with at least one oil-soluble organic acid or suitable derivative thereof and at least one basically reacting magnesium compound in the presence of water or a combination of at least one alcohol and water.

[0005] Cleverly et al., U.S. Pat. No. 5,534,168 discloses the use of magnesium oxide of relatively low reactivity in the process for the production of overbased magnesium sulfonates, together with the introduction of water and an alcohol during the carbonation step, which provide high base number products with low post-carbonation sediment (PCS) values and which can be purified by rapid filtration.

[0006] Moulin et al., WO 97/14774 discloses the use of a low molecular weight sulfonic acid, or magnesium salt thereof that is at least partially water-soluble in the process to prepare highly overbased, high molecular weight magnesium sulfonates with low post-carbonation sediment.

[0007] Muir, U.S. Pat. No. 4,617,135 discloses a one step process for production of highly overbased magnesium sulfonates with minimal sediment by using a combination of specified first and second promoters.

[0008] Muir, U.S. Pat. No. 4,647,387 discloses an oil composition which comprises (a) an engine oil or lubricating oil, and (b) an overbased magnesium sulfonate, and is practically free of water-tolerance additives added after sulfonate formation. Water tolerance is provided by a succinic anhydride promoter reaction product present during the formation of component (b).

[0009] Cleverly et al., EP-A-323 088 discloses a process for the preparation of overbased magnesium sulfonate in which the reaction mixture for carbonation contains an effective amount of an ashless dispersant. The overbased magnesium sulfonates have reduced interactions, sedimentation and haze.

SUMMARY OF THE ~~INVENTION~~DISCLOSURE

[0010] The present ~~invention~~disclosure is directed to the discovery of an improved method of making highly overbased magnesium alkyltoluene sulfonates. The present ~~invention~~disclosure is also

directed to the products made by that process. The present ~~invention~~disclosure is also directed to a lubricating oil composition and a lubricating oil additive concentrate containing the highly overbased magnesium alkyltoluene sulfonates made by the improved process.

[0011] Accordingly, in its broadest embodiment, the present ~~invention~~disclosure is directed to a process for preparing a highly overbased magnesium alkyltoluene sulfonates comprising:

(a) reacting at least one oil soluble alkyltoluene sulfonic acid and at least one source of magnesium, in the presence of a mixture comprising:

(i) at least one hydrocarbon solvent; and

(ii) at least one low molecular weight alcohol;

(b) contacting the reaction product of (a) with at least one promoter and water;

(c) contacting the product of (b) with an overbasing acid; and

(d) heating the reaction product of (c) to a temperature greater than the distillation temperature of the hydrocarbon solvent, the low molecular weight alcohol, and the water to distill the hydrocarbon solvent, the low molecular weight alcohol, and the water.

[0011a] In a further embodiment, there is provided a process for preparing a highly overbased magnesium alkyltoluene sulfonate comprising:

(a) reacting at least one oil soluble alkyltoluene sulfonic acid and at least one source of magnesium, in the presence of a mixture comprising:

(i) at least one hydrocarbon solvent; and

(ii) at least one low molecular weight alcohol;

(b) contacting the reaction product of (a) with at least one promoter and water;

(c) contacting the product of (b) with an overbasing acid; and

(d) heating the reaction product of (c) to a temperature greater than the distillation temperature of the hydrocarbon solvent, the low molecular weight alcohol, and the water to distill the hydrocarbon solvent, the low molecular weight alcohol, and the water, and

wherein the overbased magnesium alkyltoluene sulfonate has a Total Base Number of at least 300 mg KOH/g.

[0012] A further embodiment of the present ~~invention~~disclosure is directed to a highly overbased magnesium alkyltoluene sulfonate prepared by the process of the present ~~invention~~disclosure.

[0013] A further embodiment of the present ~~invention~~disclosure is directed to a lubricating oil composition comprising an oil of lubricating viscosity and a minor amount of a highly overbased magnesium alkyltoluene sulfonate prepared by the process of the present ~~invention~~disclosure.

[0014] A further embodiment of the present ~~invention~~disclosure is directed to a lubricating oil concentrate comprising from about 90 wt. % to about 10 wt. % of an organic liquid diluent and from about 10 wt. % to about 90 wt. % of a highly overbased magnesium alkyltoluene sulfonate prepared by the process of the present ~~invention~~disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0015] While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example and are herein described in detail. It should be understood, however, that the description herein of specific