A fluid blend suitable for use as a lube basestock comprises two major components: (A) a copolymer made from ethylene with one or more alpha olefins, the copolymer (i) containing not more than 50 wt % ethylene; (ii) having a number average molecular weight of from 400 to 10,000; and (iii) a molecular weight distribution <3; and (B) a polyalphaolefin fluid or a hydroprocessed oil having a VI greater than 80.
FIGURE 1

Graph showing the 40°C viscosity (cS) as a function of Wt% Blending Fluid in Group III for different blends:
- Example 3
- PIB H50
- Bright Stock
FIGURE 2

Example 3

100°C Viscosity, cS

Wt% Blending Fluid in Group III
FIGURE 3

Example 3

PIB H50

Bright
Stock

100°C Viscosity of Blends
FIGURE 4

![Graph showing the 100°C Viscosity of Blends, cS for Examples 2, 4, and PIB H300. The graph plots viscosity on the y-axis and 100°C Viscosity of Blends on the x-axis.]
NOVEL LUBRICANT BLEND COMPOSITION

FIELD OF INVENTION

[0001] The present invention relates to lubricant fluid blends especially suitable as base stocks for lubricant compositions. More particularly the inventive relates to lubricant fluid blends based on hydroprocessed oils and copolymers made from ethylene with one or more alpha-olefins.

BACKGROUND OF INVENTION

[0002] Most lubricant base stocks, including most of API Group I to Group IV fluids, have viscosities at 100 °C in the range of about 4 to about 6 cSt. When these base stocks are used to formulate different viscosity grade lubricants it is necessary to blend them with high viscosity base stocks. Currently, the readily available high viscosity base stocks include bright stock, high viscosity polyalphaolefin (PAOs) and polyisobutylenes (PIB).

[0003] Bright stock and PIB have poor viscosity indices (VIs) and poor low temperature properties and hence their potential to improve blend properties is limited. This is especially true when blended with low viscosity hydroprocessed Group II, Group III fluids or isomerate lubes derived from Fischer-Tropsch wax, which usually have VIs close to or greater than 100. Experience has shown that when Group II, Group III or Fischer-Tropsch wax isomerate fluids are blended with polyisobutylene (PIB) or bright stock, on many occasions, the resulting blends have even lower VIs than the starting Group II or Group III fluids.

[0004] High viscosity PAOs have excellent viscometrics and low temperature properties; however, they are more expensive than PIB or bright stock. Moreover, the availability of PAOs is limited to some extent due to the limited supply of the linear alpha olefins, such as 1-decene, used in preparing them.

[0005] There is a need, therefore, for fluid lubricant base stocks having good viscometrics, low temperature properties and shear stability that can be made from readily available material.

[0006] Accordingly, one object of the present invention is to provide a blend of lubricant fluids having improved viscometrics when compared to blends containing PIB, bright stock or PAOs.

[0007] Another object is to provide lubricant fluid blends having improved shear stability when compared to blends containing PIB, bright stock or PAOs.

SUMMARY OF INVENTION

[0009] Simply stated, the present invention is directed toward a fluid blend suitable for use as a lube base stock comprising two major components: (A) a polymer made from ethylene with one or more alpha-olefins and containing not more than 50 wt % ethylene, the copolymer having a number average molecular weight from up 400 to 10,000 and having a molecular weight distribution (MWD)<3 and (B) a polyalpha olefin or hydroprocessed oil having a VI greater than 80.

[0100] In another embodiment a lubricating composition is provided comprising the fluid blend and a lubricant additive package.

BRIEF DESCRIPTION OF DRAWINGS

[0111] FIGS. 1 to 4 graphically compare the viscosity of lubricant base stock blends prepared from the copolymers of the invention with viscosities of blends employing polyisobutylene or bright stock.

DETAILED DESCRIPTION OF INVENTION

[0112] One major component, component A, in the fluid blend of the present invention is a copolymer made from ethylene with one or more alpha-olefins. Consequently, as used herein, the term copolymer encompass polymers containing 2, 3 or more different monomer moieties. The copolymers in the blend of the invention have a number average molecular weight of from 400 to 10,000 and a MWD <3. Importantly, the copolymer contains not more than 50 wt % ethylene. The alpha-olefin moiety of the copolymer will be derived from at least one or more C3, C4 or higher alpha olefins.

