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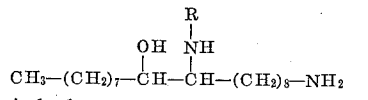
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ANTI-STALLING MOTOR FUEL

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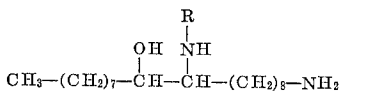
This invention relates to a volatile gasoline composition of improved anti-stalling properties containing an amino-hydroxyoctadecyl amine. More particularly, it involves the discovery that amino-hydroxyoctadecyl amines having the formula:



in which R is hydrogen or an alkyl radical having from 1 to 24 carbon atoms are effective anti-stalling, anti-icing additives for gasoline.

When internal combustion engines are operated on a gasoline fuel having the desired volatile characteristics for cold weather driving, a stalling problem is encountered during the warming period, particularly under cool humid atmospheric conditions. It has generally been recognized that the cause of repeated engine stalling in cool humid weather is the formation of ice in the carburetor. Gasoline evaporation in the carburetor has a sufficient refrigerating effect to condense and freeze the moisture present in the air. Ice particles deposited on the metal surfaces of the carburetor partially or completely block the air passageway between the carburetor throat and the carburetor throttle valve with resulting stalling particularly when the engine is idling. The amino-hydroxyoctadecyl amines are especially useful in the highly volatile fuels which are particularly prone to engine stalling due to ice formation under cool humid conditions.

The gasoline and fuel composition of this invention comprises a substantial concentration of volatile components in the gasoline boiling range and about 0.001 to 0.1 weight percent of an amino-hydroxyoctadecyl amine having the formula:



in which R is hydrogen or an alkyl radical having from 1 to 24 carbon atoms. The preferred amino-hydroxyoctadecyl amines are those in which R is hydrogen or an alkyl radical having from 1 to 16 carbon atoms. The presence of an amino-hydroxyoctadecyl amine of prescribed composition and in the prescribed concentration imparts excellent anti-icing and anti-stalling properties to the resulting gasoline compositions.

The amino-hydroxyoctadecyl amines of the invention vary from liquids of oily consistency to solids depending on the presence or structure of side groups in the compound. They can be prepared by epoxidation of oleylamine followed by reaction of the epoxidized oleylamine with an amine.

Examples of outstandingly effective aminohydroxyoctadecyl amines within the defined class include 9-amino-10-hydroxyoctadecyl amine, 9-dodecylamino-10-hydroxyoctadecyl amine, 9-decylamino-10-hydroxyoctadecyl amine, 9-octadecylamino-10-hydroxyoctadecyl amine, 9-tetradecylamino-10-hydroxyoctadecyl amine, 9-butylamino-10-hydroxyoctadecyl amine, 9-2-ethylhexylamino-10-octadecyl amine, 9-ethylamino-10-hydroxyoctadecyl amine, 9-methylamino-10-hydroxyoctadecyl amine and 9-anilino-10-hydroxyoctadecyl amine.

The amino-hydroxyoctadecyl amines of this invention

are employed as anti-stalling, anti-icing agents for motor fuels in an effective amount, generally concentrations of 0.001 to 0.1 weight percent of the total motor fuel. The preferred concentrations of the amino-hydroxyoctadecyl amine in a motor fuel is from 0.002 to about 0.01 weight percent. Concentrations of 8 and 16 pounds of the amino-hydroxyoctadecyl amine per thousand barrels of gasoline, concentrations equivalent to 0.003 to 0.006 weight percent respectively and within the preferred range have proven particularly effective in forming fuels of excellent anti-icing properties.

