

Pharmaceutical aids

These substances, which have little or no therapeutic value, but essentially used in mfg. or compounding of various pharmaceuticals, are called Pharmaceutical aids.

Source: animals, vegetables, minerals, synthetic.

Classification

1. Acidulants
It give sharp taste to food
Assist in the setting of gel & as a preservative
Eg. Tamerind , lemon juice, tomatos etc..
2. Colors:
which impart the color with stability & non toxicity
Eg: Caramel, turmeric, saffron, Indigo
3. Disintegrating Agent
Use in tablet mfgs. For reduce breakup of tablet into smaller fragments
Eg. Starch, CMC, Microcrystalline cellulose
4. Diluents: diluting agent Used to treat too viscous fluid Eg: Cinnamon water, peppermint water, corn oil, peanut oil, seasom oil, glucose, lactose
5. Emulsifying agent
Which is soluble in both fat & water and enable fat to be uniformly dispersed in water as an emulsion.
Also in backing to aid the smooth
Eg: Acacia, Agar, bentonite, gelatin etc.
6. Suspending agent:
It prevent cacking at bottom
Eg: Acacia, Agar, bentonite, gelatin etc
7. Filter aids
Help in filtration of colloids, fine particles, gel.eg; talc, bentonite,diatomite
It should be porous, irregular in shape, rigid particle, not produce filter cake, dispersing, low bulky, suspending, chemically stable & inert.
8. Flavour: It provide sensory impression to food It become sweet, sour taste. Eg: cardamom, rose, cocoa, lemon, orange
9. Lubricant □Introduce between 2 surface to reduce friction b/w them.
Improve efficiency Mg stearate, talc, cocoa butter
10. Sweetening agent:
Which provide sweet taste to food
Eg: honey, saccharin, glycyrrhiza
11. thickening agent: Increase viscosity, stability Eg: pectin, tragacanth, methyl cellulose

HONEY

Synonyms

Madhu, Madh, Mel, Purified Honey.

Biological Source

Honey is a viscid and sweet secretion stored in the honey comb by various species of bees, such as *Apis mellifera*, *Apis dorsata*, *Apis florea*, *Apis indica* and other species of *Apis*, belonging to family Apidae (Order: Hymenoptera).

Geographical Source

Honey is available in abundance in Africa, India, Jamaica, Australia, California, Chili, Great Britain and New Zealand.

Morphology

Colour	Pale yellow to reddish brown viscid fluid
Odour	Pleasant and Characteristic
Taste	Sweet, slightly acrid
Extra Features	However, the taste and odour of honey solely depends upon the availability of surrounding flowers from which nectar is collected. On prolonged storage it usually turns opaque and granular due to crystallization of dextrose and is termed as 'Granulated honey'

Chemical Constituents

The average composition of honey is as follows: Moisture 14–24%, Dextrose 23–36%, Levulose (Fructose) 30–47%, Sucrose 0.4–6%, Dextrin and Gums 0–7% and Ash 0.1–0.8%. Besides, it is found to contain small amounts of essential oil, beeswax, pollen grains, formic acid, acetic acid, succinic acid, maltose, dextrin, colouring pigments, vitamins and an admixture of enzymes, for example, diastase, invertase and inulase. Interestingly, the sugar contents in honey varies widely from one country to another as it is exclusively governed by the source of the nectar (availability of fragment flowers in the region) and also the enzymatic activity solely controlling the conversion into honey.

Chemical Tests

Adulteration in honey is determined by the following tests:

1. **Fiehe's Test for Artificial Invert Sugar:** Honey (10 ml) is shaken with petroleum or solvent ether (5 ml) for 5–10 min. The upper ethereal layer is separated and evaporated in a china dish. On addition of 1% solution of resorcinol in hydrochloric acid (1 ml) a transient red colour is formed in natural honey while in artificial honey the colour persists for sometime.

2. **Reduction of Fehling's Solution:** To an aqueous solution of honey (2 ml) Fehling's solutions A and B are added and the reaction mixture is heated on a steam bath for 5–10 min. A brick red colour is produced due to the presence of reducing sugars.
3. **Limit Tests:** The limit tests of chloride, sulphate and ash (0.5%) are compared with the pharmacopoeial specifications.

Uses

Honey shows mild laxative, bactericidal, sedative, antiseptic and alkaline characters. It is used for cold, cough, fever, sore eye and throat, tongue and duodenal ulcers, liver disorders, constipation, diarrhoea, kidney and other urinary disorders, pulmonary tuberculosis, marasmus, rickets, scurvy and insomnia. It is applied as a remedy on open wounds after surgery. It prevents infection and promotes healing. Honey works quicker than many antibiotics because it is easily absorbed into the blood stream. It is also useful in healing of carbuncles, chaps, scalds, whitlows and skin inflammation; as vermicide; locally as an excipient, in the treatment of aphthae and other infection of the oral mucous membrane. It is recommended in the treatment of preoperative cancer. Honey, mixed with onion juice, is a good remedy for arteriosclerosis in brain. Diet rich in honey is recommended for infants, convalescents, diabetic patients and invalids.

Honey is an important ingredient of certain lotions, cosmetics, soaps, creams, balms, toilet waters and inhalations. It is used as a medium in preservation of cornea.

Today, as in earlier times, honey is used as an ingredient in various cough preparations. It is also used to induce sleep, cure diarrhoea, and treat asthma. A review of literature found at least 25 scientific articles verifying honey's wound and topical ulcer healing powers.

Interestingly, potent antibacterial peptides (apidaecins and abaecin) have been isolated and characterized in the honeybee (*Apis mellifera*) itself and a new potent antibacterial protein named royalisin has been found in the royal jelly of the honeybee.

Adulterant and Substitutes

Due to the relatively high price of pure honey, it is invariably adulterated either with artificial invert sugar or simply with cane-sugar syrup. These adulterants or cheaper substituents not only alter the optical property of honey but also its natural aroma and fragrance.

Marketed Product

OLBAS Cough Syrup manufactured by Olbas Herbal Remedies, Philadelphia is mainly used for the treatment of cough and sore throat.

ARACHIS OIL

Synonyms

Groundnut oil; monkeynut oil; peanut oil; katchung oil; earth-nut oil.

Biological Source

Arachis oil is obtained by expression of shelled and skinned seeds of *Arachia hypogaea* Linn., belonging to family Papilionaceae.

Geographical Source

South America (Brazil) is the original home of ground nut and now found in South and Central America, Peru, Argentina, Nigeria, Australia, India, Gambia, and other reasonably warm regions of all countries.

