

Fig. 1

<u>Ligands (%)</u>	<u>Stability in PAO</u>
Stearic Acid (100)	White precipitate
Palmitic Acid (100)	Cloudy suspension
Palmitic (67) and Stearic (33) Acids	Slightly clear suspension
Palmitic (33) and Stearic (67) Acids	White precipitate
Oleic Acid (100)	Clear solution, no precipitate
Palmitic (67) and Oleic (33) Acids	Slightly cloudy suspension
Palmitic (33) and Oleic (67) Acids	Clear solution, very little precipitate
Naphthenic Acid (100)	Clear solution, no precipitate
Naphthenic (67) and Stearic (33) Acids	Clear solution, very little precipitate
Naphthenic (33) and Stearic (67) Acids	Clear solution, very little precipitate

Fig. 2

<u>Benchmark Formulation</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
PAO 4	0.351	-9.63, -10.91
Partial Formulation	0.166	-2.77, -2.84
Full Formulation	0.13	-1.05, -1.21

Fig. 3

<u>Test Number</u>	<u>Capped Boron Additive</u>	<u>Concentration (weight %)</u>	<u>Average Film (%)</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
1	Capped Boron 1	2.0	45	0.104	-1.99
2	Capped Boron 1	1.2	49	0.097	-2.17
3	Capped Boron 1	1.2	-	-	-
4	Capped Boron 1	0.6	62	0.101	-1.44
5	Capped Boron 1	0.3	47	0.104	-1.74

Fig. 3 (Cont.)

<u>Test Number</u>	<u>Capped Boron Additive</u>	<u>Concentration (weight %)</u>	<u>Average Film (%)</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
6	Capped Boron 2	1.2	32	0.094	-1.63
7	Capped Boron 3	1.2	54	0.098	-1.94
8	Capped Boron 4	1.2	3	0.177	-3.55
9	Capped Boron 5	1.5	-	-	-
10	Capped Boron 6	0.83	-	-	-
11	Capped Boron 7	1.5	-	-	-

Fig. 4

<u>Test Number</u>	<u>Capped Boron Additive</u>	<u>Concentration (weight %)</u>	<u>Average Film (%)</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
1	Capped Boron 1	2.0	65	0.096	-1.53
2	Capped Boron 1	1.2	98	0.082	-0.74
3	Capped Boron 1	1.2	62	0.102	-1.65
4	Capped Boron 1	0.6	98	0.085	-1.1
5	Capped Boron 1	0.3	65	0.106	-1.28

Fig. 4 (Cont.)

<u>Test Number</u>	<u>Capped Boron Additive</u>	<u>Concentration (weight %)</u>	<u>Average Film (%)</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
6	Capped Boron 2	1.2	67	0.099	-1.34
7	Capped Boron 3	1.2	36	0.106	-3.49
8	Capped Boron 4	1.2	3	0.172	-3.0
9	Capped Boron 5	1.5	7	0.367	-5.7
10	Capped Boron 6	0.83	12	0.143	-3.3
11	Capped Boron 7	1.5	11	0.215	-4.0

Fig. 5

<u>Test Number</u>	<u>Capped Boron Additive</u>	<u>Concentration (weight %)</u>	<u>Average Film (%)</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
1	Capped Boron 1	2.0	76	0.096	-0.83
2	Capped Boron 1	1.2	88	0.09	-1.16
3	Capped Boron 1	1.2	-	-	-
4	Capped Boron 1	0.6	81	0.095	-1.17
5	Capped Boron 1	0.3	35	0.106	-2.03

Fig. 5 (Cont.)

<u>Test Number</u>	<u>Capped Boron Additive</u>	<u>Concentration (weight %)</u>	<u>Average Film (%)</u>	<u>Average Friction</u>	<u>Wear Scar Depth (μm)</u>
6	Capped Boron 2	1.2	95	0.087	-0.67
7	Capped Boron 3	1.2	93	0.085	-1.05
8	Capped Boron 4	1.2	8	0.149	-2.58
9	Capped Boron 5	1.5	15	0.187	-2.5
10	Capped Boron 6	0.83	22	0.165	-2.2
11	Capped Boron 7	1.5	8	0.158	-3.0