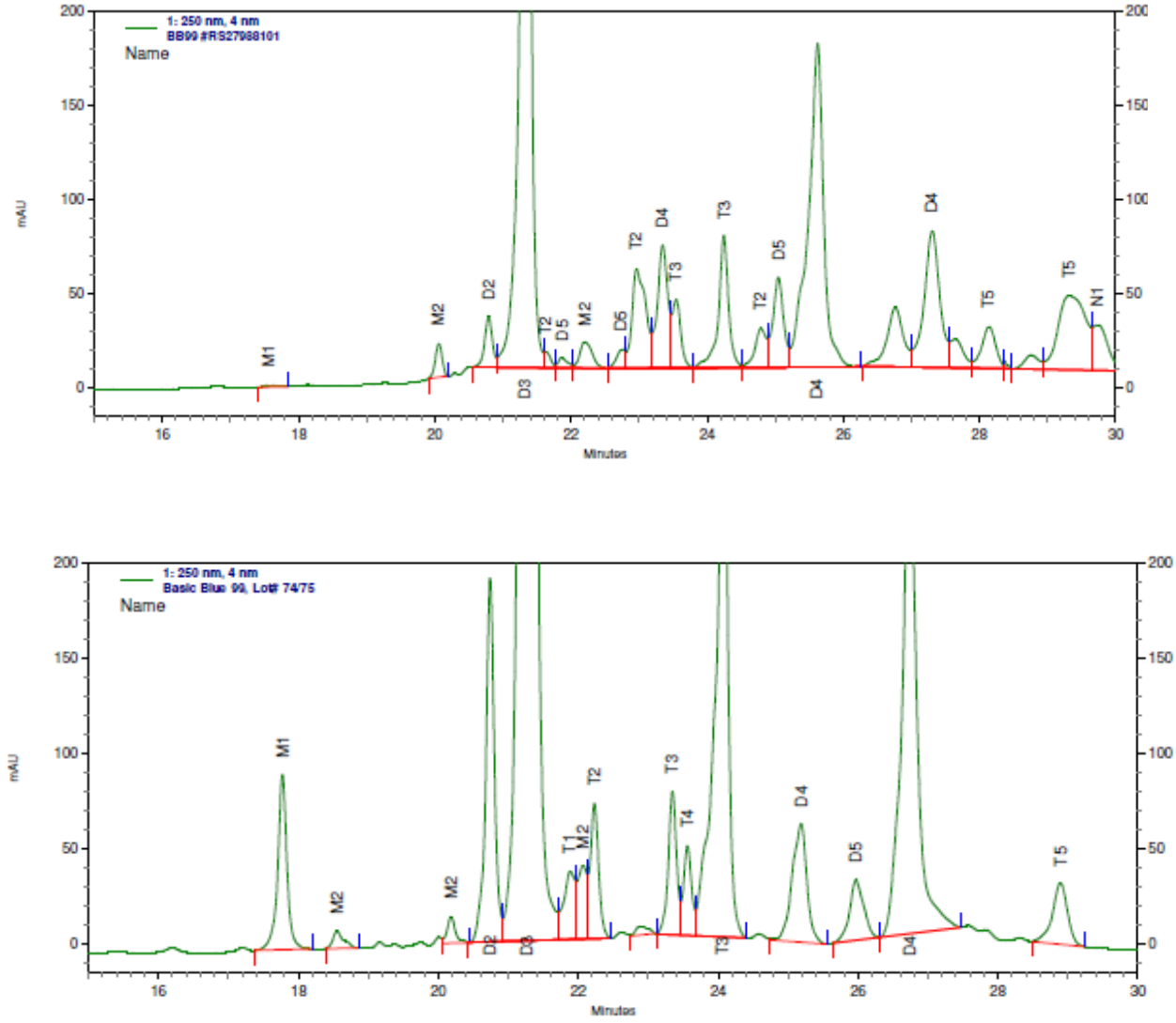


Table 1: Composition of the two batches of Basic Blue 99: HPLC peaks are characterized by names (LC/MS characterization) and composition is revealed by the area percent of each component (and their isomers) (Ref. 2, 3)