Characteristics

Groundnut plant is a small, prostrate, diffuse, erect, branched, annual herb, 30–60 cm in height, leaves alternate with adnate stipules and yellow papilionaceous flowers. After fertilization, the pedicel elongates rapidly and enters the ground, where the ovary begins to develop into a pod maturing in about two months. Pods or nuts are cylindrical, hard, reticulated, indehiscent, and inflated, 2.5–5.0 cm long, one to three seeded, with pericarp constricted between the seeds. The seeds are covered by a light or deep reddish brown seeds coat, and consisting of two white fleshy cotyledons rich in oil and proteins.

Fruits are dug out by raking the plants from the soil, seeds are separated by machine and expressed in a hydraulic press at ordinary temperature. The remaining oil of cakes is removed by solvent extraction. The two oil fractions are combined and purified.

Chemical Constituents

The important constituents of the glycerides of groundnut oil are the fatty acids palmitic (8.3%), stearic (3.1%), oleic (56%), linoleic (26%), arachidic (24%), eicosenoic, behenic (3.1%), and lignoceric (1.1%) acids. Myristic, hexacosanoic, erucic, caprylic, lauric, and trace amounts of odd carbon fatty acids are also present. The principal glycerides of the oil are triolein (11%), dioleolinolein (21%), saturated oleolinoleins (22%), dilinoleolein (12%), saturated diolein (15%), and saturated dilinoleolein (6%).

The yellow colour of the oil is due to the presence of carotenoid pigments, chiefly β -carotene and lutein. The unsaponifiable matter consists of sterols, (campesterol, stigmasterol, β -sitosterol and cholesterol), sterol glycosides β -sitosterol-D-glycoside and others), and triterpenoid alcohols (β -amyrin, cycloartenol and 24-methylene cycloartenol). Tocopherols occur free in groundnut oil. Squalene, an unsaturated hydrocarbon, occurs in extremely small amounts in the unsaponifiable fraction. Two other unsaturated hydrocarbons, hypogene, and arachidene, have also been reported.

The kernels contain fixed oil (40–50%), proteins (26.2%), water (1.8%), carbohydrates (20.6%), ash, and high concentration of thiamine. The chief proteins are arachin and conarchin, both are

globulins of different solubility. The vitamin content of groundnut is moderate, the largest being in the episperm.

Uses

Groundnut oil is used as an edible oil, in control of pasture bloat, as a substitute for Olive oil, as a solvent in pharmaceutical aid, in hydrogenated state as shortening, in mayonnaise, in confections; for the manufacture of margarine, soap, points, liniments, plasters, and ointments, as vehicle for intramuscular medication and in the laboratory as heat transfer medium in melting point apparatus.

Marketed Products

It is one of the ingredients of the hair oil known as J.P. Nikhar oil (Jamuna Pharma) and Sage baby oil (Sage Herbals).

STARCH

Synonyms Amylum.

Biological Source

Starch consists of polysaccharide granules obtained from the grains of maize (*Zea mays* Linn.); rice (*Oryza sativa* Linn.); or wheat (*Triticum aestivum* Linn.); belonging to family Gramineae or from the tubers of potato (*Solanum tuberosum* Linn.), family Solanaceae.

Geographical Source

Most of tropical, as well as, sub-tropical countries prepare starch commercially.

Preparation of Starch

Depending upon the raw material to be used for processing or type of the starch to be produced, different processes are used for the commercial manufacture of starch.

Potato Starch: The potatoes are washed to remove the earthy matter. They are crushed or cut and converted into slurry. Slurry is filtered to remove the cellular matter. As potatoes do not contain gluten, they are very easy to process further. After filtration, the milky slurry containing starch is purified by centrifugation and washing. Then, it is dried and sent to the market.

Rice Starch: The broken pieces of rice resulted during the polishing are used for processing. The pieces of rice are soaked in water with dilute sodium hydroxide solution (0.5%), which causes softening and dissolution of the gluten. After this, the soaked rice pieces are crushed and starch prepared as described under potato starch.

Maize Starch (corn starch): Maize grains are washed thoroughly with water to remove the adhered organic matter after which they are softened by keeping in warm water for 2–3 days. Sufficient sulphur dioxide is passed to the medium to prevent fermentation. The swollen kernels are passed through attrition mill to break the grains, so as to separate the endosperm and outermost coating of the grains. At this point, special attention is given to separate the germ (embryo). This is effected by addition of water, wherein germs float and are separated. The water which is used to soften the grains dissolves most of the minerals, soluble proteins and carbohydrates from the grains. The water, being rich in all these contents, is used as a culture medium for the production of antibiotics like penicillin (corn steep liquor). The separated germs are used to prepare the germ oil by expression method and are known as corn oil. The oil contains fatty acids like linoleic and linolenic acids and vitamin E. It is used commercially, for the preparation of soap. The starchy material contains gluten; most of this is removed by simple sieving and then by washing. Starch being heavier, settles at the bottom and is followed by gluten. Several treatments with cold water wash the starch effectively, which is then centrifuged or filter-pressed and finally, dried in flash dryers on a moving belt dryer.

Wheat Starch: Wheat being the major article of food is restrictedly used for preparation of starch. In this process, the wheat flour is converted into dough and kept for-a-while. The gluten in the dough swells and the masses are taken to grooved rollers, wherein water is poured over

them with constant shaking. The starchy liquid coming out of the rollers is processed conveniently to take out the starch, which is then dried and packed suitably.

Description

Colour	Rice and maize grains are white, while wheat is cream coloured and potato is slightly yellowish
Odour	Odourless
Taste	Mucilaginous
Shape	Starch occurs as fine powder or irregular, angular masses readily reducible to powder

Microscopic Characters

Rice Starch: The granules are simple or compound. Simple granules are polyhedral, 2–12 μ in diameter. Compound granules are ovoid and 12–30 $\mu \times 7$ to 12 μ in size. They may contain 2–150 components.

Wheat Starch: Simple lenticular granules which are circular or oval in shape and 5–50 μ in diameter. Granules contain hilum at the centre and concentric faintly marked striations. Rarely, compound granules with two to four components are also observed.

Maize Starch: Granules are polyhedral or rounded, 5–31 in diameter, with distinct cavity in the centre or two to five rays cleft.

Potato Starch: Generally, found in the form of simple granules, which are sub-spherical, somewhat flattened irregularly ovoid in shape. Their sizes vary from 30–100 μ . Hilum is present near the narrower end with well-marked concentric striations.



Potato starch



Wheat starch



Rice starch



Maize starch

Starch grains obtained from the different sources

Chemical Constituents

Starch contains chemically two different polysaccharides, such as amylose (β -amylose) and amylopectin (α -amylose), in the proportion of 1:2. Amylose is water soluble and amylopectin is water insoluble, but swells in water and is responsible for the gelatinizing property of the starch. Amylose gives blue colour with iodine, while amylopectin yields bluish black colouration.

