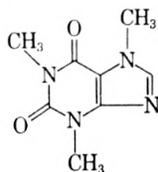


Caffeine

1,3,7-Trimethylxanthine

 $C_8H_{10}N_4O_2$

Mol wt 194.19

DESCRIPTION

A white powder, or white, glistening needles, usually matted together. Caffeine is anhydrous or contains one molecule of water of hydration. It is odorless and has a bitter taste. Its solutions are neutral to litmus. The hydrate is efflorescent in air. One g of hydrated caffeine is soluble in about 50 ml of water, in 75 ml of alcohol, in about 6 ml of chloroform, and in 600 ml of ether.

REQUIREMENTS**Identification**

- A. Dissolve about 5 mg in 1 ml of hydrochloric acid in a porcelain dish, add 50 mg of potassium chlorate, and evaporate on a steam bath to dryness. Invert the dish over a vessel containing a few drops of ammonia TS. The residue acquires a purple color, which disappears upon the addition of a solution of a fixed alkali.
- B. To a saturated solution of caffeine add tannic acid TS. A precipitate, which is soluble in an excess of the reagent, is formed.
- C. To 5 ml of a saturated solution of caffeine add 5 drops of iodine TS. No precipitate is formed. Then add 3 drops of diluted hydrochloric acid TS. A red brown precipitate, which dissolves when a slight excess of sodium hydroxide TS is added, is formed.

Assay Not less than 98.5% and not more than the equivalent of 101.0% of $C_8H_{10}N_4O_2$, calculated on the anhydrous basis.

Arsenic (as As) Not more than 3 ppm.

Heavy Metals (as Pb) Not more than 0.002%.

Lead Not more than 10 ppm.

Melting Range Between 235° and 237.5°.

Other Alkaloids Passes test.

Readily Carbonizable Substances Passes test.

Residue on Ignition Not more than 0.1%.

Water *Anhydrous caffeine*: not more than 0.5%; *hydrous caffeine*: not more than 8.5%.

TESTS

Assay Dissolve about 800 mg, accurately weighed, of finely powdered caffeine, with warming, in a mixture of 80 ml of

acetic anhydride and 180 ml of benzene. Cool, and titrate with 0.1 N perchloric acid, determining the endpoint potentiometrically. Each ml of 0.1 N perchloric acid is equivalent to 19.42 mg of $C_8H_{10}N_4O_2$.

Arsenic A *Sample Solution* prepared as directed for organic compounds meets the requirements of the *Arsenic Test*, page 464.

Heavy Metals A solution of 500 mg in 2.5 ml of hydrochloric acid and 23 ml of water meets the requirements of the *Heavy Metals Test*, page 512, using 10 µg of lead ion (Pb) in the control (*Solution A*).

Lead A *Sample Solution* prepared as directed for organic compounds meets the requirements of the *Lead Limit Test*, page 518, using 10 µg of lead ion (Pb) in the control.

Melting Range Dry at 80° for 4 h and then determine as directed in the general procedure, page 519.

Other Alkaloids Add a few drops of mercuric-potassium iodide TS to 5 ml of a 1 in 50 solution of the sample. No precipitate forms.

Readily Carbonizable Substances, page 532 Dissolve 500 mg in 5 ml of sulfuric acid TS. The color is no darker than *Matching Fluid D*.

Residue on Ignition, page 533 Ignite 2 g as directed in the general method.

Water Determine the water content by drying at 80° for 4 h (page 518) or by the *Karl Fischer Titrimetric Method*, page 552.

Packaging and Storage Store hydrous caffeine in tight containers and anhydrous caffeine in well-closed containers.

Labeling Label caffeine to indicate whether it is anhydrous or hydrous.

Functional Use in Foods Flavoring agent; stimulant.