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CORE OIL

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This invention relates to core oils or core binders and to the method of producing them, and to foundry cores produced with the aid thereof.

In accordance with the present invention, core oils or core binders suitable for use in the preparation of foundry cores are prepared by esterifying an organic acid-containing liquor, known throughout the trade as talloil, obtained from pine wood as a by-product in the manufacture of paper. This liquor may suitably be the refined product, sold in the trade under the trademark "Indusoil," which is characterized by the presence of a major proportion by weight of unsaturated fatty acids calculated as oleic, linoleic and linolenic, a minor proportion by weight of rosin acids or acids calculated as rosin acids and a relatively small proportion of unsaponifiables (mainly sterols).

A suitable refined liquor called "Indusoil" employed in the preparation of core oils in accordance with my invention has a specific gravity (at 15.5° C.) of about 0.969; an acid number of about 164.0; a saponification number of about 170.0; and ester number of about 9.4; and iodine number (Wijs) of about 168.0; and a thiocyanogeniodine number of about 91.0, and is a refined mixture of fatty acids, rosin acids and sterols derived from the liquor from the sulfate process treatment of woods such as pine.

A typical analysis of this refined liquor is as follows:

In the following analysis and in all examples hereinafter set forth, the term "parts" indicates parts by weight.

	Parts, approximate
Fatty acid calculated as linolenic acid.....	19.25
Fatty acid calculated as linoleic acid.....	10.50
Fatty acid calculated as oleic acid.....	23.04
Rosin acids (or acids calculated as rosin acids)	39.20
Unsaponifiables, largely sterols.....	8.01

The esterification of the liquor to produce core oils in accordance with my invention is effected by reacting the liquor with an alcohol, preferably a polyhydric alcohol. The alcohol may be, suitably, a di-hydric alcohol such as ethylene glycol, diethylene glycol and the like, although I prefer that it be a trihydric alcohol, for example, glycerine. If desired, the esterification of the liquor may be carried out with monohydric alcohols having a molecular weight higher than methyl alcohol, but these monohydric alcohols are not preferred. Catalysts such as lime, sulfuric acid or other mineral acids and the like may be used

in the esterification reaction, but usually catalysts are not necessary since the reaction normally proceeds rapidly and effectively, particularly where the polyhydric alcohols are utilized.

The liquor used to prepare core oils in accordance with my invention may be completely esterified to form a product having an acid number of zero or substantially zero; however, in my preferred practice the liquor is only partially esterified to form a product having an acid number of about 6 to about 50 and even higher, preferably about 15 to about 40. Thus, equivalent or stoichiometrical proportions of the reactants may be employed, although I prefer to use an excess of the liquor in respect of the alcohol, for example, glycerine, since an improved product is thereby obtained. An excess of glycerine or other polyhydric alcohol in respect of the liquor is to be avoided since this excess appears to affect deleteriously the resulting product.

The following example illustrates the method employed in accordance with my invention to produce my novel core oil. My invention is not to be construed as limited to the proportions or to the details set forth in this illustrative example since these proportions and details may be varied and modified widely without departing from the scope of my invention as set forth in the appended claims.

100 parts of the liquor, for example, "Indusoil," are mixed with 7.0 parts of glycerine, preferably one low in water content such as the conventional high gravity glycerine, in a conventional, closed, corrosion-resisting kettle. The kettle may be made of any suitable corrosion-resisting material, although I prefer that it be made of stainless steel, aluminum or other corrosion-resisting material substantially free from copper. The reactants are now heated, preferably in an atmosphere of CO₂ or other inert gas, to a temperature in the order of, say, about 450° to about 600° F. until the reaction is substantially completed. When heated to a temperature in the order of about 520° F. and held at that temperature for about ½ to about 2 hours, for example, the resulting product has an acid number in the order of about 35 to about 45. The esterified product is now permitted to cool naturally to room temperature at which time it may be stored or shipped ready for use as a core oil.

The core oil produced in accordance with the present invention may be used alone to bind together the particles of sand to form the core, or it may be used as a constituent of a conventional core oil composition. In the latter case it is

substituted for a part or all of the conventional binding oils such as linseed oil, soy bean oil, China-wood oil, treated fish oils and the like. A core oil composition containing the esterified liquor in accordance with the present invention may contain, suitably, 50% by weight of soy bean oil or other semi-drying natural vegetable, animal or synthetic oil, 20% by weight of the esterified liquor, 15% by weight of wood rosin, ester gum or other natural or synthetic resin and 15% by weight of thinner such as kerosene, light mineral oils and the like. It is, of course, manifest that these proportions may be varied, as desired, in accordance with what is usually considered good practice.

Cores formed with the core oils in accordance with the present invention dry rapidly and have unusual strength and are particularly advantageous in that they do not adhere to the metal and may be readily separated from the casting. By the aid of the core oils in accordance with the present invention, I have found that cores may be formed at lower baking temperatures and that the resulting cores are unusually strong and durable and have no tendency to "blow" or "gas" when brought in contact with the molten metal as is the case with so many of the cores produced by the aid of the prior art core oils. The improved core oils in accordance with the present invention have the further outstanding advantage of price, being less expensive than the core oils of the prior art.

I claim:

1. A core oil comprising a polyhydric alcohol ester of an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

2. A core oil comprising a partially esterified polyhydric alcohol ester of an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

3. A core oil comprising a glycerine ester of an organic acid mixture derived from the liquor

from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

4. A core oil comprising a partially esterified glycerine ester of an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

5. A core material comprising sand and a partially esterified polyhydric alcohol ester of an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

6. A core material comprising sand and a partially esterified glycerine ester of an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

7. The method of making core oil comprising reacting an organic acid mixture derived from pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols with less than stoichiometrical proportions of a polyhydric alcohol.

8. The method of making core oil comprising reacting an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols with less than stoichiometrical proportions of glycerine.

9. A core oil comprising a partially esterified glycol ester of an organic acid mixture derived from the liquor from the sulfate process treatment of pine wood comprising a major proportion of unsaturated fatty acids, a minor proportion of rosin acids and a small proportion of sterols.

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