Identification Tests

1. Boil 1 g of starch with 15 ml of water and cool. The translucent viscous jelly is produced.
2. The above jelly turns deep blue by the addition of solution of iodine. The blue colour disappears on warming and reappears on cooling.

Uses

Starch is used as a nutritive, demulcent, protective and as an absorbent. Starch is used in the preparation of dusting talcum powder for application over the skin. It is used as antidote in iodine poisoning, as a disintegrating agent in pills and tablets, and as diluent in dry extracts of crude drug. It is a diagnostic aid in the identification of crude drugs. Glycerin of starch is used as an emollient and as a base for suppositories. Starch is also a starting material for the commercial manufacture of liquid glucose, dextrose and dextrin. Starch is industrially used for the sizing of paper and cloth.

Substitutes and Adulterants

Tapioca starch or Cassava or Brazilian arrowroot- This starch is obtained from *Manihot esculenta* (Euphorbiaceae) and is used as substitute for starch.

KAOLIN

Synonyms China clay.

Source

Kaolin is a purified native hydrated aluminium silicate free from gritty particles. It is obtained by powdering the native kaolin, elutriating and collecting the fraction, which complies with the requirements of particle size. The native clay is derived from decomposition of the feldspar (potassium aluminosilicate) or granite rock and contains silica (47%), alumina (40%), and water (13%).

Description

Kaolin is white soft plastic clay composed of well-ordered kaolinite with low iron content. In many parts of the world, it is coloured pink-orange-red by iron oxide, giving it a distinct rust hue. Lighter concentrations yield white, yellow or light orange colours also. It is made up of a loose aggregation of randomly oriented stacks of kaolinite flakes, smaller packets and sheaves and individual flakes.

The median particle size of kaolin is 0.78 μ , 1.02 μ , 1.1 μ , 1.2 μ and 3.8 μ . It has loose bulk density of approximately 25 lbs/cubic feet and packed bulk density of 46 lbs./cu ft, the hardness factor is 6.0, specific gravity: 2.6 g/cc, pH: 6.0, surface area: 10–29. Odourless when dry but has clay like odour when wet. Kaolin when treated with concentrated HCl, decomposes partially but on heating it with conc. sulphuric acid, it is converted into insoluble silica and aluminium sulphates.

There are two types of kaolin: coarse (heavy) and colloidal (light). The coarser kaolin when treated with water forms a plastic and slightly sticky mass while colloidal kaolin with water forms sticky, stiff mass and if suspended in water forms a turbid solution or slurry. The standard grades of kaolin available are: calcined, Sanitary ware grade, tableware grade, and porcelain grade.

Chemical Constituents

Chemically kaolin is anhydrous aluminium silicate with a chemical formula: $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ or $\text{H}_4\text{Al}_2\text{Si}_2\text{O}_9$. The percentage composition are as follows: silicon dioxide (wt %): 56.91, iron oxide: 0.93, titanium dioxide: 0.54, aluminium oxide: 39.68, calcium oxide: 0.16, magnesium oxide: 0.16, sodium oxide: 0.60, potassium oxide: 0.60, and water: 12.6. Natural kaolinite usually contains small amounts of uranium and thorium, octahedral sheet of alumina octahedral.

Identification

Heat kaolin on charcoal black with cobalt nitrate, it forms blue mass due to alumina.

Uses

It is used as an adsorbent by oral administration, in the treatment of enteritis, dysentery and in alkaloidal and food poisoning. It is also applied externally as a dusting powder and also as clarifying agent during the filtration. Mostly, light kaolin with a particle size less than 10 μ is used in pharmaceutical preparations. Heavy kaolin with particle size up to 60 μ is only used in the preparation of kaolin poultice.

It is used as filler in paper, rubber, ceramics, cement, and fertilizer industries. It is used in anticaking preparations, cosmetics, insecticides, paints, and as source of alumina.

PECTIN

Pectin, in general, is a group of polysaccharides found in nature in the primary cell walls of all seed bearing plants and are invariably located in the middle lamella. It has been observed that these specific polysaccharides actually function in combination with both cellulose and hemicellulose as an intercellular cementing substance. One of the richest sources of pectin is lemon or orange rind which contains about 30% of this polysaccharide. Evaluation and standardization of pectin is based on its 'Gelly-grade' that is, its setting capacity by the addition of sugar. Usually, pectin having 'gelly grade' of 100, 150 and 200 are recommended for medicinal and food usages.

Biological Source

Pectin is a purified polysaccharide substance obtained from the various plant sources such as inner peel of citrus fruits, apple, raw papaya, etc. Numbers of plants sources of pectin are mentioned below:

Common Name	Botanical Name	Family
Lemon	<i>Citrus lemon</i>	Rutaceae
Orange	<i>Citrus aurantium</i>	Rutaceae
Apple	<i>Pyrus malus</i>	Rosaceae
Papaya	<i>Carica papaya</i>	Caricaceae
Sunflower heads	<i>Helianthus tuberosus</i>	Asteraceae
Guava	<i>Psidium guyava</i>	Myrtaceae
Beets	<i>Beta vulgaris</i>	Chenopodiaceae
Carrot	<i>Daucus carota</i>	Apiaceae
Mangoes	<i>Mangifera indica</i>	Anacardiaceae

Geographical Source

Lemon and oranges are mostly grown in India, Africa and other tropical countries. Apple is grown in the Himalayas, California, many European countries and the countries located in the Mediterranean climatic zone.

Morphology

Colour	Cream or yellowish coloured powder
Odour	Odourless
Taste	Mucilaginous
Appearance	It is coarse or fine light powder and hygroscopic in nature. Completely soluble in 20 parts of water, forming a solution containing negatively charged and very much hydrated particles. Dissolves more swiftly in water, if previously moistened with sugar syrup, alcohol and glycerol or if first mixed with three or more parts of sucrose

Chemical Constituents

Pectin is a polysaccharide with a variable molecular weight ranging from 20,000 to 400,000 depending on the number of carbohydrate linkages. The core of the molecule is formed by linked D-polygalacturonate and L-rhamnose residues. The neutral sugars D-galactose, L-arabinose, D-xylose and L-fructose form the side chains on the pectin molecule. Once extracted, pectin occurs as a coarse or fine yellowish powder that is highly water soluble and forms thick colloidal solutions. The parent compound, protopectin, is insoluble, but is readily converted by hydrolysis into pectinic acids (also known generically as pectins).

Chemical Tests

- A 10% (w/v) solution gives rise to a solid gel on cooling.
- A transparent gel or semigel results by the interaction of 5 ml of 1 % solution of pectin with 1 ml of 2 % solution of KOH and subsequently setting aside the mixture at an ambient temperature for 15 min. The resulting gel on acidification with dilute HCl and brisk shaking yields a voluminous and gelatinous colourless precipitate which on warming turns into white and flocculent.

