

## Carbomer (Carbomerum)

**Chemical name.** Acrylic acid polymer with sucrose polyalkyl ether; carbomer; CAS Reg. No. 9007-20-9.

**Description.** A white, fluffy powder; odour, slight, characteristic.

**Solubility.** After neutralization with alkali hydroxides or amines, soluble in water, ethanol (~750 g/l) TS, and glycerol R.

**Category.** Suspending agent.

**Storage.** Carbomer should be kept in a tightly closed container.

**Additional information.** Carbomer is very hygroscopic.

### Requirements

**Definition.** Carbomer is a synthetic high molecular mass polymer of allyl acid copolymerized with polysucrose.

Carbomer contains not less than **56.0%** and not more than the equivalent of **68.0%** of carboxylic acid groups (-COOH), calculated with reference to the dried substance.

### Identity tests

A. Disperse 0.5 g in 50 mL of water. To 10 mL add a few drops of thymol blue/ethanol TS; the colour of the dispersion is orange. To a further 10 mL add a few drops of cresol red/ethanol TS; the colour is yellow. (Keep the dispersion for test B.)

B. Adjust the pH of the dispersion from test A to about 7.5 with sodium hydroxide (1 mol/l) VS; a very viscous gel is produced.

**Yield value.** Prepare a gel as follows: Carefully add 2.5 g to 500 mL of water containing 0.25 g of sodium chloride R in a 1000-mL beaker, stirring continuously at 990-1010 revolutions per minute, the stirrer shaft set to one side of the beaker and near to the bottom at an angle of 60° from the vertical. Add Carbomer being examined slowly at a uniform rate over 45-90 seconds, ensuring that any loose aggregates of powder are broken up. Continue to stir for 15 minutes, remove the stirrer, and allow the beaker containing the dispersion to stand in a water-bath at a temperature of 24.8-25.2 °C for 30 minutes. Insert the stirrer to a depth such that air is not drawn into the dispersion and, while stirring at 290-310 revolutions per minute, add 0.2 mL of phenolphthalein/ethanol TS and 1.5 mL of bromothymol blue/ethanol TS. Add rapidly below the surface 5 mL of sodium hydroxide (~200 g/l) TS and stir for 2-3 minutes until neutralization is reached, indicated by a uniform blue colour. Adjust the pH to 7.3-7.8 potentiometrically, using glass and calomel electrodes, either adding more sodium hydroxide (~200 g/l) TS or preparing a new mucilage using less sodium hydroxide for the neutralization. Return the neutralized mucilage to the water-bath maintained at 25 °C for 1 hour.

The apparatus consists of two clear soda-glass plates, 100 mm × 100 mm × 3 mm. Rub together by hand fine carborundum paste using two opposing faces of the plates to obtain an even and matt surface. With a diamond marker engrave the plates to show centre and corner alignments and four sample location points equidistant from the plate centre and the four corners.

Place the plates in a water-bath at 24.8-25.2 °C to settle, and dry them rapidly before use. Apply 0.1 g of the mucilage to the matt surface of one of the plates at each location for the sample. Align the second plate and lower it carefully, matt side downwards, onto the lower plate. Top the apparatus with a weight so that the combined mass applied equals 100 g. Allow the assembly to stand for 10 minutes and measure the diameters of the 4 zones of each sample using a strip of paper calibrated in mm; the mean diameter of the zones does not exceed 2.0-2.2 cm.

**Sulfated ash.** Not more than 1.0 mg/g.

**Loss on drying.** Dry at 80 °C for 1 hour; it loses not more than 20 mg/g.

**Assay.** Slowly add 0.4 g, accurately weighed and previously dried at 80 °C for 1 hour, to 400 mL of water while mixing with a magnetic stirrer until completely dissolved. At reduced stirring speed, titrate potentiometrically, using glass and calomel electrodes, with sodium hydroxide (0.2 mol/l) VS. After each addition of sodium hydroxide and before recording the pH of the solution, allow to stir for 1 minute.

Each mL of sodium hydroxide (0.2 mol/l) VS is equivalent to 9.004 mg of carboxylic acid groups (-COOH).