

Research Group



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Turpentine Market in CIS

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Introduction

Turpentine is a colorless or yellowish liquid with a strong smell of pine. It is a complex mixture of hydrocarbons, mainly terpenic ones. It is easily soluble in non-polar organic solvents, diethyl ether, acetone, absolute ethanol, and is not soluble in water. Easily dissolves fat, oil and tar. Inflammation temperature is 32-35°C; self-ignition temperature is 254-300°C.

Considering the chemical composition, turpentine is a mixture of mainly mono- and bi-cyclical terpenic hydrocarbons. For example, turpentine oil includes the following: alpha- and beta-pinenes, 3-carene, camphene, myrcene, dipentene, limonene, terpinolene, cymene, etc., extraction turpentine includes, besides the mentioned substances, the following: alpha-, beta- and gamma-terpineols, terpene hydrate, boras camphor, sesquiterpenes, diterpene, etc. Ratio between components considerably differs even within the same kind of turpentine, which fact can be explained mainly by special features of raw material processed.

Turpentine is rather reactive: it easily oxidizes by air, especially when subjected to light, oxidizes with inflammation at the presence of concentrated nitric acid, chrome anhydride, inflammable materials, reacts with ozone, halogens, hydrogen halogens, nitrogen oxides, etc., easily isomerizes and polymerizes under the action of acids, especially at heating.

Turpentine is used in industry as a solvent for varnish, paint and enamel, as well as raw material for obtaining many important products (e.g. camphor, terpeneol, terpene hydrate, pine oil, poly-terpenic and terpenic-phenolic tar, insecticides, fragrant substances, the only source for obtaining pinenes and 3-carene). Purified turpentine is a local irritant for external use (e.g. forms part of ointments for rubbing at neuralgic pains), anesthetic and antiseptic.

Turpentine oil (GOST 1571-82) is a product of reprocessing pine oleoresin. As to appearance, it is a mobile colorless or yellowish transparent liquid with a specific smell of pine. It is easily mixed with organic solvents, fat, salts of fat and resin acids, but is not mixed with water.

Purified sulfate turpentine is a transparent volatile liquid without any residue or water; it does not dissolve in water, easily dissolves in organic solvents, and easily oxidizes by air. It is produced of raw sulfate turpentine through complex purifying the material from sulfur-containing chemical combinations. The methods used for purifying the material from sulfur eliminate an objectionable odor inherent to sulfate turpentine, and give the purified turpentine a pure characteristic "turpentine" smell. Chemical composition of purified sulfate turpentine is very near to that of turpentine oil. The substance is a Class 4 substance as to influence on a human organism. It is an easily inflammable liquid.

1. Production of Turpentine in Russia and CIS

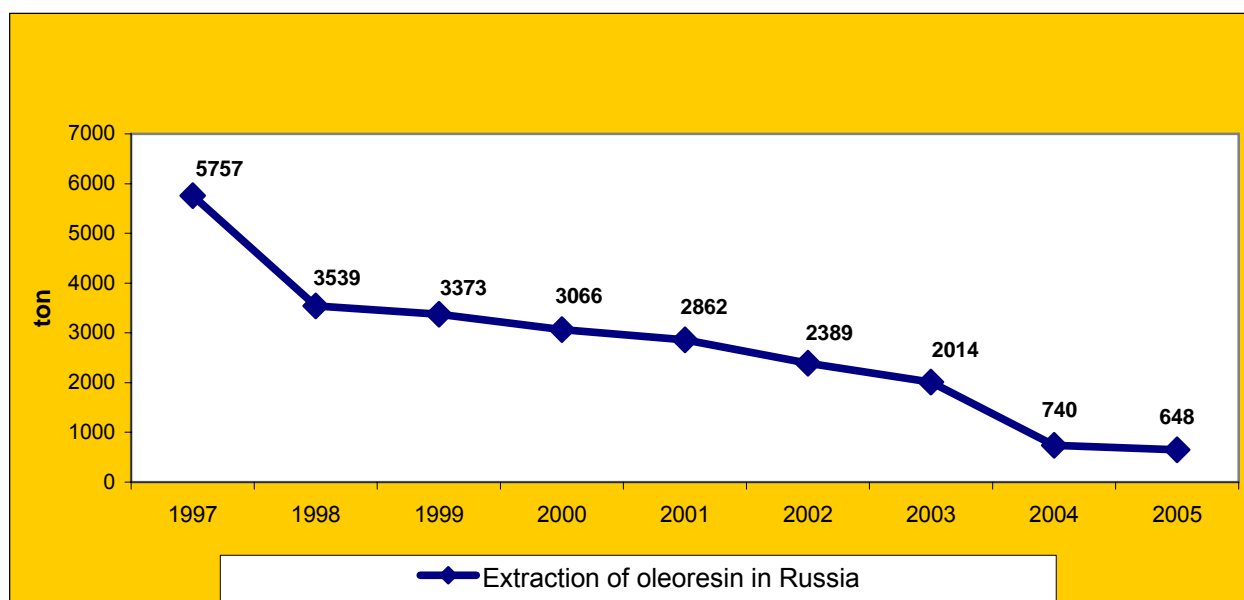
1.1. Raw Materials and Technology for Production of Turpentine