Uses

Pectin is used as an emulsifier, gelling agent and also as a thickening agent. It is a major component of antidiarrhoeal formulation. Pectin is a protective colloid which assists absorption of toxin in the gastro-intestinal tract. It is used as haemostatic in cases of haemorrhage. As a thickener it is largely used in the preparation of sauces, jams and ketchups in food industry.

One of the best characterized effects of pectin supplementation is its ability to lower human blood lipoprotein levels. Pectin supplements appear to act as 'enteroabsorbents', protecting against the accumulation of ingested radioactivity.

OLIVE OIL

Synonyms

Salad oil; sweet oil; oleum olival.

Biological Source

Olive oil is a fixed oil obtained by expression of the ripe fruits of *Olea europaea* Linn. or Indian olive (*O. ferruginea*), belonging to family Oleaceae.

Geographical Source

Olive is a native of Palestine and produced extensively in the countries adjoining the Mediterranean Sea. Spain being the largest producer. It is also grown in the south western United States and many other subtropical localities.

Characteristics

Olive oil is a pale yellow or light greenish-yellow due to presence of chlorophyll or carotenes, nondrying oily liquid with a pleasant delicate flavour. Taste is bland becoming cloudy and at 0°C it usually forms a whitish granular mass. It becomes faintly acrid. It is miscible with ether, chloroform, and carbon disulphide and is slightly soluble in alcohol. Upon cooling at +5 to 10°, it becomes cloudy and at 0°C usually forms a whitish granular mass. It becomes rancid on exposure to air. It has specific gravity of 0.914–0.919, acid value 0.2–2.8, saponification value 187–196, and iodine value 79–90.



Olea europaea

Chemical Constituents

Olive oil contains mixed glycerides of oleic acid (56–85%), palmitic (7–20%), linoleic (3–20%), stearic (1–5%), arachidic (0.9%), palmitoleic (3%), linolenic, eicosenoic, gadoleic, and lignoceric acids. The minor constituents are squalene up to 0.7%, phytosterol and tocopherols about 0.2%. Italy-Spain type olive oil is higher in oleic acid and Greece-Tunisia type oil has higher levels of linoleic acid.

Identification Tests

Under UV radiation it gives deep golden-yellow colour, while refined oil gives pale blue fluorescence. Decolourization with charcoal removes fluorescence.

Uses

Olive oil is used in the manufacture of pharmaceutical preparations, soaps, textile lubricants, sulphonated oils, liniments, cosmetics, plasters; as food in salads, and for cooking and baking. It has demulcent, emollient, choleric or cholagogue, and laxative properties. It is a good solvent for parenteral preparations.

Marketed Products

It is one of the ingredients of the preparation known as Figaro oil.

LANOLIN

Synonyms

Wool fat; Oesipos; Agnin; Alapurin; Anhydrous lanolin; Adeps lanae; Laniol.

Biological Source

Lanolin is the fat-like purified secretion of the sebaceous glands which is deposited into the wool fibres of sheep, *Ovis aries* Linn., belonging to family Bovidae.

Preparation

Wool is cut and washed with a soap or alkali. An emulsion of wool fat, called as wool grease, takes place in water. Raw lanolin is separated by cracking the emulsion with sulphuric acid. Wool grease floats on the upper layer and fatty acids are dissolved in the lower layer. Lanolin is purified by treating with sodium peroxide and bleaching with reagents.

Characteristics

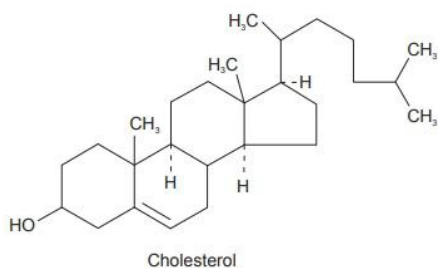
Lanolin is a yellowish white, tenacious, unctuous mass; odour is slight and characteristic. Practically, it is insoluble in water, but soluble in chloroform or ether with the separation of the water. It melts in between 34 and 40°C. On heating it forms two layers in the beginning, continuous heating removes water. Lanolin is not saponified by an aqueous alkali. However, saponification takes place with alcoholic solution of alkali.

Anhydrous lanolin is a yellowish tenacious, semisolid fat with slight odour. Practically it is insoluble in water but mixes with about twice its weight of water without separation. It is sparingly soluble in cold, more in hot alcohol, freely soluble in benzene, chloroform, ether, carbon disulphide, acetone, and petroleum ether.

Chemical Constituents

Lanolin is a complex mixture of esters and polyesters of 33 high molecular weight alcohols, and 36 fatty acids. The alcohols are of three types; aliphatic alcohols, steroid alcohols, and triterpenoid alcohols. The acids are also of three types: saturated nonhydroxylated acids, unsaturated nonhydroxylated acids, and hydroxylated acids. Liquid lanolin is rich in low molecular weight, branched aliphatic acids, and alcohols, whereas waxy lanolin is rich in high molecular weight, straight-chain acids, and alcohols.

The chief constituents of lanolin are cholesterol, iso-cholesterol, unsaturated monohydric alcohols of the formula $C_{27}H_{45}OH$, both free and combined with lanoceric ($C_{30}H_{60}O_4$), lanopalmitic ($C_{16}H_{22}O_3$), carnaubic, and other fatty acids. Lanolin also contains esters of oleic and myristic acids, aliphatic alcohols, such as cetyl, ceryl and carnaubyl alcohols, lanosterol, and agnosterol.



Identification Tests

Dissolve 0.5 g of lanolin in chloroform, and to it add 1 ml of acetic anhydride and two drops of sulphuric acid. A deep green colour is produced, indicating the presence of cholesterol.

Uses

Lanolin is used as an emollient, as water absorbable ointment base in many skin creams and cosmetic and for hoof dressing. Wool fat is readily absorbed through skin and helps in increasing the absorption of active ingredients incorporated in the ointment. However, it may act as an allergenic contactant in hypersensitive persons.

BEESWAX

Synonyms White beeswax, yellow beeswax, cera alba, and cera flava.

Biological Source

Beeswax is the purified wax obtained from honeycomb of hive bee, *Apis mellifera* Linn and other species of *Apis*, belonging to family Apidae.

Geographical Source

It is mainly found in Jamaica, Egypt, Africa, India, France, Italy, California etc.

