

1 Nonproprietary Names

BP: Acacia
JP: Acacia
PhEur: Acacia
USP–NF: Acacia

2 Synonyms

Acaciae gummi; acacia gum; arabic gum; E414; gum acacia; gum arabic; gummi africanum; gummi arabicum; gummi mimosae; talha gum.

3 Chemical Name and CAS Registry Number

Acacia [9000-01-5]

4 Empirical Formula and Molecular Weight

Acacia is a complex, loose aggregate of sugars and hemicelluloses with a molecular weight of approximately 240 000–580 000. The aggregate consists essentially of an arabic acid nucleus to which are connected calcium, magnesium, and potassium along with the sugars arabinose, galactose, and rhamnose.

5 Structural Formula

See Section 4.

6 Functional Category

Emulsifying agent; modified-release agent; suspending agent; tablet and capsule binder; viscosity-increasing agent.

7 Applications in Pharmaceutical Formulation or Technology

Acacia is mainly used in oral and topical pharmaceutical formulations as a suspending and emulsifying agent, often in combination with tragacanth. It is also used in the preparation of pastilles and lozenges, and as a tablet binder, although if used incautiously it can produce tablets with a prolonged disintegration time. Acacia has also been evaluated as a bioadhesive;⁽¹⁾ and has been used in novel tablet formulations,⁽²⁾ and modified release tablets.⁽³⁾

See Table I.

Table I: Uses of acacia.

Use	Concentration (%)
Emulsifying agent	10–20
Pastille base	10–30
Suspending agent	5–10
Tablet binder	1–5

Acacia is also used in cosmetics, confectionery, food products, and spray-dried flavors.⁽⁴⁾

See also Section 18.

8 Description

Acacia is available as white or yellowish-white thin flakes, spheroidal tears, granules, powder, or spray-dried powder. It is odorless and has a bland taste.

9 Pharmacopeial Specifications

The PhEur 9.2 provides monographs on acacia and spray-dried acacia, while the USP 40–NF 35 S1 describes acacia in a single

monograph that encompasses tears, flakes, granules, powder, and spray-dried powder. The USP 40–NF 35 S1 also has a monograph on acacia syrup. The JP XVII has monographs on acacia and powdered acacia; see Table II.

Table II: Pharmacopeial specifications for acacia.

Test	JP XVII	PhEur 9.2	USP 40–NF 35 S1
Identification	+	+	+
Characters	+	+	+
Microbial limit	–	≤10 ⁴ cfu/g	+
Water	≤17.0%	≤15.0%	≤15.0%
	≤15.0% ^(a)	≤10.0% ^(b)	–
Total ash	≤4.0%	≤4.0%	≤4.0%
Acid-insoluble ash	≤0.5%	–	≤0.5%
Insoluble residue	≤10.0 mg	≤0.5%	≤50 mg/5g
Arsenic	–	–	≤3 ppm
Lead	–	–	≤10 ppm
Heavy metals	–	–	≤4 ppm
Starch, dextrin, and agar	–	+	+
Tannin-bearing gums	+	+	+
Tragacanth	–	+	–
Sterculia gum	–	+	–
Glucose	+	–	–
Glucose and fructose	–	+	–
Solubility and reaction	–	–	+

(a) Powdered acacia.

(b) Spray-dried acacia.

10 Typical Properties

Acidity/alkalinity pH = 4.5–5.0 (5% w/v aqueous solution)

Acid value 2.5

Hygroscopicity At relative humidities of 25–65%, the equilibrium moisture content of powdered acacia at 25°C is 8–13% w/w, but at relative humidities above about 70% it absorbs substantial amounts of water.

Solubility Soluble 1 in 20 of glycerin, 1 in 20 of propylene glycol, 1 in 2.7 of water; practically insoluble in ethanol (95%). In water, acacia dissolves very slowly, although almost completely after two hours, in twice the mass of water leaving only a very small residue of powder. The solution is colorless or yellowish, viscous, adhesive, and translucent. Spray-dried acacia dissolves more rapidly, in about 20 minutes.

Specific gravity 1.35–1.49

Spectroscopy

IR spectrum see Figure 1.

NIR spectrum see Figure 2.

Raman spectrum see Figure 3.

Viscosity (dynamic) 100 mPa s for a 30% w/v aqueous solution at 20°C. The viscosity of aqueous acacia solutions varies depending upon the source of the material, processing, storage conditions, pH, and the presence of salts. Viscosity increases slowly up to about 25% w/v concentration and exhibits Newtonian behavior. Above this concentration, viscosity increases rapidly (non-Newtonian rheology). Increasing temperature or prolonged heating of solutions results in a decrease of viscosity owing to depolymerization or particle agglomeration.

See also Section 12.