The action of the amino-hydroxyoctadecyl amines for their anti-stalling, anti-icing properties in motor fuels was evaluated in a carburetor icing demonstrator apparatus consisting of a vacuum pump adapted so that cool moisture saturated air from an ice tower is drawn through a simple glass tube gasoline carburetor. The gasoline sample is placed in a sample bottle and is drawn into a glass carburetor equipped with a 20 gauge hypodermic needle. Evaporation of the gasoline in the glass tube further cools the cold moist air with resulting ice formation on the throttle plate. The formation of ice on the throttle plate causes the engine to stall and it has been found that this condition is equivalent to a pressure drop across the throttle plate of about 0.5 inch of mercury. In the test, the time to reach 0.5 inch of mercury pressure is recorded. The vacuum pump is adjusted to give a vacuum of 1.8 inches of mercury and the test is run until a pressure of 2.3 inches of mercury has been reached or is run for 300 seconds. Since with most fuels this pressure drop is reached in 1–4 minutes, 300 seconds is the maximum time for a run. A recording of 300 seconds indicates no stalling within the test period. Each fuel is run 4 times in succession and the average is recorded. If the difference between the runs is great, the glass tube carburetor and the test throttle are washed with alcohol, flushed out with gasoline and the runs repeated. A leaded winter grade premium gasoline having a Reid vapor pressure of about 13 gives a stall in about 40–65 seconds in this test. Additives which raise the stall time to over 200 seconds are regarded as effective anti-stalling, anti-icing additives.

The base fuel employed to evaluate the effectiveness of the amino-hydroxyoctadecyl amines of this invention was a premium grade gasoline containing 2.32 cc. of TEL per gallon. This gasoline had an ASTM distillation I.B.P. of 88° F., an E.P. of 404° F. and a research octane rating of 99.5. Motor fuels containing the additives of the invention, the additive concentrations employed and the anti-stalling performance are listed in Table I below. The performance of a low molecular weight hydroxy diamine is also shown in this table.

TABLE I

Motor fuel anti-stalling test

Additive Salt	Conc., lbs. per 1,000 bbls.	Stalling Time, Seconds
None		40
9-dodecylamino-10-hydroxyoctadecyl amine	8	270
Do	16	300
9-amino-10-hydroxyoctadecyl amine	8	300
Do	16	300
Do	32	300
N-aminoethyl ethanolamine	[1] 0	70
Do	[1] 8	72
Do	[1] 16	72

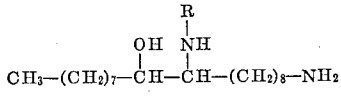
[1] Base fuel employed had an I.B.P. of 98° F., an E.P. of 364° F. and contained 3 cc. TEL.

The foregoing data show the outstanding anti-stalling, anti-icing properties of the amino-hydroxyoctadecyl amines of the invention. The additives of the invention

having the prescribed number of carbon atoms in the molecule significantly improved the anti-stalling properties of the base fuel from a level of about 40 seconds to substantially over 200 seconds to stall. As indicated previously, a good anti-stalling, anti-icing additive should improve the properties of the base fuel to such an extent that no stall is noted in 200 seconds. In contrast, low molecular weight hydroxy diamines, such as 1,3-diamino-2-propanol and N-aminoethyl ethanolamine are essentially ineffective in gasoline. Gasoline saturated with N-aminoethyl ethanolamine gave no significant change in the stalling characteristics of the base fuel.

I claim:

1. A gasoline containing 0.001 to 0.1 weight percent of an amino-hydroxyoctadecyl amine having the formula:



in which R is selected from the group consisting of hydrogen and an alkyl radical having from 1 to 24 carbon atoms and imparting improved anti-stalling, anti-icing properties to said gasoline.

2. A gasoline according to claim **1** in which R is selected from the group consisting of hydrogen and an alkyl radical having from 1 to 16 carbon atoms.

3. A gasoline according to claim **1** containing 0.002 to 0.01 weight percent of said amino-hydroxyoctadecyl amine.

4. A gasoline containing 0.001 to 0.1 weight percent of 9-amino-10-hydroxyoctadecyl amine.

5. A gasoline according to claim **4** in which said 9-amino-10-hydroxyoctadecyl amine is present in an amount from 0.002 to 0.01 weight percent.

6. A gasoline containing 0.001 to 0.1 weight percent of 9-dodecylamino-10-hydroxyoctadecyl amine.

7. A gasoline according to claim **6** in which said 9-dodecylamino-10-hydroxyoctadecyl amine is present in and amount from 0.002 to 0.01 weight percent.

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