[0113] Accordingly, suitable alpha-olefinic monomers include those represented by the formula H2C═CHR, wherein R is a straight or branched chain alkyl radical comprising 1 to 18 carbon atoms and preferably 1 to 10 carbon atoms. When R is a branched chain, the branch is preferred to be at least two carbons away from the double bond.

[0114] The copolymers are prepared by copolymerizing a feed containing ethylene and one or more alpha olefins in the weight ratio of 60:40 to about 5:95 in the presence of a metallocene catalyst system.

[0115] Metallocene catalyst systems are well known in the art and mention is made of U.S. Pat. No. 5,859,159, incorporated herein by reference, for a description of metallocene catalysts systems useful for producing the polymers from ethylene and one or more alpha-olefins suitable for the lubricant fluid blends of the present invention.

[0116] The polymer is produced by polymerizing a reaction mixture of ethylene and at least one additional alpha-olefin monomer in the presence of a metallocene catalyst system, preferably in solution. Optionally, hydrogen may be added to regulate the degree of polymerization or molecular weight, and to reduce the amount of unsaturation in the product. In such situations the amount of hydrogen typically will be 0.1 mole % to 50 mole % based on the amount of ethylene.

[0117] Any known solvent effective for such polymerization can be used. For example, suitable solvents include hydrocarbon solvent such as aliphatic, cycloaliphatic and aromatic hydrocarbons. The preferred solvents are propane, isobutane, pentane, isopentane, hexane, isohexane, heptane, isohexane, Norpar, Isopar, benzene, toluene, xylene, alkylaromatic-containing solvents, or mixture of these solvents.

[0118] The polymerization reaction may be carried out in a continuous manner, such as in a continuous flow stirred tank reactor where feed is continuously introduced into the reactors and product removed therefrom. Alternatively, the polymerization may be conducted in a batch reactor, prefer-
ably equipped with adequate agitation, to which the catalyst, solvent, and monomers are added to the reaction and left to polymerize therein for a time sufficient to produce the desired product.

0019. Typical polymerization temperature for producing the copolymers useful herein are in the range of about 0° C. to about 300° C. and preferably 25° C. to 250° C. at pressures of about 15 to 1500 psig, and preferably 50 to 1000 psig.

0020. The conditions under which the polymerization is conducted will determine the degree of unsaturation in the resulting copolymer. As is known in the art, the degree of unsaturation of a polymer can be measured by bromine number. In the present invention it is preferred that the copolymer have a bromine number below 2 and more preferably in the range of 0 to 1.

0021. In those instances where the product copolymer has a high degree of unsaturation, such as when the copolymer product has a viscosity less than about 1000 cSt at 100° C., the copolymer preferably is hydrogenated to provide a final product having a bromine number below 2. The hydrogenation may be carried out in a batch mode or in a continuous stirred tank or in a continuous fixed bed operation, using typical hydrogenation catalysts. Examples of the hydrogenation catalysts are nickel on kieselguhr catalyst, Raney Nickel catalyst, many commercial hydro-treating catalyst, such as nickel, cobalt, molybdenum or tungsten on silica, silica-alumina, alumina, zirconium support, etc., or supported Group VIII B metals, such as platinum, palladium, ruthenium and rhodium. The hydrogenation conditions may range from room temperature to 300° C. with hydrogen pressure from atmospheric pressure to 2000 psi for long enough residence time to reduce most or all of the unsaturation. The unsaturation degree can be measured by bromine number of iodine index. Preferably the bromine number of the finished product should be below 2. The lower the bromine number the better the oxidative stability. More preferably, the reaction temperature, pressure, residence time, catalyst loading all will be adjusted to achieve 0-1 bromine number.

0022. In instances where the polymerization conditions favor the formation of copolymers having a very low degree of unsaturation, hydrogenation of the copolymer is not necessary and the copolymer can be used directly in forming the lubricant blend.

