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Standard Terminology Relating to Naval Stores, Including Tall Oil and Related Products¹

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1. Scope

1.1 Although the naval stores industry has been a continuing producer of chemical products for many centuries, the nature of the industry, its products, and its terminology have changed. In particular, the original practice of recovering naval stores through the processing of the exudate from pine trees (gum naval stores) has been supplemented by their extraction by solvent (wood naval stores) and by wood pulping chemicals (sulfate naval stores). Thus, this terminology contains some old terms now mostly of historic value, together with the terms of the modern naval stores industry.²

2. Referenced Documents

2.1 *ASTM Standards*:³

D6090 Test Method for Softening Point Resins (Mettler Cup and Ball Method)

E28 Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus

3. Terminology

abietic acid, commercial grade, *n*—a product consisting chiefly of rosin acids in substantially pure form, separated either from rosin or tall oil commercially for specific purposes and in which abietic acid and its isomers are the principal components.

colophony, *n*—a term denoting medium and high grades of rosin.

crude stripper oil, *n*—a by-product of the manufacture of citrus juice, composed largely of d-limonene and containing up to 1.5 % of aldehydes. (See also **d-limonene**.)

dipentene, *n*—chemically defined as the optically inactive form of the monocyclic terpene hydrocarbon limonene.

DISCUSSION—Commercial dipentenenes contain substantial portions of other monocyclic and bicyclic, as well as some oxygenated, terpenes having closely related boiling ranges. They are generally obtained by fractional distillation from crude oils recovered in the several commercial methods of utilizing pine wood, also by isomerization during the chemical processing of terpenes. There is no legal requirement under the Naval Stores Act that the source, origin, or kind of dipentene be shown in the commercial designation. Consequently, coined trade names are sometimes used in selling this product. The four kinds of commercial dipentene are:

chemically processed dipentene, n—recovered as a product or a by-product in connection with the chemical treatment and conversion of other terpenes.

destructively distilled dipentene, n—from the lighter portions of the oil recovered during the destructive distillation of pine wood.

steam-distilled dipentene, n—fractionated from the crude oleoresinous extract during the processing of related steam-distilled wood naval stores.

sulfate dipentene, n—from the crude condensate of the vapors generated in the digestion of wood in the sulfate paper pulp process.

ester gum, *n*—a resin made from rosin and a polyhydric alcohol, generally glycerol or pentaerythritol.

gloss oil, *n*—a solution of limed rosin or limed rosin acids in a volatile solvent, used chiefly in surface coatings. (When made from tall oil, the source is usually indicated.)

d-limonene, *n*—a purified optically active terpene hydrocarbon recovered from by-products of the citrus industry.

DISCUSSION—It is used as a chemical intermediate and as a monomer in terpene resins.

metallic resinates, *n*—rosin in which part or all of the rosin acids have been chemically reacted with those metals that give soaps or salts which are water insoluble.

DISCUSSION—Limed rosin, zinc-treated rosin, and the resinates of lead, cobalt, copper, and manganese, are of the greatest industrial importance.

modified rosin, *n*—rosin that has been treated with heat or catalysts, or both with or without added chemical substances, so as to cause substantial change in the structure of the rosin acids, as isomerization, hydrogenation, dehydrogenation, or polymerization, usually without substantial effect on the carboxyl group.

¹ This terminology is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.34 on Naval Stores.

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² Zinkel, D. F., and Russell, J., eds., *Naval Stores: Production, Chemistry and Utilization*, Pulp Chemicals Association, NY, 1989.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

DISCUSSION—The following are types of modified rosin:
disproportionated (dehydrogenated) rosin, n—rosin that has been subjected to chemical or physical treatment, or both, so as to cause substantial simultaneous hydrogenation and dehydrogenation of the rosin acids to form their hydrogenated and dehydrogenated counterparts.

heat-treated rosin, n—rosin in which a reduction of acid number and a positive shift in optical rotation has been brought about by controlled heat treatment only, in order to improve its suitability for specific uses.

hydrogenated rosin, n—rosin that has been treated with hydrogen under conditions that cause a partial or complete saturation of the resin acids present, best indicated by a drop in the refractive index. Commercial hydrogenated rosin is usually only partially saturated.

polymerized rosin, n—rosin that has been treated by chemical or physical means, or both, in a manner so as to cause a union of a part of the rosin acids to form dimers to such an extent that the average molecular weight of such rosin will be measurably greater than that of the original rosin. Also known as “dimerized rosin.”

monocyclic terpenes, n—a designation sometimes used in the trade to describe a heterogeneous mixture of monocyclic, bicyclic, and other related terpene $C_{10}H_{16}$ hydrocarbons recovered or removed in the fractionation of certain terpenes or other essential oils, or as a by-product in the chemical conversion of pinenes generally sold under trade names.

