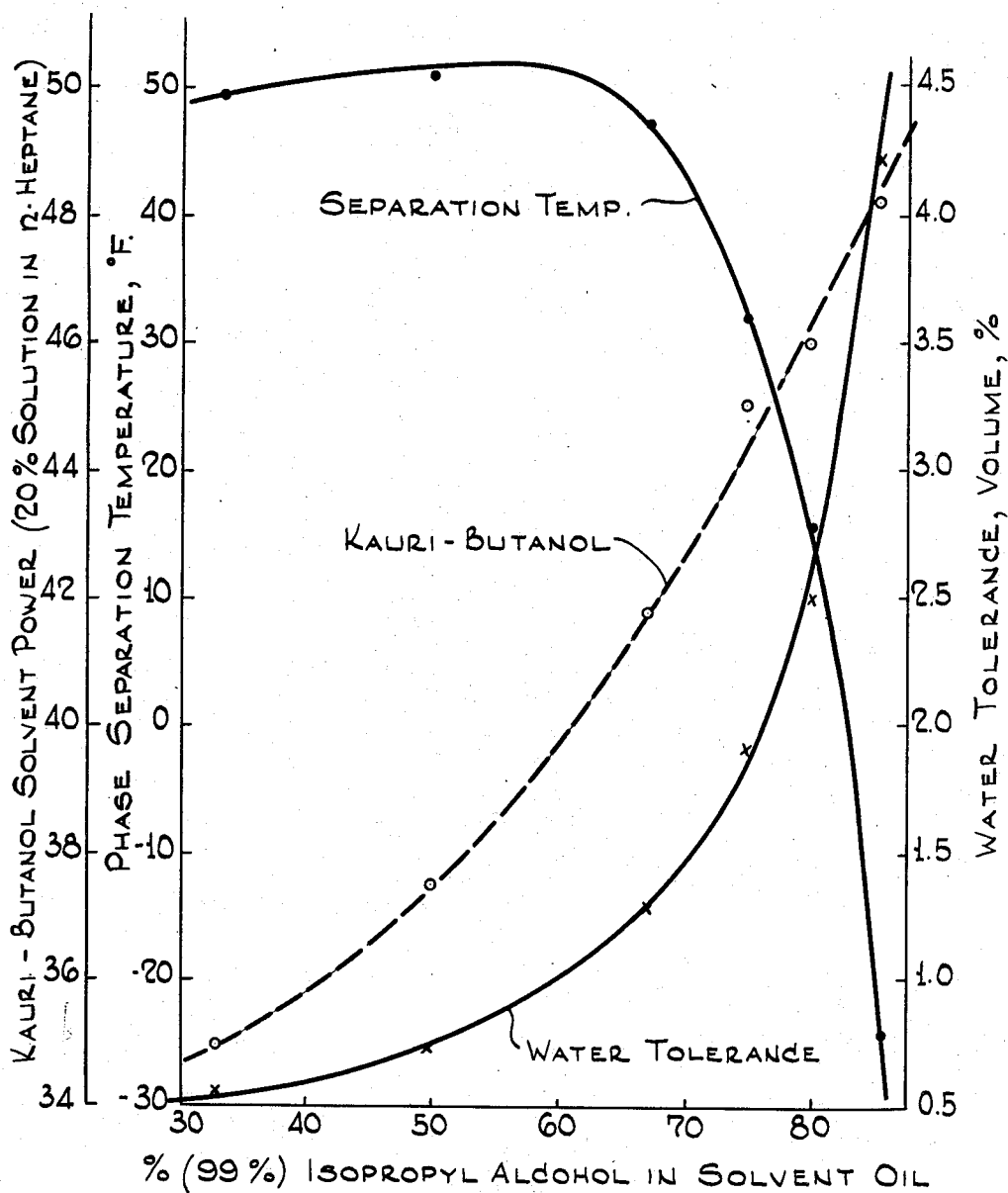


July 21, 1953

J. E. NEUDECK
GASOLINE FUELS CONTAINING DIMETHYL
CARBINOL AND SOLVENT OIL
Filed Dec. 15, 1951

2,646,348

PROPERTIES OF MIXTURES OF SOLVENT OIL AND
99% PURITY ISOPROPYL ALCOHOL



Joseph E. Neudeck Inventor

By W. V. Hilman Attorney

UNITED STATES PATENT OFFICE

2,646,348

GASOLINE FUELS CONTAINING DIMETHYL
CARBINOL AND SOLVENT OILJoseph E. Neudeck, Union, N. J., assignor to
Standard Oil Development Company, a corpo-
ration of Delaware

