WHAT IS CLAIMED IS:

1. An isomerized alpha olefin sulfonate having the general formula:

$R\text{-}SO_3\ M$

wherein R is an aliphatic hydrocarbyl group having from about 12 to about 40 carbon atoms, having from about 20 to 98 weight percent branching, and containing one or more olefin or alcohol moieties or mixtures thereof; and R is derived from a partially isomerized alpha olefin containing a residual alpha olefin content, wherein when the percent branching in the partially isomerized alpha olefin is less than or equal to 25 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 8 weight percent; and M is a mono-valent cation.

2. The sulfonate of Claim 1 wherein the partially isomerized alpha olefin is composed of at least about 23 wt% branching, at least about 9% residual alpha olefin, and having from about 20 to about 24 carbon atoms.

3. The sulfonate of Claim 1 wherein the partially isomerized alpha olefin is composed of at least about 65% branching, at least about 0.2% residual alpha olefin and having from about 20 to about 24 carbon atoms.

4. A method making an isomerized alpha olefin sulfonate comprising the steps of

(a) sulfonating an isomerized alpha olefin with sulfur trioxide in the presence of air thereby producing primarily an isomerized alpha olefin sulfonic acid, wherein the isomerized alpha olefin is derived from the isomerization of C_{12}-C_{40} normal alpha olefins;

(b) optionally thermally digesting the product from step (a);

(c) neutralizing the product from step (b) with a source of a mono-valent cation; and

(d) optionally, hydrolyzing the product from step (c) with additional base or caustic.

5. The method of Claim 4 wherein the isomerized alpha olefin has from about 12 to about 40 carbon atoms, and from about 20 to 98 weight percent branching; and comprises a partially isomerized alpha olefin containing a residual alpha olefin content, wherein when the percent branching in the partially isomerized alpha olefin is less than or equal to 25 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 8 weight percent.

6. The method of Claim 4 wherein the partially isomerized alpha olefin is composed of at least about 23 wt% branching, at least about 9% residual alpha olefin, and having from about 20 to about 24 carbon atoms.

7. The method of Claim 4 wherein the partially isomerized alpha olefin is composed of at least about 65% branching, at least about 0.2% residual alpha olefin and having from about 20 to about 24 carbon atoms.

8. The sulfonate of Claim 1 wherein when the percent branching in the partially isomerized alpha olefin is less than or equal to 18 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 10 weight percent.

9. An isomerized alpha olefin sulfonate having the general formula:

$R\text{-}SO_3\ M$

wherein R is an aliphatic hydrocarbyl group having from about 12 to about 40 carbon atoms, having from about 20 to 98 weight percent branching, and containing one or more olefin or alcohol moieties or mixtures thereof; and R is derived from a partially isomerized alpha olefin containing a residual alpha olefin content, wherein if the percent branching in the partially isomerized alpha olefin is greater than or equal to 15 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is less than or equal to 15 weight percent and wherein if the percent branching in the partially isomerized alpha olefin is less than or equal to 15 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 15 weight percent ; and M is a mono-valent cation.

10. The method of Claim 4 wherein the product from step (b) is neutralized with a source of an alkali metal or ammonium or substituted ammonium ion; and

WHAT IS CLAIMED IS:

1. An isomerized alpha olefin sulfonate having the general formula:

$$R\text{-}SO_3\ M$$

wherein R is an aliphatic hydrocarbyl group having from 12 to 40 carbon atoms, having from 20 to 98 weight percent branching, and containing one or more olefin or alcohol moieties or mixtures thereof; and R is derived from a partially isomerized alpha olefin containing a residual alpha olefin content, and M is a mono-valent cation wherein

(i) when the percent branching in the partially isomerized alpha olefin is less than or equal to 25 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 8 weight percent; or

(ii) if the percent branching in the partially isomerized alpha olefin is greater than or equal to 15 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is less than or equal to 15 weight percent and wherein if the percent branching in the partially isomerized alpha olefin is less than or equal to 15 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 15 weight percent.

2. The sulfonate according to claim 1, wherein when the percent branching in the partially isomerized alpha olefin is less than or equal to 25 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 8 weight percent.

3. The sulfonate of Claim 2 wherein the partially isomerized alpha olefin is composed of at least 23 wt% branching, at least about 9% residual alpha olefin, and having from 20 to about 24 carbon atoms.

4. The sulfonate of Claim 2 wherein the partially isomerized alpha olefin is composed of at least 65% branching, at least 0.2% residual alpha olefin and having from 20 to 24 carbon atoms.

5. The sulfonate of Claim 2 wherein when the percent branching in the partially isomerized alpha olefin is less than or equal to 18 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 10 weight percent.

6. The sulfonate of claim 1, wherein if the percent branching in the partially isomerized alpha olefin is greater than or equal to 15 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is less than or equal to 15 weight percent and wherein if the percent branching in the partially isomerized alpha olefin is less than or equal to 15 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 15 weight percent.

7. A method of making an isomerized alpha olefin sulfonate comprising the steps of

(a) sulfonating an isomerized alpha olefin with sulfur trioxide in the presence of air thereby producing primarily an isomerized alpha olefin sulfonic acid, wherein the isomerized alpha olefin is derived from the isomerization of C_{12}-C_{40} normal alpha olefins;

(b) optionally thermally digesting the product from step (a);

(c) neutralizing the product from step (b) with a source of a mono-valent cation; and

(d) optionally, hydrolyzing the product from step (c) with additional base or caustic;

wherein the isomerized alpha olefin has from 12 to 40 carbon atoms, and from 20 to 98 weight percent branching; and comprises a partially isomerized alpha olefin containing a residual alpha olefin content, wherein when the percent branching in the partially isomerized alpha olefin is less than or equal to 25 weight percent, then the residual alpha olefin content in such partially isomerized alpha olefin is greater than or equal to 8 weight percent.

8. The method of Claim 7 wherein the partially isomerized alpha olefin is composed of at least 23 wt% branching, at least a 9% residual alpha olefin, and having from 20 to 24 carbon atoms.

9. The method of Claim 7 wherein the partially isomerized alpha olefin is composed of at least 65% branching, at least 0.2% residual alpha olefin and having from 20 to 24 carbon atoms.

10. The method of Claim 7 wherein the product from step (b) is neutralized with a source of an alkali metal or ammonium or substituted ammonium ion.