Characteristics

Yellow wax or Cera flava is yellowish to greyish brown coloured solid, with agreeable, honey-like odour and a faint, characteristic taste. When cold, it is somewhat brittle and when broken, shows presence of a dull, granular, noncrystalline fracture. Yellow wax is insoluble in water and sparingly soluble in cold alcohol. It is completely soluble in chloroform, ether, and in fixed or volatile oils, partly soluble in cold benzene or in carbon disulphide and completely soluble in these liquids at about 30°C.

White wax is less unctuous to the touch; it is yellow, soft, and ductile at 35°C and fusible at 65°C. A yellowish-white solid, somewhat translucent in thin layers. It has a faint, characteristic odour which is free from rancidity and tasteless. It is insoluble in water, soluble in chloroform, ether, fixed oil, and volatile oils (hot turpentine oil) and sparingly soluble in alcohol. It is not affected by the acids at ordinary temperatures, but is converted into a black mass when boiled with concentrated sulphuric acid.

Chemical Constituents

Beeswax contains myricin, which is melissyl palmitate; melting point 64°C, free cerotic acid (C₂₆H₅₂O₂), myricyl alcohol (C₃₀H₆₁OH) is liberated when myricyl palmitate is saponified. Melissic acid, some unsaturated acids of the oleic series, ceryl alcohol, and 12 to 13% higher hydrocarbons are present.

Uses

Beeswax is used in the preparation of ointments, plaster, and polishes.

Adulterants

Beeswax is adulterated by solid paraffin, ceresin, carnauba wax, or other fats and waxes of animal or mineral origin. Spermaceti and lard render wax softer and less cohesive, of a smoother and less granular fracture and different odour when heated. The melting point and specific gravity are lowered by tallow, suet, lard, and especially by paraffin. Ceresin, a principle obtained from ozokerite is also employed as an adulterant. In yellow wax the iodine value is also of use as a test for detection of adulterants but in white wax the bleaching process has altered the bodies which absorb the iodine.

Marketed Products

It is one of the ingredients of the preparations known as Saaf Organic Eraser Body Oil and Jatyadi tail (Dabur).

ACACIA GUM

Synonyms

Acacia gum, Acacia vera, Egyptian thorn, Gummi africanum, Gum Senegal, Gummae mimosae, Kher, Sudan gum arabic, Somali gum, Yellow thorn, Indian Gum and Gum Arabic.

Biological Source

According to the USP, acacia is the dried gummy exudation obtained from the stems and branches of *Acacia senegal* (L.) Willd or other African species of Acacia. In India, it is found as dried gummy exudation obtained from the stems and branches of *Acacia arabica* Willd, belonging to family Leguminosae

Geographical Source

Acacia senegal is the characteristic species in the drier parts of Anglo-Egyptian Sudan and the northern Sahara, and is to be found throughout the vast area from Senegal to the Red Sea and to eastern India. It extends southwards to northern Nigeria, Uganda, Kenya, Tanzania and southern Africa. The plant is extensively found in Arabia, Kordofan (North-East Africa), Sri Lanka and Morocco. In India it is found chiefly in Punjab, Rajasthan and Western Ghats. Sudan is the major producer of this gum and caters for about 85% of the world supply.

Morphology

Colour	Tears are usually white, pale-yellow and sometimes creamish-brown to red in colour. The powder has off-white, pale-yellow or light-brown in appearance.
Odour	Odourless
Taste	Bland and mucilaginous
Shape and Size	Tears are mostly spheroidal or ovoid in shape and having a diameter of about 2.5–3.0 cm
Appearance	Tears are invariably opaque either due to the presence of cracks or fissures produced on the outer surface during the process or ripening. The fracture is usually very brittle in nature and the exposed surface appears to be glossy.



Acacia senegal

Chemical constituents

Acacia consists principally of arabin, which is a complex mixture of calcium, magnesium and potassium salts of arabic acid. Arabic acid is a branched polysaccharide that yields L-arabinose, D-galactose, D-glucuronic acid and L-rhamnose on hydrolysis. 1, 3-Linked D-galactopyranose units form the backbone chain of the molecule and the terminal residues of the 1, 6-linked side chains are primarily uronic acids. Acacia contains 12–15% of water and several occluded enzymes such as oxidases, peroxidases and pectinases. The total ash content should be in the range of 2.7–4.0%.

Chemical Tests

1. **Lead acetate test:** An aqueous solution of acacia when treated with lead acetate solution yields a heavy white precipitate.
2. **Reducing sugars test:** Hydrolysis of an aqueous solution of acacia with dilute HCl yields reducing sugars whose presence are ascertained by boiling with Fehling's solution to give a brick-red precipitate of cuprous oxide.
3. **Blue colouration due to enzyme:** When the aqueous solution of acacia is treated with benzidine in alcohol together with a few drops of hydrogen peroxide (H_2O_2), it gives rise to a distinct blue colour due to the presence of oxidases enzyme.
4. **Borax test:** An aqueous solution of acacia affords a stiff translucent mass on treatment with borax.
5. **Specific test:** A 10% aqueous solution of acacia fails to produce any precipitate with dilute solution of lead acetate (a clear distinction from Agar and Tragacanth); it does not give any colour change with Iodine solution (a marked distinction from starch and dextrin); and it never produces a bluish-black colour with $FeCl_3$ solution (an apparent distinction from tannins).

Uses

The mucilage of acacia is employed as a demulcent. It is used extensively as a vital pharmaceutical aid for emulsification and to serve as a thickening agent. It finds its enormous application as a binding agent for tablets, for example, cough lozenges. It is used in the process of 'granulation' for the manufacturing of tablets. It is considered to be the gum of choice by virtue of the fact that it is quite com-patible with other plant hydrocolloids as well as starches, carbohydrates and proteins. It is used in combination with gelatin to form conservates for micro-encapsulation of drugs. It is employed as colloidal stabilizer. It is used extensively in making of candy and other food products. Gum acacia solution has consistency similar to blood and is administered intravenously in haemodialysis. It is used in the manufacture of adhesives and ink, and as a binding medium for marbling colours.

TRAGACANTH

Synonyms

Goat's thorn, gum dragon, gum tragacanth, hog gum.

Biological Source

It is the air dried gummy exudates, flowing naturally or obtained by incision, from the stems and branches of *Astragalus gummifer* Labill and certain other species of *Astragalus*, belonging to family Leguminosae.

Geographical Source

Various species of *Astragalus* which yield gum are abundantly found in the mountainous region of Turkey, Syria, Iran, Iraq and the former U.S.S.R. at an altitude of about 1,000–3,000 m. Two important varieties of tragacanth, that is, Persian tragacanth and Smyrana or Anatolian tragacanth come from Iran and turkey respectively. In India it is found wild in Kumaon and Garhwal region.

The approximate distribution of a number of gum-producing species found in the areas where tragacanth is collected is shown in Table below.

