PAPRIKA OLEORESIN

Prepared at the 35th JECFA (1989), published in FNP 49 (1990) and in FNP 52 (1992). Metals and arsenic specifications revised at the 59th JECFA (2002). An ADI 'acceptable' was established at the 14th JECFA (1970)

SYNONYMS   Paprika extract, Oleoresin paprika, INS No. 160c

DEFINITION   Obtained by solvent extraction of paprika, which consists of the ground fruit pods, with or without the seeds, of Capsicum annuum L and contains the major flavouring and colouring principles of this spice; the major flavouring principle is capsaicin; the major colouring principles are capsanthin and capsorubin; a wide variety of other coloured compounds are known to be present. Only the following solvents may be used: trichloroethylene, acetone, propan-2-ol, methanol, ethanol, hexane. The solvent is subsequently removed.

Chemical names   Capsaicin: (E)-N-[(4-hydroxy-3-methoxyphenyl)methyl]-8-methyl-6-nonenamide
Capsanthin: (3R,3'S,5'R)-3,3'-dihydroxy-beta,kappa-carotene-6-one
Capsorubin: (3S,3'S,5R,5R')-3,3'-dihydroxy-kappa,kappa-carotene-6,6'-dione
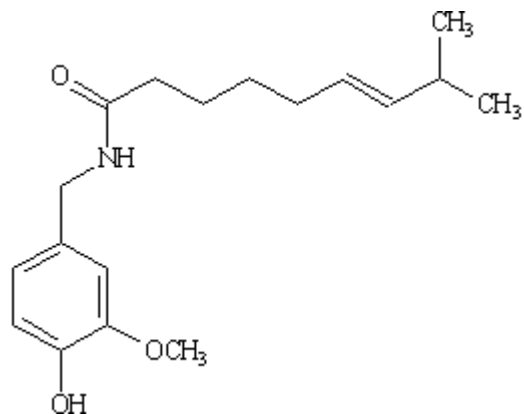
C.A.S. number   68917-78-2
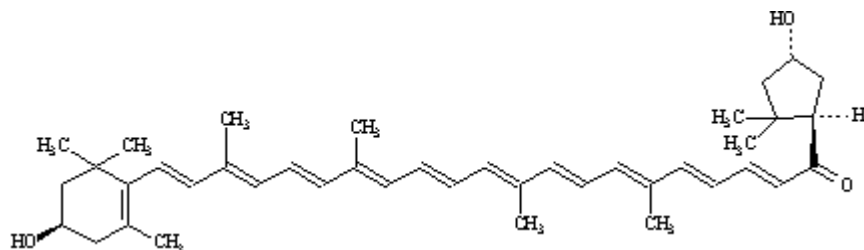
Chemical formula   Capsaicin $C_{18}H_{27}NO_3$
Capsanthin $C_{40}H_{56}O_3$
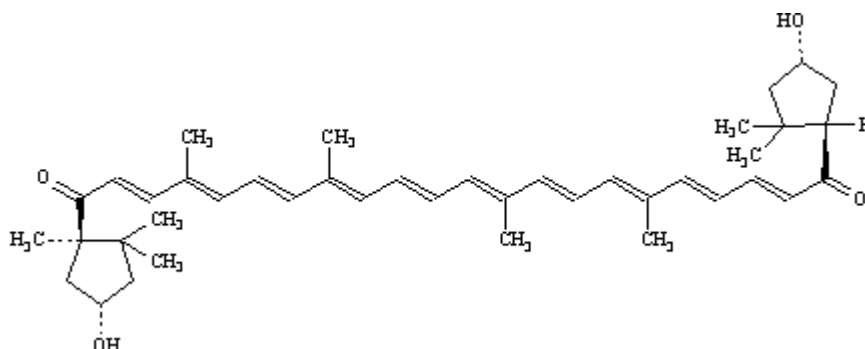Capsorubin $C_{40}H_{56}O_4$

Structural formula

Capsaicin

Capsanthin

Capsorbin

Formula weight	Capsaicin: 305.40 Capsanthin: 584.85 Capsorubin: 600.85
Assay	Not less than 500 ASTA Colour Value units

DESCRIPTION   Dark red viscous liquid

FUNCTIONAL USES Colour, flavouring agent

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)	Practically insoluble in water: partially soluble with oily separation in ethanol; insoluble in glycerin
Spectrophotometry (Vol. 4)	In hexane the maximum absorption is at about 470 nm
Colour reaction	To one drop of sample add 2-3 drops of chloroform and one drop of sulfuric acid. A deep blue colour is produced.

