

CARTHAMUS YELLOW

Prepared at the 51st JECFA (1998), published in FNP 52 Add 6 (1998) superseding specifications prepared at the 49th JECFA (1998), published in FNP 52 Add 5 (1997). Metals and arsenic specifications revised at the 59th JECFA (2002). No ADI allocated at the 29th JECFA in 1985.

SYNONYMS

Safflower yellow, CI Natural Yellow 5

DEFINITION

Carthamus Yellow, a flavonoid, is obtained by extracting the corolla (petals) of *Carthamus tinctorius* L. with water or slightly acidified water and drying the extract. The principal colouring matters are safflorin A (hydroxysafflor yellow A) and safflorin B (safflor yellow B). Besides the colour pigments carthamus yellow consists of sugars, salts and/or proteins naturally occurring in the source materials. Food grade materials such as dextrin may be added as carriers for manufacturing dry, powdered items of commerce.

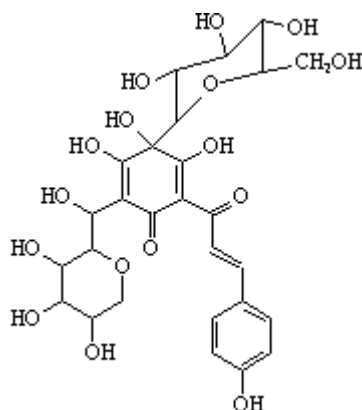
C.A.S number

I. 78281-02-4 (Safflorin A)
II. 120478-62-8 (Safflorin B)

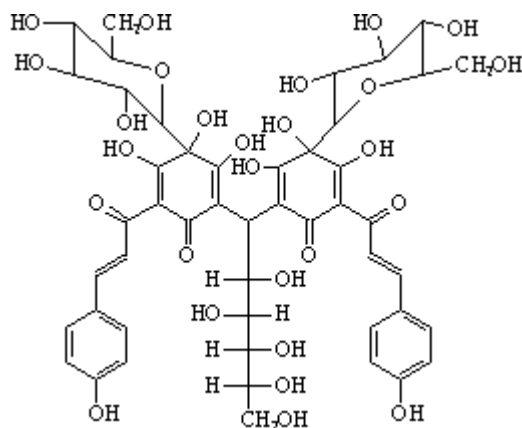
Chemical formula

I. $C_{27}H_{32}O_{16}$ (Safflorin A)
II. $C_{48}H_{54}O_{27}$ (Safflorin B)

Structural formula



Safflorin A



Safflorin B

Formula weight

I. 612.5 (Safflorin A)
II. 1062 (Safflorin B)

Assay Content of colouring matters (calculated as safflomin A) not less than declared

DESCRIPTION Yellow to dark brown crystals, paste, powder or liquid with a faint characteristic odour.

FUNCTIONAL USES Colour

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Very soluble in water, practically insoluble in ether and ethanol

Spectrophotometry (Vol. 4) A solution of the sample in citric acid/disodium hydrogen phosphate buffer solution (pH 5.0) is yellow and shows an absorption maximum at 400-408 nm.

Thin layer chromatography (Vol. 4) Activate cellulose for 20 min at 60-80° and prepare a TLC plate. Prepare a 10% solution of the sample in methanol and apply 20 µl to the plate. Allow to dry and develop using a mixture of n-butanol, acetic acid and water (4:1:2 by volume) until the solvent front has ascended about 10 cm. Allow to dry. The main components of carthamus yellow appear as two yellow spots with R_f values in the range 0.2-0.5.

Colour reaction Make the solution of the sample in water alkaline by 10% sodium hydroxide solution; the colour changes from yellow to orange-yellow

PURITY

Synthetic dyes Basic dyes: To 1 g of the sample add 100 ml of 1% sodium hydroxide solution, and mix well. Extract 30 ml of this solution with 15 ml of ether. Then extract the ether layer twice with dilute acetic acid (5 ml); the dilute acetic acid layer does not contain any colour.

Acidic dyes: To 1 g of the sample add 1 ml of ammonia TS and 8 ml of water, and shake well. Discard an oily layer when separated. Proceed as directed under *Paper Chromatography (Ascending Chromatography)* using 20 µl of the solution as the sample solution, and a mixture of pyridine and ammonia TS (2:1 by volume) as the developing solvent. Stop the development when the solvent front has advanced about 15 cm from the point of application. No spot is observed at the solvent front after drying under daylight. If any spot is observed, it should be decolourized when sprayed with a solution of stannous chloride in hydrochloric acid (2 in 5).

Lead (Vol. 4) Not more than 5 mg/kg
Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."

METHOD OF ASSAY

Transfer about 0.02 g of the sample, accurately weighed, in a 200-ml volumetric flask; dissolve in and dilute to volume with citric acid/disodium hydrogen phosphate buffer solution (pH 5.0), and centrifuge if necessary.

Determine the absorbance (A) at an absorption maximum in 400-408 nm in a 1-cm cell with the buffer solution as a blank and calculate the percent of colouring matter (P) with the following formula:

$$P = \frac{A}{487} \times \frac{200}{W}$$

where

W = weight of sample in g

$A_{1\text{ cm}}^{1\%}$ of safflorin A = 487

λ_{max} = 400 - 408 nm