Morphology

Colour	The flakes are white or pale yellowish-white
Odour	Odourless
Taste	Mucilaginous
Shape and Size	Tragacanth occurs in the form of ribbon or flakes. Flakes are approximately 25 x 12 x 2 mm in size
Appearance	The gum is horny, translucent with transverse and longitudinal ridges Fracture is short

Chemical Constituents

Interestingly, tragacanth comprises two vital fractions: first, being water soluble and is termed as 'tragacanthin' and the second, being water insoluble and is known as 'bassorin'. Both are not soluble in alcohol. The said two components may be separated by carrying out the simple filtration of very dilute mucilage of tragacanth and are found to be present in concentrations ranging from 60% to 70% for bassorin and 30–40% for tragacanthin. Bassorin actually gets swelled up in water to form a gel, whereas tragacanthin forms an instant colloidal solution. It has been established that no methoxyl groups are present in the tragacanthin fraction, whereas the bassorin fraction comprised approximately 5.38% methoxyl moieties. Rowson (1937) suggested that the gums having higher methoxyl content, that is, possessing higher bassorin contents yielded the most viscous mucilage.

Tragacanth gum is composed mainly of sugars and uronic acid units and can be divided into three types of constituents. The acidic constituents tragacanthic acid on hydrolysis yields galactose, xylose and galacturonic acid. A neutral polysaccharide affords galactose and arabinose after its hydrolysis while a third type is believed to be steroidal glycoside.

Chemical Tests

1. An aqueous solution of tragacanth on boiling with conc. HCl does not develop a red colour.
2. It does not produce red colour with ruthenium red solution.
3. When a solution of tragacanth is boiled with few drops of FeCl₃ [aqueous 10% (w/v)], it produces a deep-yellow precipitate.
4. It gives a heavy precipitate with lead acetate.
5. When tragacanth and precipitated copper oxide are made to dissolve in conc. NH₄OH, it yields a meager precipitate.

Uses

It is used as a demulcent in cough and cold preparations and to manage diarrhoea. It is used as an emollient in cosmetics. Tragacanth is used as a thickening, suspending and as an emulsifying agent. It is used along with acacia as a suspending agent. Mucilage of tragacanth is used as a binding agent in the tablets and also as an excipient in the pills. Tragacanth powder is used as an adhesive. It is also used in lotions for external use and also in spermicidal jellies. It is also used as a stabilizer for ice cream in 0.2–0.3% concentration and also in sauces. Tragacanth has been reported to inhibit the growth of cancer cells in vitro and in vivo.

Adulterant and Substitutes

Tragacanth gum of lower grades known as hog tragacanth is used in textile industry and in the manufacture of pickles. The gum varies from yellowish brown to almost black. Citral gum obtained from *A. strobiliferus* is also used as an adulterant.

Karaya gum which is sometimes known as sterculia gum or Indian tragacanth is invariably used as a substitute for gum tragacanth.

SODIUM ALGINATE

Synonyms

Algin, Alginic acid sodium salt, Sodium polymannuronate, Kelgin, Minus, Protanal.

Biological Source

Sodium alginate is the sodium salt of alginic acid. Alginic acid is a polyuronic acid composed of reduced mannuronic and glucuronic acids, which are obtained from the algal growth of the species of family Phaeophyceae. The common species are *Macrocystis pyrifera*, *Laminaria hyperborea*, *Laminaria digitata*, *Ascophyllum nodosum* and *Durvillaea lessonia*. It is a purified carbohydrate extracted from brown seaweed (algae) by treatment of dilute alkali.

Geographical Source

Sea-weeds are found in Atlantic and Pacific oceans, particularly in coastal lines of Japan, United States, Canada, Australia and Scotland. In India, it is found near the coast of Saurashtra. The largest production of algin is in United States and U.K.

Morphology

Colour	White to buff coloured powder
Odour	Odourless
Taste	Tasteless
Appearance	It is available either as a coarse or fine powder. It is readily soluble in water forming viscous colloidal solution and insoluble in alcohol, ether, chloroform and strong acids. 1% solution of gum at 20°C may have a viscosity in the range of 20–400 centipoises.

History

Alginic acid, a hard, horny polysaccharide, was first isolated by the English chemist Stanford in 1883 and in Britain was first marketed in 1910. The commercial production of algin first began in 1929 in United States. Since then it is produced in U.K., France, Norway and Japan. The present total algin production is estimated to be more than 15,000 tones per annum.

Identification Tests

1) Precipitate formation with Calcium chloride

To a 0.5% solution of the sample in sodium hydroxide, add one-fifth of its volume of a 2.5% solution of calcium chloride. A voluminous, gelatinous precipitate is formed. This test distinguishes sodium alginate from gum arabic, sodium carboxymethyl cellulose, carrageenan, gelatin, gum ghatti, karaya gum and tragacanth gum.

2) Precipitate formation with Ammonium sulphate

To a 0.5% solution of the sample in sodium hydroxide, add one-half of its volume of a saturated solution of ammonium sulphate. No precipitate is formed. This test distinguishes sodium alginate from agar, sodium carboxymethyl cellulose, carrageenan, methyl cellulose and starch.

3) Test for alginate

Moisten 1–5 mg of the sample with water and add 1 ml of acid ferric sulphate. Within 5 min, a cherry-red colour develops that finally becomes deep purple.

1% solution in water forms heavy gelatinous precipitate with dilute sulphuric acid.

Chemical Constituents

Algin consists chiefly of the sodium salt of alginic acid, a linear polymer of L-guluronic acid and D-mannuronic acid; the chain length is long and varies (mol. wt. from 35,000 to 1.5×10^6) with the method of isolation and the source of the algae. Mannuronic acid is the major component. The alginic acid molecule appears to be a copolymer of 1, 4-linked mannopyranosyluronic acid units, of 1, 4-linked gulopyranosyluronic acid units, and of segments where these uronic acids alternate with 1, 4-linkages.

Uses

High and medium viscosity grades of sodium alginate are used in the preparation of paste, creams and for thickening and stabilizing emulsions. It is a good suspending and thickening agent, but a poor emulsifying agent. It is used as binding and disintegrating agent in tablets and lozenges. In food industry, it is used for the preparation of jellies, ice cream, etc. It is also used in textile industry. For pharmaceutical purposes, when desired, it is sterilized by heating in an autoclave. The solution of sodium alginate should not be stored in metal containers. It is preserved by the addition of 0.1% of chloroxylenol, chlorocresol, benzoic acid or parabenes. Potassium, aluminium and calcium alginates are also used medicinally.

Capsules containing sodium alginate and calcium carbonate are used to protect inflamed areas near the entrance to the stomach. The acidity of the stomach causes formation of insoluble alginic acid and carbon dioxide; the alginic acid rises to the top of the stomach contents and forms a protective layer.