Batch RS2798801

Detector PDA L-2450

1: 250 nm, 4 nm
Results

Pk #	Name	Retention Time	Area	Area Percent
1	A1	2,807	76469	0,109
2	A2	3,387	373216	0,530
3	M1	17,573	62093	0,088
4	M2	20,060	493322	0,701
5	D2	20,787	845987	1,201
6	D3	21,327	25809798	36,655
7	T2	21,640	223205	0,317
8	D5	21,867	213419	0,303
9	M2	22,200	716968	1,018
10	D5	22,747	362206	0,514
11	T2	22,960	2940571	4,176
12	D4	23,347	2846759	4,043
13	T3	23,547	1259885	1,789
14	T3	24,247	2926186	4,156
15	T2	24,787	930366	1,321
16	D5	25,047	2140861	3,040
17	D4	25,620	10849541	15,408
18		26,767	2139409	3,038
19	D4	27,307	4702229	6,678
20		27,647	812561	1,154
21	T5	28,140	1275192	1,811
22		28,373	53318	0,076
23		28,760	444057	0,631
24	T5	29,313	4458174	6,331
25	N1	29,740	1580425	2,244
26	T6	30,693	56413	0,080
27	T7	31,813	684980	0,973
28	T5	32,700	429202	0,610
29		33,200	399826	0,568
30		33,973	139394	0,198
31		37,713	84265	0,120
32		38,680	83027	0,118
Totals			70413324	100,000

Batch 74/75

1: 250 nm, 4 nm
Results

Pk #	Name	Retention Time	Area	Area Percent
1	A1	2,700	561285	0,393
2	A2	3,460	2776670	1,945
3	A3	4,860	1607192	1,126
4	D1	8,447	1407895	0,986
5	A4	9,820	388356	0,272
6		12,467	491966	0,345
7	M1	17,773	3403664	2,384
8	M2	18,553	386585	0,271
9	M2	20,180	453992	0,318
10	D2	20,740	6641408	4,652
11	D3	21,260	70402380	49,316
12	T1	21,887	1654799	1,159
13	M2	22,067	1408617	0,987
14	T2	22,233	2336724	1,637
15		22,907	222682	0,156
16	T3	23,347	2506664	1,756
17	T4	23,560	1521554	1,066
18	T3	24,073	15483505	10,846
19	D4	25,187	3635854	2,547
20	D5	25,967	1778877	1,246
21	D4	26,733	15574076	10,910
22	T5	28,893	1942774	1,361
23	N1	31,727	3601472	2,523
24		35,900	266817	0,187
25		41,313	1383596	0,969
26		45,253	344468	0,241
27		49,700	572388	0,401
Totals			142756260	100,000

Table 2: Distribution of major components (and their isomers) of Basic Blue 99 in the batches RS2798801 and 74/75, deduced from Table 1

Batch RS2798801			Batch 74/75		
Component/ Name	**Peak No. of all isomers**	**Area percent of all isomers**	**Component/ Name**	**Peak No. of all isomers**	**Area percent of all isomers**
D3	6	36.7%	D3	11	49.3%
D4	12, 17, 19	4.0+15.4+6.7= 26.1%	D4	19, 21	2.6+10.9 = 13.5%
D5	8, 10, 16	0.3+0.5+3.0 = 3.8%	D5	20	1.3%
T2	7, 11, 15	0.3+4.2+1.3 = 5.8%	T2	14	1.6%
T3	13, 14	1.8+4.2 = 6.0%	T3	16, 18	1.8+10.9 = 12.7%
T5	21, 24, 28	1.2+6.3+0.6 = 8.1%	T5	22	1.4%

3.2. Function and uses

Basic Blue 99 is used as a direct hair dye substance in hair dye formulations with a maximum on-head concentration 1.0%.

3.3. Toxicological Evaluation

3.3.1. Acute toxicity

Not applicable

3.3.2 Irritation and corrosivity

Not applicable

3.3.3. Skin sensitisation

Not applicable

3.3.4. Dermal / percutaneous absorption

Not applicable

3.3.5. Repeated dose toxicity

Not applicable

3.3.6. Mutagenicity / Genotoxicity

Not applicable

3.3.7. Carcinogenicity

Not applicable

3.3.8. Reproductive toxicity

Not applicable

3.3.9. Toxicokinetics

Not applicable

3.3.10. Photo-induced toxicity

Not applicable

3.3.11. Human data

Not applicable

3.3.12. Special investigations

Not applicable

3.3.13. Safety evaluation (including calculation of the MoS)

Not applicable

3.3.14. Discussion

Not applicable

4. CONCLUSION

Basic Blue 99 is a mixture of 23-32 substances of varying concentrations as demonstrated by the HPLC analysis of two batches RS2798801 and 74/75. (Figures 1-3)

Due to the highly variable composition of Basic Blue 99 in these batches, the safety of Basic Blue 99 cannot be evaluated.

5. MINORITY OPINION

Not applicable

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