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MISCIBLE OIL AND PROCESS FOR
PREPARING SAME

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This invention relates to miscible oils, and particularly to soluble oils to be employed as thread cutting compounds.

The principal object of the invention is to produce a miscible oil which will exert such excellent emulsifying characteristics that it will emulsify readily with slight agitation in various proportions with water and will possess an unusually high degree of stability when so emulsified.

I have discovered that miscible oils having these very desirable characteristics may be advantageously produced by employing ordinary wood rosin as an auxiliary emulsifying agent in addition to the usual soap and other agents which may be employed in the preparation of oils of this character. Thus I have found that a desirable cutting oil may be prepared with sodium naphthenate as a soap, rosin as an auxiliary emulsifying agent, and ethylene glycol as a blending or solvent agent, the whole being combined with relatively large proportions of mineral oil. The preparation of such an oil may include the saponification of a naphthenic acid obtained from petroleum fractions, and the mixing of the naphthenate with ethylene glycol and rosin, and then diluting the mixture with mineral oil. Instead of the sodium naphthenate any ordinary equivalent thereof may be substituted such as sodium oleate or other soaps of low titer fatty acids, that is soaps of liquid fatty acids, although in general I prefer the naphthenate. The ethylene glycol is used as a blending agent for the reason that it serves this function well and in addition possesses a high boiling point and does not decompose. Diethylene glycol, mono-ethyl ether of diethylene glycol, and butyl alcohol are also solvents of relatively high boiling points which may be used instead of the ethylene glycol. However, in general, I prefer the ethylene glycol as the most satisfactory solvent for use in the preparation of this material. The substitute solvents may be used in practically the same quantities as the ethylene glycol.

The invention therefore may be broadly stated as residing in a miscible oil comprising a mineral oil, a soap such as an alkali naphthenate, an auxiliary emulsifying agent having the function of stabilizing the resultant oil, and a blending agent or solvent of stable character such as ethylene glycol. The invention includes an oil of this character wherein the auxiliary agent is ordinary rosin. The invention includes also the method of preparation of such a soluble oil, emulsions prepared from such miscible oils, and also the concentrated soluble oil as a concen-

trated base suitable for dilution with mineral oil.

In carrying out the invention, the desired soap, such as one of those above mentioned, is heated to a temperature sufficient to melt the rosin, and the rosin is then added and dissolved in the soap mixture. Preferably after the rosin has been dissolved, ethylene glycol is added for the purpose of producing a satisfactory blend of the two emulsifying agents and a large proportion of lubricating oil which is added preferably following the introduction of the ethylene glycol. A proper consistency of the mixture is obtained by agitation and such application of heat as may be found to facilitate the operation. The proportions may be varied to a considerable degree, but a desirable average may be around 15 or 20% of soap and perhaps 3 to 5% of ethylene glycol with 3 to 5% of rosin, the whole being brought up to the desired total with mineral oil.

While various soaps such as sodium oleates and soaps of other liquid fatty acids may be employed, it is preferred to prepare the miscible oil with sodium naphthenate, and for this reason a more or less detailed description of the method of producing the oil therewith is described. According to this method a sodium naphthenate is first obtained as by saponification with caustic soda of the acidic materials obtained by acidifying waste alkalies produced by neutralizing with caustic soda various raw or treated petroleum distillates or other petroleum fractions. These acidified waste alkalies contain the naphthenic acids in considerable quantity, the crude acids rising to the surface and being collected, prior to the caustic soda neutralization which converts them into the desired sodium naphthenates. The product of such neutralization may contain either a slight excess of organic acid or a slight excess of alkali, and of course it contains a quantity of mineral oil in admixture with the naphthenates. In using this naphthenate mixture, it is first heated for a time to remove most of the water which may be present. After the water has been sufficiently expelled the ordinary wood rosin above mentioned is added and the mixture maintained at a temperature sufficiently high to melt the rosin and cause it to be dissolved in the oil and naphthenate mixture. For this purpose, the temperature may be carried between about 180 and 300° F. As soon as the rosin is dissolved the ethylene glycol is added to the mixture, the temperature for this purpose being carried anywhere between 180 and 300° F. Finally a lubricating oil, preferably one of low viscosity,

is added to the mixture in quantity sufficient to produce a sodium naphthenate content in the finished product such as to afford the desirable emulsifying characteristics previously described.

5 Naphthenic acids which may be used in the preparation of the naphthenates may be obtained from any petroleum distillate but those derived from lubricating distillates in the lower viscosity ranges and having lower molecular weights ap-
10 parently are more desirable. These acids may be recovered either before or after the treatment of the distillates with sulfuric acid as above indicated or with sulfur dioxide or other treating agents, it being merely sufficient that the acids be
15 recovered and separated as naphthenates, and that the naphthenates be substantially free from other substances except the lubricating oil with which they are ordinarily obtained upon separation.