Marketed Product

Each 100 ml of Lamina G solution manufactured by Taejoon Pharm Co. Ltd, Seoul contains 5.0g of sodium alginate. It is mainly used for the treatment of Gastric and duodenal ulcer, erosive gastritis, reflux esophagitis (usual dosage is 20–60 ml orally three to four times daily before meal) and Hemostasis in gastric biopsy (usual dosage is 10–30 ml by endoscope, followed by 30 ml orally).

AGAR

Synonym

Agaragar, Japanese Isinglass, Vegetable gelatin.

Botanical Source

It is the dried gelatinous substance obtained by extraction with water from *Gelidium amansii* or various species of red algae like *Gracilaria* and *Pterocladia*, belonging to family Gelidaceae (*Gelidium* and *Pterocladia*), Gracilariaceae (*Gracilaria*).

Geographical Source

Japan was the only country producing agar before the World War II, but it is now produced in several countries like, Japan: *Gelidium amansii* and other *Gelidium species*, Australia; *Gracilaria confervoides*, New Zealand; *Pterocladia lucida* and other allied species, Korea, South Africa, United States, Chile, Spain, and Portugal.

Morphology

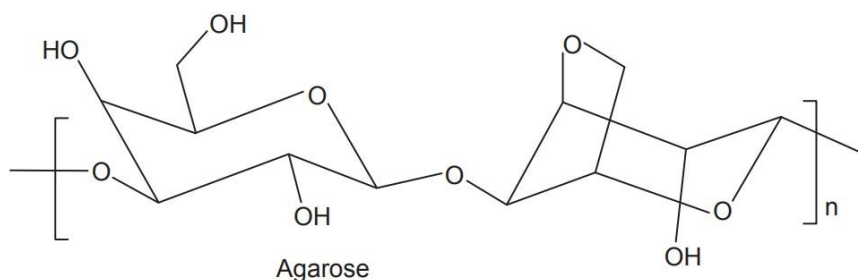
Colour	Yellowish white to gray or colourless
Odour	Slight/odourless
Taste	Mucilaginous
Shape	Strips, flakes or coarse powder
Size	Strips are about 60 cm in length and 4 mm wide. Wide sheets are 50–60 cm long and 10–15 cm wide
Solubility	Insoluble in organic solvents, cold water but soluble in hot water and forms a gelatinous solution after cooling the hot solution.



Gelidium amansii

Chemical Constituents

Agar is a complex heterosaccharide and contains two different polysaccharides known as agarose and agarpectin. Agarose is neutral galactose polymer and is responsible for the gel property of agar. It consists of D-galactose and L-galactose unit. The structure of agarpectin is not completely known, but it is believed that it consists of sulphonated polysaccharide in which galactose and uronic acid are partly esterified with sulphuric acid. Agarpectin is responsible for the viscosity of agar solution.



Chemical Tests

1. Agar responds positively to Fehling's solution test.
2. Agar gives positive test with Molisch reagent.
3. Aqueous solution of agar (1%) is hydrolysed with concentrated HCl by heating for 5–10 min. On addition of barium chloride solution to the reaction mixture, a white precipitate of barium sulphate is formed due to the presence of sulphate ions. This test is absent in case of starch, acacia gum and tragacanth.
4. To agar powder a solution of ruthenium red is added. Red colour is formed indicating mucilage.
5. Agar is warmed in a solution of KOH. A canary yellow colour is formed.
6. An aqueous solution of agar (1%) is prepared in boiling water. On cooling it sets into a jelly.
7. To agar solution an N/20 solution of iodine is added. A deep crimson to brown colour is obtained (distinctive from acacia gum and tragacanth).
8. To a 0.2% solution of agar an aqueous solution of tannic acid is added. No precipitation is formed indicating absence of gelatin.
9. Agar is required to comply with tests for the absence of *E. coli* and *Salmonella*, and general microbial contamination should not exceed a level of 10^3 microorganisms per gram as determined by a plate count. It has a swelling index of not less than 10.

Uses

Agar is used to treat chronic constipation, as a laxative, sus-pending agent, an emulsifier, a gelating agent for suppositories, as surgical lubricant, as a tablet excipient, disintegrant, in production of medicinal encapsulation and ointment and as dental impression mold base. It is extensively used as a gel in nutrient media for bacterial cultures, as a substitute for gelatin and isinglass, in making emulsions including photographic, gel in cosmetic, as thickening agent in food especially confectionaries and dairy products, in meet canning; sizing for silk and paper; in dyeing and printing of fabrics and textiles; and in adhesive.

Substitutes and Adulterants

Some of the common adulterants present in agar are gelatin and Danish agar. The presence of gelatin can be detected by addition of equal volume of 1% trinitrophenol and 1% of agar solution; the solution produces turbidity or precipitation. Danish agar has an ash of 16.5–18.5%, it is formed from rhodophyceae indigenous to the Denmark costal region. The Danish agar has a gel strength which is half of its gel strength of Japanese agar.

GUAR GUM

Synonyms

Guar gum, Jaguar gum, Guar flour and Decorpa.

Biological Source

Guar gum is a seed gum produced from the powdered endosperm of the seeds of *Cyamopsis tetragonolobus* Linn belonging to family Leguminosae.

Geographical Source

Guar or cluster bean is a drought-tolerant annual legume that was introduced into the United States from India in 1903. Commercial production of guar in the United States began in the early 1950s and has been concentrated in northern Texas and south-western Oklahoma. The major world suppliers are India, Pakistan and the United States, Australia and Africa. Rajasthan in western India is the major guar-producing state, accounting for 70% of the production. Guar is also grown in Gujarat, Haryana, Punjab and in some parts of Uttar Pradesh and Madhya Pradesh. India grows over 850,000 tons, or 80% of the total guar produced all over the world. 75% of the guar gum or derivatives produced in India are exported, mainly to the United States and to European countries.

Morphology

Colour	It is colourless or pale yellowish-white coloured powder
Odour	Characteristic
Taste	Gummy



Cyamopsis tetragonolobus

Chemical Constituents

The water-soluble part of guar gum contains mainly of a high molecular weight hydrocolloidal polysaccharide, that is, galactomannan, which is commonly known as guaran. Guaran consists of linear chains of (1→4)— β —D—mannopyranosyl units with α —D—galactopyranosyl units

attached by (1→6) linkages. However, the ratio of D— galactose to D—mannose is 1: 2. The gum also contains about 5–7% of proteins.