DISCUSSION—The term “other monocyclic hydrocarbons,” used in statistical reports of the U.S. Department of Agriculture, covers this type of material.

naval stores, n—chemically reactive oils, resins, tars, and pitches derived from the oleoresin contained in, exuded by, or extracted from wood chiefly of the pine species (*Genus Pinus*).

DISCUSSION—The term naval stores is derived from the use of these chemical products for the sealing of the hulls of naval vessels in colonial times. The term has survived but now is used to describe the products obtained by upgrading oleoresin and crude tall oil.

neutral content, n—the total amount of material contained in naval stores, such as rosin, tall oil, and their derivatives that do not contain any acidic functionality.

DISCUSSION—Neutral content includes unsaponifiable matter and any combined acidic material present as derivatives, such as esters, anhydrides, or lactones.

oil of (pine) tar, n—certain heavier fractions of the volatile oil recovered by distilling pine-tar oil to convert it into pine tar.

oil of turpentine, n—the pharmaceutical name for spirits of turpentine that conforms to the requirements of the National Formulary.

oleoresin, n—pine gum, the nonaqueous secretion of resin acids dissolved in a terpene hydrocarbon oil that is produced or exuded from the intercellular resin ducts of a living tree, and is present, together with oxidation products, in the dead wood of weathered limbs and stumps.

pine needle oil, n—an essential oil of typical fragrance obtained by steam distillation of the leaves (needles) of certain species of pine.

DISCUSSION—Some imported oils derived from other conifers are classified as pine needle oil.

pinenes, n—bicyclic terpene hydrocarbons, the principal constituent of all turpentines and existing therein in two isomeric forms, alpha-pinene and beta-pinene.

pine oil, n—a colorless to amber colored volatile oil with characteristic pinaceous odor, consisting principally of isomeric tertiary and secondary cyclic terpene alcohols, with variable quantities of terpene hydrocarbons, ethers, ketones, phenols, and phenolic ethers, the amount and character of which depend on the source and method of manufacture.

DISCUSSION—The four commercial kinds of pine oil are:

destructively distilled pine oil, n—obtained from the lighter distillate from the destructive distillation (carbonization) of pine wood.

steam-distilled pine oil, n—obtained from the crude oleoresinous extract of pinewood during the processing of related steam-distilled wood naval stores.

sulfate pine oil, n—a high boiling fraction obtained in the refining and fractional distillation of crude sulfate turpentine.

synthetic pine oil, n—obtained by chemical hydration of pinenes to form monocyclic terpene alcohols, mainly alpha-terpineol.

pine tar, n—A product of the destructive distillation of pine wood.

pitch—see tall oil pitch.

reclaimed, rosin, n—rosin that has been recovered or reclaimed by any means from waste or deteriorated material, provided that the concentration of rosin acids is not below that normal for rosin, and any residual or contaminating component from the waste material itself or from any article used in the recovery process is not in sufficient quantity to cause the physical or chemical properties of the reclaimed product to differ materially from those of rosin.

resinates, metallic—See **metallic resinates**.

rosin, n—a specific kind of natural resin obtained as a vitreous water-insoluble material from pine oleoresin by removal of the volatile oils, or from tall oil by the removal of the fatty acid components thereof.

DISCUSSION—It consists primarily of several diterpenoid isomers of tricyclic monocarboxylic acids having the general empirical formula $C_{20}H_{30}O_2$, with small quantities of compounds saponifiable with boiling alcoholic potassium or sodium hydroxide, and some unsaponifiable matter. The three general classifications or kinds of rosin in commerce are:

gum rosin, n—obtained from the oleoresin collected from living trees.

tall oil rosin, n—obtained by the fractional distillation of tall oil. Such rosin shall have the characteristic form, appearance, and other physical and chemical properties normal for other kinds of rosin.

wood rosin, n—obtained from the oleoresin contained in dead wood such as stumps and knots.

rosin acids or resin acids, n—principally monocarboxylic acids with the empirical formula $C_{19}H_{20}-COOH$.

DISCUSSION—It is generally considered that the term “resin acids” is applicable to all substances having the specified molecular formula whereas the term “rosin acids” is only used when referring to those found in rosins. They are classified into two groups: the abietic type and the pimaric type. Both types and their derivatives are found in wood, gum, and tall oil rosins.