This invention relates to specialty naphthas. It is more specifically concerned with improving the odor characteristics of petroleum-derived industrial naphthas.

The re-odorizing of various substances by adding odor to them to disguise or conceal any disagreeable odors that may be an inherent characteristic of the product, while the product is being handled by the consumer, is subject to his physiological reactions and, in the second instance in which the material is consumed, they are subject to acceptance based upon their aesthetic appeal. Accordingly, it is necessary that products which have disagreeable properties, especially odor, be modified to transform the disagreeable odor to a pleasant one. In the case of unsatisfactory or undesirable odors this objective is effected by the use of odor masking agents or re-odorants.

The technique of re-odorizing is practiced in many products, including a variety of petroleum products. One class of petroleum products, which in recent years has achieved commercial significance, is the highly refined naphthas. These products are defined as selected fractions of the lighter, more volatile constituents of crude petroleum, chemically refined and separated into various boiling ranges. Although this definition includes aromatic compounds, the instant invention is concerned only with straight-run or virgin products. Because of their good solvent properties, essentially nontoxic character, low corrosion, ready availability, and their functional versatility, petroleum naphthas can be prepared which are adaptable to a wide variety of industrial uses. It is therefore desirable that any odor which may be unpleasant or disagreeable to the consumer be eliminated. In some instances, petroleum products develop a rancid odor after an induction period. Generally, this type of odor is due to the oxidation of the hydrocarbons contained in the petroleum product and can be obviated by the use of additives which function as oxidation inhibitors. However, specialty naphthas have strong laryngal and/or rhinitic effects which become in certain products more disagreeable when the naphtha is used in relatively high temperature processing. Although many qualitative and quantitative tests have been devised to control the properties of naphthas and insure their uniform quality, no standard test has been developed which will permit the evaluation of the odorous properties of naphthas. Petroleum naphthas have a wet odor which occurs in naphtha in bulk form. They also may have a dry or residual odor which could be present in fabrics which have been in contact with petroleum naphthas, such as in the dry cleaning industry. Even though the dry cleaning solvent is substantially completely extracted from the goods being cleaned, there may persist in the goods an unpleasant odor attributed to the dry cleaning solvent.

In evaluating the odor characteristics of a petroleum naphtha, it is necessary to employ organoleptic panel testing for detecting the presence of off-quality odors in petroleum products. Although this test is entirely subjective, the qualitative and quantitative evaluation of odor is generally not susceptible to other analytical procedures.

This type of testing is used extensively in the evaluation of odor and flavor in foods and beverages. In general, the technique involves the selection of a carefully selected panel of several individuals which minimizes errors which might arise from the use of a single evaluation. Panel testing as a means for detecting odors is a recognized expedient for the determination of the type and source of odor and the level. For a more comprehensive discussion of the techniques of organoleptic panel testing reference is made to Analytical Chemistry 24 (1), March 1952, at page 503; Modern Packaging 25 (11), July 1952, at page 145, and 26 (10), June 1953, at page 149.

It is therefore an object of this invention to re-odorize specialty petroleum naphthas. It is another objective of this invention to provide a petroleum naphtha free from lacrymatory and/or rhinitic effects. Still another objective of this invention is to improve the odor of specialty naphthas. It is also an object of this invention to improve the wet and/or dry or residual odors of specialty petroleum naphthas. These and other objectives will be apparent from the following detailed description of the invention.

According to this invention, improvement in the odor of specialty naphthas is provided by the addition thereto of trace amounts of an organic nitrile compound. It has been found that small amounts of an organic nitrile, having not more than 12 carbon atoms per molecule, are admixed with a specialty petroleum naphtha, a composition free from irritating odors can be produced. The organic nitriles which can be employed in carrying out this invention include alicyclic and alicyclic nitriles, aromatic nitriles and alkaryl nitriles. Specific examples include but are not limited to acetonitrile, butyronitrile, caproyl

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These tests are described by Henderson et al., in an article entitled "Effect of Sulfur and Sulfur Compounds in Naphtha Upon Certain Corrosion Tests," I. & E. Chemistry, Analytical Edition 12 (1), 1. Refined, straight-run petroleum naphthas, which pass the doctor test and the distillation-corrosion test and are low in sulfur content, containing not more than about 0.05% by weight of sulfur, are employed in this invention.

To illustrate the subject invention, a specialty petroleum naphtha, produced from a Mid-Continent-type crude petroleum oil and treated in a conventional Linde sweetening process, had the following characteristics:

Gravity __________________________ 46.5° APL
ASTM boiling range, ° F.:  
I.B.P. __________________________ 365° F. 
50% __________________________ 370° F. 
E.P. __________________________ 405° F.
Color __________________________ 29.
Doctor test __________________________ Negative.
Distillation-corrosion test __________________________ Negative.
T.C.C. flash point __________________________ 142° F.
H₂SO₄ absorption __________________________ 1.5%.
Odor (panel testing) __________________________ Strong, irritating.

To this specialty naphtha was added 50 parts per million of caprylonitrile. In subjecting this to an organoleptic panel testing evaluation, it was found that a substantial improvement in odor was effected and the resultant composition had a mild and pleasant, non-irritating odor.

The foregoing example is an illustrative and non-limiting embodiment of this invention. The unusualness of this invention is made manifest by the use of selected organic nitriles which have disagreeable odors, per se, as reodorants for light petroleum distillates boiling in the naphtha range.

Therefore, we claim as our invention:

1. The method of preparing a specialty naphtha of satisfactory odor from refined straight-run petroleum naphtha of disagreeable odor, having a sulfur content sufficiently low to pass the "doctor test" and "distillation-corrosion test," which consists in blending with said naphtha at ambient temperature between 1 and 90 parts per million of an organic nitrile having not more than 12 carbon atoms per molecule, the amount of nitrile being sufficient to improve the disagreeable and unpleasant odor of said naphtha.

2. Method in accordance with claim 1 in which the nitrile is an aliphatic nitrile.

3. Method in accordance with claim 1 in which the nitrile is an alkyl nitrile.

4. Method in accordance with claim 1 in which the nitrile is an aromatic nitrile.

5. Method in accordance with claim 1 in which the nitrile is an alkaryl nitrile.

6. Method in accordance with claim 1 in which the nitrile is a caprylonitrile.

7. Method in accordance with claim 1 in which the nitrile is selected from the group consisting of acetoni- trile, butyronitrile, caprylonitrile, isovaleronitrile, trideconitrile, benzonitrile, O-methylbenzonitrile, O-tolunitrile, naphthylnitrile, cyclohexylbenzonitrile, cyclohexylnitrile, phenylbutyronitrile, phenylacetanitrile.

8. Method in accordance with claim 1 in which the naphtha boils between 365 and 405° F., the organic nitrile is caprylonitrile and the nitrile is blended with the naphtha in the amount of 50 parts per million.

References Cited in the file of this patent

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