0023. The other major component, component B, in the fluid blend of the present invention is a polyalpha olefin or a hydroprocessed oil having a VI greater than 80. Examples of such oils are Group II and III oils, Fischer-Tropsch wax isomers (as disclosed in U.S. Pat. No. 6,090,989; U.S. Pat. No. 6,080,301 or U.S. Pat. No. 6,008,164) and Group IV synthetic polyalpha olefin fluids.

0024. The amounts of ethylene-co-olefin copolymer and hydroprocessed oils in the blends of fluid the present invention are not critical and will depend on the intended use of the blend. In general the amount of ethylene-co-olefin copolymer will constitute from about 1 to about 95 wt % of the blend. Generally, it is prefer to be from 5 to 80%. If too small amount of the polymer is used, the blend will not have sufficient viscometrics. On the other hand, if too much of the polymer is used, it may be more costly or the blend viscosity may be too high for practical use.

0025. The fluid blends of the present invention can be combined with selected lubricant additives to provide lubricant compositions.

0026. The additives listed below are typically used in such amounts so as to provide their normal attendant functions. Typical amounts for individual components are also set forth below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Broad Wt %</th>
<th>Preferred Wt %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity Index Improver</td>
<td>1-12</td>
<td>1-4</td>
</tr>
<tr>
<td>Corrosion Inhibitor</td>
<td>0.01-3</td>
<td>0.01-1.5</td>
</tr>
<tr>
<td>Oxidation Inhibitor</td>
<td>0.01-5</td>
<td>0.01-1.5</td>
</tr>
<tr>
<td>Dispersant</td>
<td>0.1-10</td>
<td>0.1-5</td>
</tr>
<tr>
<td>Lube Oil Flow Improver</td>
<td>0.01-2</td>
<td>0.01-1.5</td>
</tr>
<tr>
<td>Detergents and Rust Inhibitors</td>
<td>0.01-6</td>
<td>0.01-3</td>
</tr>
<tr>
<td>Pour Point Depressant</td>
<td>0.01-1.5</td>
<td>0.01-1.5</td>
</tr>
<tr>
<td>Antiwearing Agents</td>
<td>0.01-6</td>
<td>0.001-0.01</td>
</tr>
<tr>
<td>Seal Swellant</td>
<td>0.001-5</td>
<td>0.001-2</td>
</tr>
<tr>
<td>Extreme Pressure Additives</td>
<td>0.001-5</td>
<td>0.001-2</td>
</tr>
<tr>
<td>Seal Swellant</td>
<td>0.1-4</td>
<td>0.1-4</td>
</tr>
<tr>
<td>Friction Modifiers</td>
<td>0.01-3</td>
<td>0.01-1.5</td>
</tr>
<tr>
<td>Fluid Blend of Invention</td>
<td>≥80%</td>
<td>≥80%</td>
</tr>
</tbody>
</table>

0027. When other additives are employed, it may be desirable, although not necessary, to prepare additive concentrates comprising concentrated solutions or dispersions of the dispersant, together with one or more of the other additives to form an additive mixture, referred to herein as an additive package whereby several additives can be added simultaneously to the base stock to form the lubricating oil composition. Dissolution of the additive concentrate into the lubricating oil may be facilitated by solvents and by mixing accompanied with mild heating, but this is not essential. The concentrate or additive-package will typically be formulated to contain the dispersant additive and optional additional additives in proper amounts to provide the desired concentration in the final formulation when the additive package is combined with a predetermined amount of the fluid blend of the invention.

0028. All of the weight percents expressed herein (unless otherwise indicated) are based on active ingredient (A.I.) content of the additive, and/or upon the total weight of any additive-package, or formulation which will be the sum of the A.I. weight of each additive plus the weight of total oil or diluent.

0029. The composition of the invention may also include a co-base stock to enhance lubricant performance or to improve additive solubility in the basestock. Typically co-basestocks are selected from polar fluids useful as lubricants.

0030. Examples of these fluids include many types of esters, alkyl-aromatics, and oil-soluble polyalkylene glycols. Typical esters used in lubricant formulations include polyol esters, adipate esters, sebacate esters, phthalate esters, sterates, etc. Typical alkylaromatics used in lube formulation include alkylated naphthenales, alkylbenzenes, alkylhu- lenes, detergent alkylate bottoms, etc. Typical oil-soluble polyalkylene glycols include poly-propylene oxides, polybutylene oxides, etc. Such fluids may be used in amounts of about 1 wt % to about 60 wt % although amounts of about 1 wt % to about 10 wt % are preferred.
The present invention is further illustrated by the examples which follow.