Application December 15, 1951, Serial No. 261,785

4 Claims. (Cl. 44-56)

1

The present invention is concerned with a new composition consisting essentially of a hydrocarbon oil and dimethyl carbinol. The composition of the present invention is adapted to impart desirable characteristics to mineral and petroleum oil compositions as for example, heating oils, fuel oils, diesel oils and motor fuels. The novel composition of the present invention is primarily intended to impart to these oils desirable characteristics such as anti-freezing properties, rust preventive properties, increased solvency power and the like. The composition of the present invention is also desirable for dissolving and fluxing gummy deposits in fuel systems and the like. The present composition is also adapted for the removal and fluxing of resinous films.

The present application is a continuation-in-part of Serial No. 132,211, filed December 9, 1949, now Patent 2,579,692 by Joseph E. Neudeck, entitled "Gasoline Fuels Containing Dimethyl Carbinol and Solvent Oil."

As mentioned heretofore, the present composition consists essentially of a solvent oil and of dimethyl carbinol.

With regard to the solvent oil to be used in compositions of this invention, reference may be made to U. S. Patent 2,066,234, issued to Sloane and Wasson on December 29, 1936. This patent fully disclosed the nature of the additive known as solvent oil which is contemplated for use in the compositions of this invention. Essentially, as there brought out, a solvent oil consists of a liquid hydrocarbon mixture having a kauri-butanol solvent power above about 20, having a 50% distillation point above 350° F., at 10 mm. mercury pressure, having a Saybolt viscosity at 100° F. not above 450 seconds, and having an API gravity of about 18 to 28°. It is to be understood therefore, that in referring to a solvent oil throughout this specification reference is made to an additive of this nature, as defined above and as fully described in the cited patent. A typical solvent oil for example has the following inspections:

Kauri-butanol value	25.2
50% distillation point -- 413 at 10 mm. Hg press.	
Saybolt viscosity at 100° F.....	75.3
A. P. I. gravity	26.6

The dimethyl carbinol, or isopropanol, to be employed must be of 90% purity, or greater, although it is preferred that 98% pure dimethyl carbinol be employed. This chemical is ordinarily produced as crude dimethyl carbinol having a purity of 65%. The 35% of impurities consist

2

chiefly of water together with small quantities of di-isopropyl ether, higher carbinols and ketones. Use of the crude product of this nature cannot be tolerated, in part since a phase separation would occur on adding the crude product to petroleum products. The consequent phase separation would result in an aqueous phase and an oil phase containing dimethyl carbinol of about 98% purity. It is presently contemplated that, if desired, crude dimethyl carbinol may be added to naphtha in order to obtain the final product consisting of naphtha containing dimethyl carbinol of 98% purity, which may be recovered by distillation. It is preferred, however, to purify the dimethyl carbinol in the conventional manner to obtain substantially pure dimethyl carbinol having less than 2% of water. The purified dimethyl carbinol of greater than 98% purity may then be blended directly with solvent oil.

As an aid in understanding the principles of this invention, it is of interest to note that homologues of dimethyl carbinol cannot satisfactorily be employed. In the case of higher molecular weight homologues, it has been found that normal propyl carbinol, together with all other high homologues are not sufficiently water soluble to be effective for one of the purposes of this invention, the purpose of suppressing the formation of carburetor ice. In the case of dimethyl carbinol, apparently sufficient quantities of this compound dissolve in any water condensed in a fuel tank or carburetor so as to sufficiently lower the freezing point of this water to prevent ice formation. However, in the case of the higher carbinols, solubility is not sufficient in the water to permit this effect. A further consideration in this connection is that it is desirable to employ a compound having as low a molecular weight as possible, to depress the freezing point of water to the maximum extent according to Raoult's law. However, it has also been found impossible to use carbinols of lower molecular weight than dimethyl carbinol. Thus in the case of carbinol, or methanol, the volatility is such that the compound would not condense on the throttle plate of carburetors, and apparently for this reason has little effect in suppressing icing. As a further consideration, oil compositions containing carbinol are extremely water sensitive so that the unavoidable contact of the blended composition with water during marketing would result in phase separation and the loss of carbinol. Methyl carbinol, or ethanol, is similarly objectionable particularly on the basis of water sensitivity. To illustrate this effect, reference may be made to data obtained by contact-

ing gasoline compositions containing, respectively, 2% of carbinol, methyl carbinol, and dimethyl carbinol, with two volume percent of water. It was found that 81% of the carbinol was removed by the water, while 65% of the methyl carbinol was removed, while only 10% of the dimethyl carbinol was lost.

