



## Sudan dyes and other illegal dyes

### Analysis in spices and food

Sudan dyes, e.g. Sudan I to IV, Sudan Orange G, Sudan Red B, Sudan Red G, Sudan Red 7B, and Sudan Black B as well as other dyes like 4-(Dimethylamino)-azobenzene (Butter Yellow) and Para Red are basically synthetically produced azo dyes. Their degradation products are considered to be carcinogens and teratogens. Due to this fact, the EU does not permit the use of these colours as food additives. However, in some countries, these dyes are still occasionally used in order to intensify the colour of bell pepper and chilli powder.

### Background

During 2003, the EU-Rapid Alert System (RASFF) issued a series of notifications concerning the presence of Sudan dyes in chilli products and others such as spices, mixtures of spices, tomato sauces, pastas and sausages. Immediate action was taken on affected products such as withdrawals / recalls and finally destruction in accordance with Decision 2004/92/EC.

In October 2004, the governmental chemical institute "Bergisches Land" in Wuppertal, Germany, reported the identification of two prohibited colours: Butter Yellow and Para Red in bell pepper powder and curry.

In February 2005, Great Britain experienced an extensive Rapid Alert action cycle. Due to the widespread use of one batch of chilli powder contaminated with Sudan I, batches of different products like Worcester sauce, pizzas, pot noodles and seafood sauces were subjected to complete recalls.

Another recent concern is the discovery of the natural colour annatto in food and spice mixes. Annatto (E 160b) is permitted by the EU for use in a variety of foods and beverages but not in spices and spice mixtures. Its main colouring constituent is Bixin, with Norbixin being present in smaller amounts. The detection of Bixin is considered as evidence for annatto being present in a product.

## Legal Background

In August 2005 the European Food Safety Authority (EFSA) published an opinion, which reviews the toxicology of a number of dyes illegally present in food in the EU.

For colouring of foods Sudan dyes are not admitted. Directive 94/36/EC contains a positive list with all the materials permitted for food; Sudan dyes are not mentioned in this list and therefore strictly prohibited.

In addition, Regulation (EC) No. 669/2009 controls the import for chilli, chilli products, curcuma and palm oil in terms of unauthorised Sudan dyes.

## Analysis

Our experts from the Competence Centre of Organic Contaminants have many years of experience with the analysis of illegal dyes in spices, oleoresins and other food matrices. Our analytical portfolio includes a wide scope of dyes using LC-MS/MS technology (Tab. 1).

As part of a regular quality assurance program, it is highly recommended to screen products such as spices and spice mixtures, tomato based sauces, gravies, oleoresins etc. for Sudan dyes and other illegal dyes.

Substance	CAS-No.	Substance	CAS-No.	Substance	CAS-No.	Substance	CAS-No.
Sudan I	842-07-9	Dimethylyellow / Butteryellow	60-11-7	Oil Orange SS / Orange OT	2646-17-5	Ponceau MX	3761-53-3
Sudan II	3118-97-6	Rhodamine B	81-88-9	Auramine O	2465-27-2	Acid Red 73 / Brilliant Crocein	5413-75-2
Sudan III	85-86-9	Orange II	633-96-5	cis-Bixin	6983-79-5	Azorubin E122	3567-69-9
Sudan IV / Sudan Red B	85-83-6	Fast Garnet GBC	97-56-3	Basic Red 46	12221-69-1	Red 2G E128	3734-67-6
Sudan Orange G	2051-85-6	Toluidine Red	2425-85-6	Chrysoidine / Solvent Orange 3	532-82-1	Yellow 2G	6359-98-4
Sudan Red G	1229-55-6	Metanil Yellow	587-98-4			Quinoline Yellow E104	8004-92-0
Sudan Red 7B	6368-72-5	Sudan Black B	4197-25-5	Naphthol Yellow	846-70-8	Erythrosine E127	568-63-8
Para Red	6410-10-2	p-Nitroaniline	100-01-6	Ponceau 3R	3564-09-8	Rocceline (Acid Red 88)	1658-56-6

Tab. 1: Parameters analysed by Eurofins (liposoluble dyes orange deposited, water soluble dyes blue deposited)