**EXAMPLES**

**Example 1**

1-butene was charged at 100 ml/hour and ethylene was charged at 16 gram/hour to a 600 ml autoclave containing a catalyst solution of 20 mg zirconocene dichloride, 0.4 gram methylaluminoxane and 50 gram toluene, and cooled in an ice water bath. The feeds were discontinued after four hours. After 12 hours of reaction at room temperature or below, the reaction was quenched with water and alumina. The catalyst and any solid was removed by filtration. The viscous liquid product was isolated in 90% yield by distillation at 140°C/0.1 millitor for 2 hours to remove any light end. This liquid product was further hydrogenated at 200°C, 1000 psi H₂ pressure using 2 wt % nickel on Kieselguhr catalyst for 4 hours. The hydrogenated copolymer product had the following properties: 100°C, Kv=45.8 cS, 40°C, Kv=54.0 cS, VI=136, pour point =−36°C. This polymer contains 28.6 wt % ethylene as measured by C13-NMR.

**Example 2**

Similar to Example 1, except ethylene was added at 20 grams per hour. The distilled liquid yield=92%. The hydrogenated product had the following properties: 100°C, Kv=161.3 cS, 40°C, Kv=207.2 cS, VI=190, pour point=−25°C. This polymer contains 38.7 wt % ethylene as measured by C13-NMR. The Mn of this polymer is 2280 and MWD is 2.66.

**Example 3**

This polymer was prepared in a continuous mode of operation. In this reaction, polymer grade ethylene, polymer grade 1-butene and polymer grade isobutane solvent were charged into a 200 gallon reactor after purification through molecular sieve and treatment by injecting 50 ppm tri-t-butylalumina. The feed rates for ethylene, 1-butene and isobutane were 12, 120 and 180 lb/hour, respectively. A catalyst solution, containing 5x10 g-mole/liter of dimethylsilylMbais (4,5,6,7 tetrahydro-indenyl) zirconium dicarbodi and methylaluminoxane of 1/400 Zr/Al molar ratio in toluene, was charged into the reactor at 13.5 ml/minute. The reactor temperature was maintained 89.4°C and 95.6°C, pressure 237-261 psi and average residence time 2 hours. The crude reaction product was withdrawn from the reactor continuously and washed with 0.4 wt % sodium hydrosol solution followed with a water wash. A viscous liquid product was obtained by devolatilization to remove iso-butane solvent, light stripping at 60°C/5 psig followed by deep stripping at 140°C/1 millitor. The residual viscous liquid was then hydro-finished at 200°C, 800-1200 psi H₂ pressure with 2 wt % Ni-on-Kieselguhr catalyst for eight hours. The hydrogenated product contains 34 wt % ethylene content and had the following properties: 100°C, Kv=114.0 cS, 40°C, Kv=1946.5 cS, VI=145 and pour point =−24°C. This polymer has Mn of 2374 and MWD of 1.88.

**Example 4**

This polymer was prepared in a similar manner as in Example 3, except that the feed rates for ethylene, 1-butene and isobutanes were 58, 120 and 283 lb/hour, and the reaction temperature was between 98.3°C and 101.1°C, pressure 290-300 psi and average residence time 1 hour. After hydrofinishing, the lube base stock contained 44 wt % ethylene and had the following properties: 100°C, Kv=149.9 cS, 40°C, Kv=2418.4 cS, VI=164 and pour point =−24°C. This polymer has Mn of 2660 and MWD of 1.76.

**Example 5**

This polymer was prepared in a similar manner as in Example 3, except that the feed contained 40 wt % 1-butene, 11 wt % ethylene and 49 wt % isobutane, the reaction temperature was 71°C, and average residence time 1 hour. After hydrofinishing, the hydrogenated product contained 19 wt % ethylene and had the following properties: 100°C, Kv=1894 cS, 40°C, Kv=24608 cS, VI=278 and pour point =−1°C. This polymer has Mn of 5491 and MWD of 2.80.