Chemical Tests

1. On being treated with iodine solution (0.1 N), it fails to give olive-green colouration.
2. It does not produce pink colour when treated with Ruthenium Red solution (distinction from sterculia gum and agar).
3. A 2% solution of lead acetate gives an instant white precipitate with guar gum (distinction from sterculia gum and acacia).
4. A solution of guar gum (0.25 g in 10 ml of water) when mixed with 0.5 ml of benzidine (1% in ethanol) and 0.5 ml of hydrogen peroxide produces no blue colouration (distinction from gum acacia).
5. Aqueous solution of guar gum is converted to a gel by addition of a small amount of borax.

Uses

Guar gum is used as a protective colloid, a binding and disintegrating agent, emulsifying agent, bulk laxative, appetite depressant and in peptic ulcer therapy. Industrially, it is used in paper manufacturing, printing, polishing, textiles and also in food and cosmetic industries. Guar gum is extensively used as flocculent in ore-dressing and treatment of water.

Guar gum has been shown to decrease serum total cholesterol levels by about 10–15% and low-density lipoprotein cholesterol (LDL-cholesterol) by up to 25% without any significant effect on triglycerides or high-density lipoprotein cholesterol (HDL-cholesterol) levels.

The ability of guar to affect gastrointestinal transit may contribute to its hypoglycemic activity. Guar reduces postprandial glucose and insulin levels in both healthy and diabetic subjects and may be a useful adjunct in the treatment of noninsulin-dependent diabetes.

Guar gum remains important ingredient in over-the-counter weight loss preparations. Even in the absence of weight loss, guar supplementation for 2 weeks reduced blood pressure by 9% in moderately overweight men.

Marketed Product

Ascenta *Omega Smooth* Orange Sensation by Ascenta Health Ltd.

GELATIN

Synonyms

Gelfoam; puragel; gelatinum.

Biological Source

Gelatin is a protein derivative obtained by evaporating an aqueous extract made from bones, skins, and tendons of various domestic animals. Some important sources are: Ox, *Bos taurus*, and Sheep, *Ovis aries* belonging to family Bovidae

Preparation

The process of manufacture of gelatin vary from factory to factory. However, the general outline of the process is given below.

Raw material

Bones, skins, and tendons of Bovideans is collected and subjected to liming operation.

Liming Process

The raw material is first subjected to the treatment known as 'liming'. In this process, the skins and tendons are steeped for fifteen to twenty and sometimes for 40 days in a dilute milk of lime. During this, fleshy matter gets dis-solved, chondroproteins of connective tissues gets removed and fatty matter is saponified. The animal skin is further thoroughly washed in running water.

Defatting

In case of bones, the material is properly ground and defatted in close iron cylinders by treatment with organic solvents such as benzene. The mineral and inorganic part of the bone is removed by treatment with hydrochloric acid.

Extraction

The treated material from bones, skins and tendons is boiled with water in open pans with perforated false bottom. This process can also be carried out under reduced pressure. The clear liquid runs of again and again and is evaporated until it reaches to above 45 per cent gelatin content.

Setting

The concentrated gelatin extract is transferred to shallow metal trays or trays with glass bottom. It is allowed to set as a semisolid jelly.

Drying

The jelly is transferred to trays with a perforated wire netting bottom and passed through series of drying compartments of 30–60°C increasing each time with 10°C. About a month is taken for complete drying.

Bleaching

In case of darker colour, finished product is subjected to bleaching by sulphur dioxide. Bleaching affords a light coloured gelatin.

Characteristics

Gelatin occurs as a colourless or slightly yellow, transparent, brittle, practically odourless, tasteless sheet, flakes or coarse granular powder. In water it swells and absorbs 5–10 times its weight of water to form a gel in solutions below 35–40°C. It is insoluble in cold water and organic solvents, soluble in hot water, glycerol, acetic acid; and is amphoteric. In dry condition it is stable in air, but when moist or in solution, it is attacked by bacteria. The gelatinizing property of Gelatin is reduced by boiling for long time. The quality of gelatin is determined on the basis of its jelly strength (Bloom strength) with the help of a Bloom gelometer. Jelly strength is used in the preparation of suppositories and pessaries.

Commercially two types of gelatin, A and B, are available. Type A has an isoelectric point between pH 7 and 9. It is incompatible with anionic compounds such as Acacia, Agar and Tragacanth. Type B has an isoelectric point between 4.7 and 5, and it is used with anionic mixtures. Gelatin is coloured with a certified colour for manufacturing capsules or for coating of tablets. It may contain various additives.

Chemical Constituents

Gelatin consists of the protein glutin which on hydrolysis gives a mixture of amino acids. The approximate amino-acid contents are: glycine (25.5%), alanine (8.7%), valine (2.5%), leucine (3.2%), isoleucine (1.4%), cystine and cysteine (0.1%), methionine (1.0%), tyrosine (0.5%), aspartic acid (6.6%), glutamic acid (11.4%), arginine (8.1%), lysine (4.1%), and histidine (0.8%). Nutritionally, gelatin is an incomplete protein lacking tryptophan. The gelatinizing compound is known as chondrin and the adhesive nature of gelatin is due to the presence of glutin.

Chemical Tests

1. ***Biuret reaction:*** To alkaline solution of a protein (2 ml), a dilute solution of copper sulphate is added. A red or violet colour is formed with peptides containing at least two peptide linkages. A dipeptide does not give this test.
2. ***Xanthoproteic reaction:*** Proteins usually form a yellow colour when warmed with concentrated nitric acid. This colour becomes orange when the solution is made alkaline.
3. ***Millon's reaction:*** Millon's reagent (mercuric nitrate in nitric acid containing a trace of nitrous acid) usually yields a white precipitate on addition to a protein solution which turns red on heating.

4. *Ninhydrin test*: To an aqueous solution of a protein an alcoholic solution of ninhydrin is added and then heated. Red to violet colour is formed.
5. On heating gelatin (1 g) with soda lime, smell of ammonia is produced.
6. A solution of gelatin (0.5 g) in water (10 ml) is precipitated to white buff coloured precipitate on addition of few drops of tannic acid (10%).
7. With picric acid gelatin forms yellow precipitate.

Uses

Gelatin is used to prepare pastilles, pastes, suppositories, capsules, pill-coatings, gelatin sponge; as suspending agent, tablet binder, coating agent, as stabilizer, thickener and texturizer in food; for manufacturing rubber substitutes, adhesives, cements, lithographic and printing inks, plastic compounds, artificial silk, photographic plates and films, light filters for mercury lamps, clarifying agent, in hectographic matters, sizing paper and textiles, for inhibiting crystallization in bacteriology, for preparing cultures and as a nutrient.

It forms glycerinated gelatin with glycerin which is used as vehicle and for manufacture of suppositories. Combined with zinc, it forms zinc gelatin which is employed as a topical protectant. As a nutrient, Gelatin is used as commercial food products and bacteriologic culture media.