20 One example of a sufficiently finished oil obtained according to this invention, contains approximately 15% sodium naphthenate, 3% ethylene glycol ($\text{CH}_2\text{OH}.\text{CH}_2\text{OH}$), 3% rosin, 79% mineral oil, and a small quantity of perfume if
25 desired. The ingredients however are not restricted to these proportions, and in fact may vary widely. Thus the naphthenate may be varied between about 10 to 25%, the ethylene glycol between 1 to 5 or 6%, the rosin between 1 to
30 7 or 8%, and the mineral oil accordingly. The emulsifying characteristics of the oil may also be modified somewhat by variations in proportions. It is to be noted that if preferred, the sodium naphthenate could be replaced with po-
35 tassium naphthenate. The percentages given above, both as to the example and as to the wider limits, will apply to the indicated equivalents as well as to the components specified in the examples.

40 As previously pointed out one of the great advantages of the miscible oils of the present invention is found in their excellent emulsifying characteristics by reason of which they emulsify readily with slight agitation in various
45 proportions of water. In addition, another great advantage is that the resultant emulsions are unusually permanent. Thus an emulsion prepared from the oil above described containing 15%
50 of sodium naphthenate, showed practically no separation of oil after standing for periods of three to six months. Another advantage is found in the fact that aeration caused during usage of emulsions made with the present product does
55 not promote fermentation and decomposition, and therefore does not as a consequence require cresol, phenols, or other preservatives.

It is to be understood that the above disclosures are not to be considered as limiting but merely as illustrative of the generic invention,
60 and that many variations may be made within the scope of the appended claims.

I claim,

1. A miscible oil comprising a naphthenic acid soap, a blending agent in the form of a high
65 boiling point solvent, an auxiliary emulsifying agent in the form of a free rosin and a mineral oil.

2. A miscible oil comprising an alkali metal naphthenate, ethylene glycol, free rosin and mineral oil.

3. An emulsifiable oil comprising approximately 15% to 20% of a naphthenate, 3 to 5% each
5 of ethylene glycol and free rosin, and approximately 75% to 82% mineral oil.

4. A method of preparing a miscible oil comprising saponifying petroleum sludge containing naphthenic acids, separating the naphthenates
10 and accompanying mineral oils, heating the naphthenates and mineral oil mixture, dissolving free rosin in the heated mixture, adding a blending agent, and combining the resultant mixture with mineral oil to produce the desired
15 miscible oil.

5. A stable emulsion comprising a naphthenate, ethylene glycol, free rosin, mineral oil and water.

6. An emulsifiable oil comprising a mineral
20 oil, sodium naphthenate, ethylene glycol and wood free rosin, said oil possessing the characteristics of ready emulsifiability with slight agitation in all proportions with water to produce
25 an emulsion stable on long standing.

7. A miscible oil comprising a soap, a blending agent in the form of a high boiling point solvent, free rosin and a mineral oil.

8. An emulsion comprising a naphthenate, a
30 blending agent having a high boiling point, free rosin, mineral oil and water in which the other agents are dispersed.

9. A soluble oil containing a naphthenate, ethylene glycol, free rosin which constitutes an auxiliary emulsifying agent, and the mineral oil.
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10. A concentrated soluble oil base which is suitable for dilution with mineral oil to produce a miscible oil, comprising an alkali metal naphthenate, free rosin, and ethylene glycol.

11. A process for preparing a miscible oil base
40 comprising acidifying waste alkali liquors derived from caustic soda treatment of petroleum fractions, separating the resultant layer comprising the crude naphthenic acids, saponifying these crude acids with caustic soda, and mixing
45 the crude sodium naphthenate with ethylene glycol and free rosin to produce the base.

12. A process for preparing a miscible oil comprising preparing a miscible oil base according to claim 11 and diluting the base with a mineral oil.
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13. A miscible oil comprising a crude sodium naphthenate obtained from petroleum waste alkali liquors, ethylene glycol, free rosin and mineral oils.
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14. A miscible oil comprising a crude alkali naphthenate obtained from petroleum, a free rosin adapted to act as an auxiliary emulsifying agent, a high boiling point blending agent, and mineral oil.
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15. A miscible oil comprising a soap, a blending agent consisting of any of the solvents, butyl alcohol, mono-ethyl ether of diethylene glycol, and diethylene glycol, in conjunction with free rosin and a mineral oil.
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