**Example 6**

This polymer was prepared in a similar manner as in Example 3, except that the feed contained 40 wt % 1-butene, 35 wt % ethylene and 25 wt % isobutane, the reaction temperature was 93.3°C, and average residence time approximately 1 hour. After hydrofinishing, the lube base stock contained 44.5 wt % ethylene and had the following properties: 100°C, Kv=1493 cS, 40°C, Kv=49073 cS, VI=230 and pour point=5°C. This polymer has Mn of 5664 and MWD of 2.76.

**Example 7**

A series of blends were prepared using copolymers of the invention and a hydroprocessed Group III or a Group II base stock. For comparative purposes additional blends of the Group III and Group II basestocks were prepared using the blending fluids shown in Table 1.

<table>
<thead>
<tr>
<th>Blending Fluid</th>
<th>100°C</th>
<th>40°C</th>
<th>Pour Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIB H50</td>
<td>117</td>
<td>3442</td>
<td>104</td>
</tr>
<tr>
<td>PIB H30</td>
<td>663</td>
<td>25099</td>
<td>117</td>
</tr>
<tr>
<td>Bright Stock</td>
<td>32</td>
<td>474</td>
<td>96</td>
</tr>
<tr>
<td>100 cS PAO</td>
<td>100</td>
<td>1250</td>
<td>170</td>
</tr>
</tbody>
</table>

1. PIB H50 and H30 are trade names for polyisobutylene sold by BP Chemical Co, BP North America (chemicals), 150 W Warrenville Rd., N-3, Naperville, IL 60563 USA.
2. The 100 cS PAO is available from ExxonMobil Chemical Co at Edison, NJ.

**Properties**

The properties of the blends made from the Group III basestocks with the copolymers of Example 3, PIB H50 and bright stock were determined and are shown in Table 2.
Although the Example 3 polymer and PIB H5O both have the similar 100° C. viscosities, the blends from Example 3 have higher 100° C. and 40° C. viscosities than PIB at same weight percent (FIGS. 1 and 2). The thickening efficiency for Example 3 is also higher than PIB. These data demonstrated that Example 3 sample have better viscosity boosting effect than PIB of comparable viscosity. Furthermore, the lube base fluids made from Example 3 and Group III base stocks have higher VI at similar 100° C. viscosity, as shown in FIG. 3. Similar trends were observed when compared to the blends with bright stock.

The properties of blends made from the Group III base stock with the copolymer of Example 2, Example 4 and PIB H300 were determined and are shown in Table 3.

Although Examples 2 and 4 fluids both have much lower 100° C. viscosities than PIB H300 (161 cS and 150 cS vs. 663 cS), the blends from Example 2 and 4 fluids have higher viscosities than those from PIB H300. At the same weight percent of blend stock, the thickening efficiencies of Example 2 and 4 fluids are higher than PIB H300. These data demonstrate that Example 2 and 4 fluids have better viscosity-boosting effect than PIB. Also, the VI of the blends from Example 3 and 5 fluids are higher than those from PIB H300 (FIG. 4).

The properties of blends prepared from the Group III base stock with the Example 5 and 6 fluids were determined and are shown in Table 4.

As can be seen the blends have a VI that is higher than the Group III base stock alone.
Blends were prepared from a Group II basestock with the Example 3 and 4 fluids and with PIB H50. The details and properties of the blends are given in Table 5.

<table>
<thead>
<tr>
<th>Blend Number</th>
<th>Blending Fluid</th>
<th>Wt %</th>
<th>100°C K, cS</th>
<th>40°C K, cS</th>
<th>VI</th>
<th>Shear Viscosity Loss Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>PIB H50</td>
<td>9.1</td>
<td>10.62</td>
<td>90.96</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>PIB H50</td>
<td>25.0</td>
<td>14.65</td>
<td>347.96</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Example 3</td>
<td>50.0</td>
<td>24.93</td>
<td>342.48</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Example 3</td>
<td>25.0</td>
<td>18.93</td>
<td>379.30</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Example 3</td>
<td>50.0</td>
<td>36.01</td>
<td>415.09</td>
<td>129</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Example 4</td>
<td>9.1</td>
<td>12.51</td>
<td>97.84</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Example 4</td>
<td>25.0</td>
<td>20.41</td>
<td>388.71</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Example 4</td>
<td>50.0</td>
<td>40.25</td>
<td>413.78</td>
<td>147</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen, the blends from Example 2 and 3 fluids had higher viscosities and VI’s than blends with PIB.