It is apparent, therefore, that dimethyl carbinol is uniquely qualified, and in effect is the only compound of its class which can be considered as a possible agent for the present purpose.

The amount of solvent oil used as compared to the amount of dimethyl carbinol employed is preferably in the range from about 30% to 19% by volume of solvent oil and 70% to 81% by volume of dimethyl carbinol. Preferred concentrations are in the range from about 20% to 22% of solvent oil and from 80% to 78% by volume of dimethyl carbinol.

When utilizing the critical proportions of solvent oil and dimethyl carbinol as indicated above, it may be seen from the figure that no phase separation will occur until temperatures in the range from about 43° F. to 9° F. are attained. Thus, when employing an 81% dimethyl carbinol solution no phase separation will occur until the temperature reaches 9° F. This makes the solution eminently satisfactory for winter handling at relatively low temperatures. Furthermore, the solvency power is very high as measured by a 38 to 44 kauri-butanol value in a dilute solution. This solvency power is in the range of solvents utilized in the paint industry for dissolving resins. It also means that the composition of the present invention is excellent for dissolving and fluxing gummy deposits in fuel systems, such as diesel fuel systems, motor fuel systems, heating oil systems and the like. The composition as mentioned heretofore is very satisfactory for preventing formation of ice in any fuel system.

The presence of the solvent oil in conjunction with the dimethyl carbinol promotes the penetrating properties of the mixture so that the mixture will readily penetrate into small apertures where freezing is most likely to occur. Thus, for the prevention of ice deposits in the feed lines of fuel systems, this penetrating characteristic is most desirable.

The composition of the present invention is particularly desirable for dissolving a film of resin since the solvent oil, being of a similar chemical structure to that of the matrix in which the resin forms, spreads uniformly over the resin film and greatly enhances the effect of the alcohol which it carries along as co-solvent.

The invention may be more fully appreciated by the following example further illustrating the same.

Example

Tests were conducted wherein water was added to the composition of the present invention. A strip of iron was immersed in the solution. After a period of 14 days substantially no rusting of the

strip occurred. Thus, it is apparent that the present composition will ordinarily cause no excessive rusting of iron with which it comes into contact, up to the limit of its water tolerance.

While the composition of the present invention consists essentially of solvent oil and dimethyl carbinol, it is particularly contemplated that metal deactivators and rust preventatives may be included. N,N'-disalicylal-1,2-diamino propane, and N,N'-disalicylal-1,2-diamino ethane are examples of suitable metal deactivators. Sorbitan mono-oleate, pentaerythritol mono-oleate and phosphates, nitrates, and nitrites such as the amine phosphates, nitrates, and nitrites are examples of suitable rust preventives which may be used. A desirable rust preventive to be used is pentaerythritol mono-oleate. A still more desirable rust preventive comprises sorbitan mono-oleate. This latter material has the ability to increase the water tolerance of the composition without incurring phase separation.

On the other hand, if the composition of the present invention is to be utilized with a diesel fuel, a desirable additive comprises a sodium sulfonate derived from petroleum oils. Nitrites are also very desirable in conjunction with the present composition when the composition is to be utilized in a cracked fuel or a heating oil. The nitrites with the composition of the present invention tend to further increase the stability of the fuel against sediment formations. The concentration of the metal deactivators and rust preventives used should be in the range from .5% by volume to 2.5% by volume based upon the amount of solvent oil and methyl carbinol present. A very desirable concentration is about 1% by weight.

What is claimed is:

1. Novel composition consisting essentially of 30% to 19% by volume of a solvent oil consisting of a liquid hydrocarbon mixture having a kauri-butanol solvent power above about 20, a 50% distillation point above 350° F., a 10 mm. mercury pressure, a Saybolt viscosity at 100° F., not above 450 seconds, and an API gravity of about 18° to 28°, and from 70% to 81% by volume of dimethyl carbinol.

2. Composition as defined by claim 1 wherein the amount of solvent oil present ranges from about 20% to 22% by volume and wherein the amount of dimethyl carbinol present ranges from 80% to 78% by volume.

3. Composition as defined by claim 1 which contains from .5 to 2.5% of a rust preventive.

4. Composition as defined by claim 3 wherein said rust preventive is sorbitan mono-oleate.

JOSEPH E. NEUDECK.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,919,628	Frolich	July 25, 1933
2,365,009	Robertson	Dec. 12, 1944
2,429,707	Catalano	Oct. 28, 1947