Cetyl Alcohol

1 Nonproprietary Names

BP: Cetyl Alcohol

JP: Cetanol

PhEur: Cetyl Alcohol

USP–NF: Cetyl Alcohol

2 Synonyms

Alcohol cetylicus; *Avol*; *Cachalot*; *Cetanol*; *Crodacol C70*; *Crodacol C90*; *Crodacol C95*; ethal; ethol; *HallStar CO-1695*; 1-hexadecanol; *n*-hexadecyl alcohol; *Hyfatol 16-95*; *Hyfatol 16-98*; *Kessco CA*; *Lanette 16*; *Lipocol C*; *Nacol 16-95*; palmityl alcohol; *Rita CA*; *Speziol C16 Pharma*; *Tego Alkanol 16*; *Vegarol 1695*; *Vegarol 1698*.

3 Chemical Name and CAS Registry Number

Hexadecan-1-ol [36653-82-4]

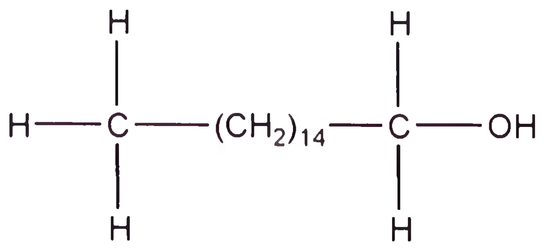
4 Empirical Formula and Molecular Weight

$C_{16}H_{34}O$ 242.44 (for pure material)

Cetyl alcohol, used in pharmaceutical preparations, is a mixture of solid aliphatic alcohols comprising mainly 1-hexadecanol ($C_{16}H_{34}O$). The USP 40–NF 35 S1 specifies not less than 90.0% of cetyl alcohol, the remainder consisting chiefly of related alcohols.

Commercially, many grades of cetyl alcohol are available as mixtures of cetyl alcohol (60–70%) and stearyl alcohol (20–30%), the remainder being related alcohols.

5 Structural Formula



6 Functional Category

Coating agent; emollient; emulsifying agent; stiffening agent.

7 Applications in Pharmaceutical Formulation or Technology

Cetyl alcohol is widely used in cosmetics and pharmaceutical formulations such as suppositories, modified-release solid dosage forms, emulsions, lotions, creams, and ointments.

In suppositories cetyl alcohol is used to raise the melting point of the base, and in modified-release dosage forms it may be used to form a permeable barrier coating. In lotions, creams, and ointments cetyl alcohol is used because of its emollient, water-absorptive, and emulsifying properties. It enhances stability, improves texture, and increases consistency. The emollient properties are due to absorption and retention of cetyl alcohol in the epidermis, where it lubricates and softens the skin while imparting a characteristic 'velvety' texture.

Cetyl alcohol is also used for its water absorption properties in water-in-oil emulsions. For example, a mixture of petrolatum and cetyl alcohol (19:1) will absorb 40–50% of its weight of water. Cetyl alcohol acts as a weak emulsifier of the water-in-oil type, thus allowing a reduction of the quantity of other emulsifying agents used in a formulation. Cetyl alcohol has also been reported to increase the consistency of water-in-oil emulsions.

In oil-in-water emulsions, cetyl alcohol is reported to improve stability by combining with the water-soluble emulsifying agent. The combined mixed emulsifier produces a close packed, monomolecular barrier at the oil–water interface which forms a mechanical barrier against droplet coalescence.

In semisolid emulsions, excess cetyl alcohol combines with the aqueous emulsifier solution to form a viscoelastic continuous phase that imparts semisolid properties to the emulsion and also prevents droplet coalescence. Therefore, cetyl alcohol is sometimes referred to as a 'consistency improver' or a 'bodying agent', although it may be necessary to mix cetyl alcohol with a hydrophilic emulsifier to impart this property.

It should be noted that pure or pharmacopeial grades of cetyl alcohol may not form stable semisolid emulsions and may not show the same physical properties as grades of cetyl alcohol that contain significant amounts of other similar alcohols. *See* Section 4.

See Table I.

Table I: Uses of cetyl alcohol.

Use	Concentration (%)
Emollient	2–5
Emulsifying agent	2–5
Stiffening agent	2–10
Water absorption	5

8 Description

Cetyl alcohol occurs as waxy, white flakes, granules, cubes, or castings. It has a faint characteristic odor and bland taste.

9 Pharmacopeial Specifications

See Table II.

Table II: Pharmacopeial specifications for cetyl alcohol.

Test	JP XVII	PhEur 9.2	USP 40–NF 35 S1
Identification	–	+	+
Characters	–	+	–
Melting range	47–53°C	46–52°C	–
Residue on ignition	≤0.05%	–	–
Ester value	≤2.0	–	–
Alkali	+	–	–
Acid value	≤1.0	≤1.0	≤2
Iodine value	≤2.0	≤2.0	≤5
Hydroxyl value	210–232	218–238	218–238
Saponification value	–	≤2.0	–
Clarity and color of solution	+	+	–
Assay	–	≥95.0%	≥90.0%

10 Typical Properties

Boiling point

316–344°C;

300–320°C for *Nacol 16-95*;

310–360°C for *Speziol C16 Pharma*;