### Example 8

A series of blends of ISO 32 viscosity grade were prepared from the Group III base stock, Example 3 and 4 fluids, PIB PAO and bright stock. The blend viscosities, thickening efficiency and shear stability (ASTM Test D 5621) were determined and are shown in Table 6.

<table>
<thead>
<tr>
<th>Blend Number</th>
<th>Blending Fluid</th>
<th>Wt %</th>
<th>100°C K, cS</th>
<th>40°C K, cS</th>
<th>VI</th>
<th>Shear Viscosity</th>
<th>Shear Loss Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>Example 3</td>
<td>14.4</td>
<td>6.465</td>
<td>31.67</td>
<td>163</td>
<td>31.66</td>
<td>0.0%</td>
</tr>
<tr>
<td>35</td>
<td>Example 4</td>
<td>13.5</td>
<td>6.839</td>
<td>32.83</td>
<td>174</td>
<td>32.78</td>
<td>0.2%</td>
</tr>
<tr>
<td>36</td>
<td>Example 3</td>
<td>33</td>
<td>9.41</td>
<td>51.78</td>
<td>187</td>
<td>51.60</td>
<td>0.3%</td>
</tr>
<tr>
<td>37</td>
<td>PIB H300</td>
<td>15.1</td>
<td>6.184</td>
<td>29.77</td>
<td>150</td>
<td>29.22</td>
<td>4.8%</td>
</tr>
<tr>
<td>38</td>
<td>Example 2</td>
<td>9</td>
<td>6.01</td>
<td>27.82</td>
<td>171</td>
<td>27.45</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

As can be seen, the blending fluids of this invention (Blends 34 to 36) have comparable thickening efficiency as the best comparative example (Blend 38). At this comparable thickening efficiency, the copolymer blend of the invention (Blend 34 to 36) has better shear stability than that of the PIB blend 37.

Similarly, a blend (blend no 38) is prepared using the Example 2 fluid, which has a much broader MWD (2.66) than the Example 3 and 4 polymers. The polymer again has excellent thickening efficiency (Table 6), better than PIB H300. However, this polymer still has better shear stability than PIB when tested in the D5621 method.

Data in Table 6 further demonstrated that the blends containing polymers from ethylene-alpha-olefins with narrower molecular weight distribution have better shear stability. Blends 34 to 36 were prepared using polymers with MWD of 1.75 to 2.01. They have slightly better shear stability (0.2% viscosity loss) than the blend prepared by using polymer with MWD of 2.66 (blend 38 with 1.3% viscosity loss). Therefore, we conclude that blends containing polymer made from ethylene and alpha-olefins with narrower MWD are more desirable than blends made from ethylene and alpha-olefins with broader MWD.

Table 7 compares the shear stability of the blends made with Example 5 and Example 6 (blend 39 and 40) versus a blend made with commercial sample, Viscoplex 8-219 (available from RohMax USA, Inc) of comparable thickening efficiency in a Group III base stock. As the data showed that blends 39 and 40 have much better shear stability with only 1.3 and 1.6% viscosity loss as compared to the comparative blend 41 with 6% viscosity loss.

As can be seen, the blending fluids of this invention (Blends 34 to 36) have comparable thickening efficiency as the best comparative example (Blend 38). At this comparable thickening efficiency, the copolymer blend of the invention (Blend 34 to 36) has better shear stability than that of the PIB blend 37.

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As can be seen, the blending fluids of this invention (Blends 34 to 36) have comparable thickening efficiency as the best comparative example (Blend 38). At this comparable thickening efficiency, the copolymer blend of the invention (Blend 34 to 36) has better shear stability than that of the PIB blend 37.

