

INGREDIENTS HANDBOOK

# Food Colours

Edited by  
Victoria Emerton



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Leatherhead Food International

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Victoria Emerton

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## FOREWORD

The Ingredients Handbook series, published by Leatherhead Food International and Blackwell Publishing Ltd., constitutes a comprehensive source of information on food additives and ingredients including colours, sweeteners, fat replacers and pre- and probiotics. Each title in the series provides a concise overview of the general and physiological properties associated with the specific ingredient or additive, as well as detailed information on applications. In addition, all handbooks contain a review of the related legislation in the UK, Europe and USA, and a detailed list of suppliers.

All chapters are written by experts from within the industry who manufacture or use these products on a daily basis, and edited by Leatherhead Food International's team of experienced technical advisors. These handbooks are an invaluable and authoritative source of reference for all food technologists, and other food-industry professionals. The second handbook in this series on food colours, first published in 1997, has now been completely revised with respect to recent regulatory changes.

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My thanks to the authors who have contributed both their time and expertise to this publication, and also to their employers for supporting them; I would like to thank Valerie Rayner of Sensient Colours UK Ltd in particular as she wrote all the chapters on Synthetic Colours. I would also like to acknowledge: - Alice Pegg, Business Manager for the Ingredients and Product Innovation Group at Leatherhead Food International, whose broad experience of the food and drink industry, has been invaluable; Catherine Raw in Leatherhead Food International's Publications Department who has been an exceptional guide throughout; Alison Turner for her continued diligence whilst typesetting; Ann Pernet for indexing; and Claire King in our Regulatory team for her expertise on the legislation covering colours.

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## INTRODUCTION

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Colour is the first thing that we notice about food, so is a very important factor in food choice. In fact, if we do not like the appearance of the food we may not even get as far as tasting it. The colour of the food or drink is also strongly linked to flavour. We expect strawberry-flavoured foods to be red, or processed peas to be green. Tests have shown that if a product is coloured a different colour to that expected for the flavour (e.g. a red colour with a lemon flavour), most people will get the flavour wrong.

The challenge with prepared food products is that processing (to ensure product safety) often degrades the colour, and this can continue to reduce over the product shelf life. For consumer appeal, the natural colour therefore needs to be boosted with added colours. Also, many products are naturally colourless, for example, sugar confectionery and soft drinks, so colour is added for better consumer appeal. Colour enhancement can also play a vital role in consumer expectation and perceived product quality. Consistency across product batches is also important as consumers expect the colour of the product to continually match their expectations. With natural ingredients, such as fruit and vegetables, natural variation is inevitable, and foods that require some processing may benefit from additional colour to ensure uniformity.

Factors which influence the choice of colour are: the properties of the food (e.g. pH, water- or fat-based), processing parameters (exposure to light, oxygen or heat), packaging material and shelf life, costs, marketing aspects, and legislation. The advantage of this Handbook is that it will make it much easier to identify which colours are most suitable for your food or drink product.

One of the major drivers currently is that of 'clean labelling', fuelled by consumer demand for everything to be natural, and the removal of chemical/artificial additives. This has recently been fuelled by research indicating adverse effects of certain artificial colours on the behaviour of children. Some artificial colours have long been linked with hyperactive behaviour, and attention deficit hyperactivity disorder (ADHD), and consumer concern over this, driven by

the retailers, has already seen the removal of artificial colours from foods, particularly those aimed at children. The European Food Safety Authority is reviewing the use of artificial colours in food, focusing initially on Allura red, Quinoline Yellow, Sunset Yellow, Carmoisine, Tartrazine and Ponceau 4R, and in the autumn of 2007 the colour Red 2G was banned from use in food due to concerns over carcinogenicity.

This 2<sup>nd</sup> edition of the Colours Handbook from Leatherhead Food International has been fully revised, with updated legislation covering each colour, and colours now banned from use have been removed from the book's content.

An added challenge for food manufacturers is the drive to produce healthier food products, reducing salt, sugar and fat, and adding ingredients with added health benefits. Yet these 'healthy' products need to be just as appealing in terms of colour, taste and texture as the less healthy versions. The Colours Handbook will give manufacturers a complete guide to the wide range of food colours available, and which colours will best suit their product, process and shelf life conditions. It remains the ideal practical tool for the food industry, and those interested in the ingredients used to colour food.

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## **1. NATURAL COLOURS**





## 1.1 ANNATTO (Bixin and Norbixin) (E160b)

### 1.1.1 Description

**Synonyms:** Bixin, Norbixin, Rocou, Achioté,  
C.I. Natural Orange 4, C.I. 75120

**Classification:** Apocarotenoid

**Chemical names:**

Bixin: 6'-Methylhydrogen-9'-*cis*-6,6'-diapocarotene-6,6'-dioate  
6'-Methylhydrogen-9'-*trans*-6,6'-diapocarotene-6,6'-  
dioate

Norbixin: 9'*Cis*-6,6'-diapocarotene-6,6'-dionic acid  
9'-*Trans*-6,6'-diapocarotene-6,6'-dionic acid (and its  
corresponding sodium or potassium salts)

**Empirical formula:** Bixin:  $C_{25}H_{30}O_4$   
Norbixin:  $C_{24}H_{28}O_4$

**Molecular mass:** Bixin: 394.51  
Norbixin: 380.48

**Structural formula:**