There are several kinds of turpentine, depending on the method of production.

Turpentine oil is obtained through distillation of the volatile part of oleoresin (pine, fir, larch, cedar, etc.) at production of colophony.

Figure 1 shows dynamics of extraction of oleoresin in Russia in 1997-2005 (not considering the enterprises manufacturing colophony using this material). Extraction of oleoresin continuously decreased in the period in question. Index of 2005 is nearly nine folds less than the analogous index of 1997.

Figure 1. Dynamics of Extraction of Oleoresin in Russia in 1997-2005



Source: Statistics Office of Russia

Extraction turpentine is obtained through distillation of resin substances of highly resinous stub or trunk chips using organic solvents (usually benzene).

Sulfate and sulfite turpentines are obtained through fractional condensation of vapor emitted at boiling *coniferous wood* at production of cellulose.

Hydrolytic turpentine is a by-product of hydrolytic production.

Wood turpentine, or retort turpentine, is obtained through thermal treatment of the same raw material as that used at production of extraction turpentine.

Chemical treatment of the mentioned kinds of turpentine allows obtaining the following by-products: turpentine without pinene (turpentine oil, extraction turpentine), isomerized turpentine, oxidized turpentine oil sulfate without pinene, sulfate turpentine solvent.

1.2. Quality Requirements for Turpentine

Quality requirements for turpentine oil are defined in GOST 1571-82 (see Table 1).

Quality requirements for purified sulfate turpentine are defined in TU 13-0281078-36-89 (see table 2).

Table 1. Technical Requirements for Turpentine Oil

#	Index	Extra class	First class	Second class
1	Appearance	Transparent volatile liquid with characteristic smell, without residue and water		
2	Density at 20°C, g/cm ³	0.855-0.863		
3	Refraction index	1.465-1.462	1.465-1.462	1.465-1.475
4	Volume share of strippant, in the temperature range, at a pressure of 101325 Pa (760 mm of mercury), %	Up to 155°C – absent, up to 170°C – not less 92	Up to 155°C – absent, up to 170°C – not less 90	Up to 155°C – absent, up to 170°C – not less 80
5	Mass percentage of alpha- and beta-pinene, not less %	60	55	50
6	Acidity index, mg KOH per 1 g of the product, less	0.5	0.5	1
7	Mass percentage of non-volatile residue, less %	0.5	0.5	0.9

Source: FSUE “Standartinform”

Table 2. Technical Requirements for Purified Sulfate Turpentine

#	Index	Extra class	First class	Second class
1	Appearance	Transparent volatile liquid without residue and water		
2	Color intensity	Not more than the color of comparison solution column of the same height	No standard	
3	Density at 20°C, g/cm ³	0.855-0.865		
4	Refraction index	1.467-1.469	1.465-1.471	1.460-1.471
5	Temperature range of distillation at a pressure of 101325 Pa (760 mm of mercury)			
	Initial boiling temperature, °C, not less	154	151	148
	Volume share of strippant up to 170°C, not less %	94	94	93
6	Mass percentage of sulfur, less %	0.02	0.03	0.05
7	Mass percentage of alpha- and beta-pinene, not less %	65	65	65
8	Acidity index, mg KOH per 1 g of the product, less	0.4	0.4	0.5
9	Mass percentage of non-volatile residue, less %	0.5	0.5	0.5

Source: FSUE “Standartinform”