PURITY

Residual solvent (Vol. 4)	Dichloromethane and trichloroethylene: Not more than 30/mg/kg, singly or in combination Acetone: Not more than 30 mg/kg Propan-2-ol: Not more than 50 mg/kg Methanol: Not more than 50 mg/kg Ethanol: Not more than 50 mg/kg Hexane: Not more than 25 mg/kg
Capsaicin	Not more than 0.5%

	See description under TESTS

Arsenic (Vol. 4)   Not more than 3 mg/kg (Method II)

Lead (Vol. 4)   Not more than 2 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."

TESTS

PURITY TESTS

Capsaicin   Weigh accurately about 5 g in a 300-ml ground joint flask. After addition of 100 ml of 70% methanol, shake for 30 min. Let the solution settle for 5 min and filter. Cover the funnel to avoid evaporation. The first 25 ml of the filtrate is discarded and the rest of the filtrate mixed well. Afterwards, solutions are prepared in 100-ml volumetric flasks in the following manner:

	flask 1 (ml)	flask 2 (ml)	flask 3 (ml)	flask 4 (ml)
Filtrate solution	4.00	4.00	-	-
Distilled water	17.80	16.80	19.00	18.00
1 N HCl	1.00	-	1.00	-
1 N NaOH	-	2.00	-	2.00

Mix the solutions well and fill the flasks to 100 ml with methanol. Measure the absorbances A_1 - A_4 of the four solutions at 248 nm and 296 nm (deuterium lamp, quartz cuvettes).

Calculate the concentration of capasicin from:

At 248 nm:

$$\% \ Capsaicin \ = \ \frac{[(A_2 \ - \ A_1) \ - \ (A_4 \ - \ A_3)] \times 2500}{314 \times weight \ of \ sample \ (g)}$$

At 296 nm

$$\% \ Capsaicin \ = \ \frac{[(A_2 \ - \ A_1) \ - \ (A_4 \ - \ A_3)] \times 2500}{127 \times weight \ of \ sample \ (g)}$$

where
2500 = dilution
314 and 127 = correction factors
Replicate determinations of (a) and (b) must not differ more than 10%, otherwise the determination is to be repeated.

METHOD OF ASSAY Determine the ASTA (American Spice Trade Association) Colour Value according to the following procedure:

Apparatus:
Spectrophotometer, capable of accurately measuring absorbance at 460 nm, absorption cells, 1 cm, matched cells with stoppers, volumetric flasks, 100 ml, with ground glass stoppers, pipette, transfer-type, 10 ml, Whatman No. 40 filter paper or equivalent

Reagents
- Acetone, technical grade
- Cobaltous ammonium sulfate crystals (caution: very toxic material)
- Potassium dichromate, reagent grade
The cobaltous ammonium sulfate should be dried one week in a desiccator containing anhydrous calcium sulfate. No preliminary treatment is needed for the potassium dichromate.

Standard colour solution:
0.3005 g/L potassium dichromate plus 34.96 g/L cobaltous ammonium sulfate crystals in 1.8 M sulfuric acid solution. The absorbance of this solution (A_s) in a 1-cm cell at 460 nm should be about 0.600.

Procedure:
Accurately weigh a sample of 50 to 80 mg in a 100-ml volumetric flask and dilute to the mark with acetone. Allow the extraction to proceed for at least 15 min with occasional shaking. With a 10-ml pipette, transfer 10.0 ml of the extract into another 100-ml volumetric flask, and dilute to the mark with acetone. Filter the diluted extract using Whatman No. 40 filter paper or equivalent; discard the first 10 or 15 ml of filtrate. Decant a portion of the filtrate into a cell and measure the absorbance at 460 nm using acetone as a blank. Determine the absorbance (A_s) of the Standard colour solution at 460 nm.

Calculation
Calculate cell length and instrument correction factor, I_f from:

$$I_f = \frac{0.600}{A_s}$$

Calculate Extractable colour (ASTA colour value units) from:

$$\frac{A \times 164 \times I_f}{sample\ weight\ (g)}$$

where
A = absorbance of acetone extract at 460 nm