



Lab Test Results

Summary: The mission was to qualify 4 potential products, and to perform a detailed competitive analysis of each.

Additional Information on Sample:

The following is an overview of the performance characteristics of the following products; information was provided by the Supplier.

1 – Semi synthetic for moderate to heavy duty applications, multi-metal, low foaming in high pressure. Good microbiological and corrosion control. Designed for central systems.

2 – Micro-emulsion semi synthetic. Light to moderate duty applications. Foams in soft water < 7 gpg. Operates exceptionally clean with good microbiological and corrosion control. Job shop product; will handle 50% of typical machining needs.

3 –Semi-synthetic for moderate to heavy duty applications. Low foaming in soft water and high pressure coolant delivery systems. Runs very clean.

4 – High performance soluble oil. Excellent cleanliness with good microbiological control. Multi-metal including automotive and aerospace alloys.

RESULTS:

A summary of the results is presented in the following table. Analyses of similar products sold by Acculube are shown for comparison and benchmarking.



Lab Test Results

Product Evaluation Summary: Competitive Analysis

Product Evaluated: 1, 2, 3 and 4

Product	1	2	3	Benchmark 1	4	Benchmark 2
Test Results						
Appearance of Concentrate	Brown, Clear Liquid. Floaters observed	Yellow, Clear Liquid	Orange, Clear Liquid	Pale Yellow Clear Liquid	Brown Clear Liquid	Pale Yellow Clear Liquid
Appearance of Mixture	Yellowish Emulsion	White Emulsion	Tan Emulsion	White Emulsion	Tan Emulsion	White Emulsion
Refractometer Readings						
Concentration, %						
2	1.0	0.4	1.0	1.4	2.0	2.2
3	1.2	0.7	1.8	2.6	3.0	3.4
4	2.0	1.2	2.2	3.0	4.0	4.0
5	3.6	1.8	3.0	4.8	5.0	5.0
7	2.5	2.6	4.6	5.2	7.2	6.8
10	7.0	4.0	6.4	8.0	10.0	9.4
Refractometer Constant	1.5	2.9	1.6	1.2	1.0	1.0



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Product Evaluation Summary: Competitive Analysis

Product Evaluated: 1, 2, 3 and 4

Product	1	2	3	Benchmark 1	4	Benchmark 2
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Test Results (continued)

pH

Concentration, %

2	10.29	9.87	9.39	9.83	9.31	9.79
3	10.42	10.05	9.46	9.88	9.49	9.95
4	10.51	10.19	9.50	9.89	9.64	9.97
5	10.66	10.37	9.60	10.00	9.75	9.94
7	10.82	10.41	9.80	9.99	9.82	10.06
10	10.85	10.54	9.70	10.00	9.89	10.04

Foaming

5% Concentration

Inches of foam after 30 second Blending Period	1.50	1.00	1.13	1.25	1.75	1.50
Time to Defoam	0:45	>5:00	1:55	>5:00	>5:00	4:30
Inches of Foam after 5 minute Settling Period	0	0.19	0	0.25	0.38	0

10% Concentration

Inches of foam after 30 second Blending Period	1.75	1.63	1.31	1.25	2.00	1.75
Time to Defoam	>5:00	> 5:00	immediate	3:35	>5:00	4:45
Inches of Foam after 5 minute Settling Period	0.25	0.31	0	0	0.50	0

Product Evaluation Summary: Competitive Analysis



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Product Evaluation Summary: New Products and Competitive Analysis

Product Evaluated: 1, 2, 3 and 4

Product	1	2	3	Benchmark 1	4	Benchmark 2
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Test Results (continued)

Residue

1 - Leaves an oily, soft, not sticky residue. The residue does not easily re-emulsify in fresh mixture. With stirring, completely remixes back into fresh mixture.

2 - Leaves a soft, sticky residue. The residue does not easily re-emulsify in fresh mixture. With stirring, completely remixes back into fresh mixture.

3 - Leaves a soft, sticky residue. The residue does not easily re-emulsify in fresh mixture. With stirring, remixes back into fresh mixture. Some residues (curds) remain.

4 - Leaves an oily, soft, not sticky residue. The residue does not easily re-emulsify in fresh mixture. With stirring, remixes back into fresh mixture. Some residues (curds) remain.

Benchmark Product 1 - Leaves a soft, not sticky residue. The residue does not easily re-emulsify in fresh mixture. With stirring, remixes back into fresh mixture. Some residues (curds) remain.

Benchmark Product 2 - Leaves a soft, not sticky residue. The residue does not easily re-emulsify in fresh mixture. With stirring, remixes back into fresh mixture. Some residues (curds) remain.

Comments:

In their present configuration, the use of Products 1 and 2 is not recommended. 1 showed some floaters present during initial visual inspection and this issue worsened after the product had frozen and thawed. The 2 product also experienced difficulties in the freeze-thaw test, with a white layer forming on the surface of the product upon thawing.

The use of Products 3 and 4 is questionable. The products passed the Cast Iron Corrosion Test at 7% concentration, leading one to question their corrosion



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preventative properties. That being said, it may be possible to use these products in applications where corrosion is not a concern.