Similar to another set of experiments, ethylene alpha-olefins copolymers were prepared similar to Example 3 except using different amounts of ethylene in the feed. The polymers when blended with Group III base stocks are clear and bright and have excellent viscometries as shown in Table 8. These example demonstrated that even with high ethylene content (44 wt %) and MWD of 2.3, 15 blends of excellent properties can be obtained.
TABLE 8

<table>
<thead>
<tr>
<th>Blend Properties of Group III base stocks with ethylene alpha-olefins of high ethylene contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt % C2H4 in blend stock</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>40.6</td>
</tr>
<tr>
<td>44.0</td>
</tr>
</tbody>
</table>

Comparative Example

Following the procedure of Example 3, except using higher ethylene feed rate, a copolymer sample containing 50.8 wt % ethylene was prepared. This polymer has Mn of 2386, which is comparable to example 3. However, it has broader MWD of 2.81, instead of 1.88 as the Example 3 polymer.

This polymer with high ethylene content and broad MWD was found to be not as good as that of Examples 1 to 7. When blended with same Group III base stock used in the blend of the examples, the resulting blend was very cloudy and the blend would not be used as high performance base stock. Furthermore, when 20% of this comparative polymer was blended with Group III base stock, the blend had only 124 VI, whereas a similar blend with Example 3 polymer has VI of 167 or 186, as shown in Table 8.

TABLE 9

<table>
<thead>
<tr>
<th>Comparison of blend properties</th>
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<tbody>
<tr>
<td>Blend Number</td>
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<tr>
<td>--------------</td>
</tr>
<tr>
<td>Group III</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
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<tr>
<td>Comparative</td>
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What is claimed is:

1. A fluid blend comprising:
   (a) a copolymer of ethylene with one or more alpha olefins, containing not more than 50 wt % ethylene, the copolymer having a number molecular weight from 400 to 10,000 and having a molecular weight distribution <3; and
   (b) a polyalphaolefin fluid or a hydroprocessed oil having a VI greater than 80.

2. The blend of claim 1 wherein the alpha olefin is a C3 to C20 olefin.

3. The blend of claim 2 wherein the fluid or oil is selected from Group II and Group III oils, Fischer-Tropsch wax isomerates, and Group VI synthetic polyalphaolefin fluids.

4. The blend of claim 3 wherein the amount of copolymer in the blend ranges from about 1 to about 95 wt %.

5. The blend of claim 4 wherein the hydroprocessed oil is a Group III oil.

6. The blend of claim 4 wherein the hydroprocessed oil is a Group II oil.

7. A lubricant base stock comprising a blend of:
   (a) from 1 to 95 wt %, based on the blend, of an ethylene alpha olefin copolymer of ethylene with one or more alpha olefins containing not more than 50 wt % ethylene, the copolymer having a number average molecular weight from 400 to 10,000 and having a molecular weight distribution <3; and
   (b) from 5 to 99 wt %, based on the blend, of a polyalphaolefin fluid or a hydroprocessed oil having a VI greater than 80 and selected from Group II and Group III oils, Fischer-Tropsch wax isomerates and Group VI synthetic polyalpha olefins.

8. The base stock of claim 7 wherein the olefin is a C3 to C20 olefin.

9. The base stock of claim 8 wherein the hydroprocessed oil is a Group II oil.

10. The base stock of claim 8 wherein the hydroprocessed oil is a Group III oil.

11. A lubricant which is prepared from:
   (i) a lubricant base stock comprising a blend of:
       (a) a copolymer of ethylene with one or more alpha olefins containing not more than 50 wt % ethylene, the copolymer having a number average molecular weight from 400 to 10,000 and a molecular weight distribution <3; and
       (b) a polyalphaolefin fluid or a hydroprocessed oil having a VI greater than 80; and
   (ii) a lubricant additive package.

12. The lubricant of claim 11 wherein the olefin is a C3 to C20 olefin.

13. The lubricant of claim 12 wherein the hydroprocessed oil is a Group II oil.

14. The lubricant of claim 12 wherein the hydroprocessed oil is a Group III oil.

15. The lubricant of claims 13 or 14 in which the additive package comprises additives selected from the group consisting of viscosity index improvers, corrosion inhibitors, dispersants, oxidation inhibitors, detergents, rust inhibitors, antwear agents, anti-foaming agents, flow improvers, friction modifiers, and seal swellants.

16. A lubricant of claim 11 including a polar co-base stock selected from the group consisting of polyesters, alkylated aromatics and polyalkylene glycols.

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