

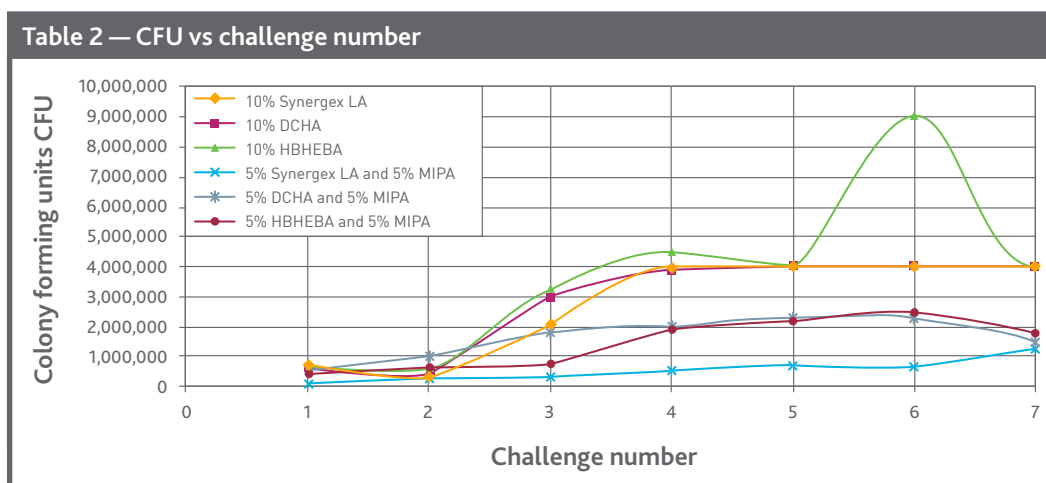


Synergex™ LA lipophilic amine

The hydrophobic/hydrophilic amine combination

An excellent hydrophobic alkanolamine for hydrophobic/ hydrophilic amine combinations. Synergex LA, especially in combination with a hydrophilic amine, can allow for exceptionally stable emulsions. Combining hydrophobic tertiary amines with hydrophilic primary amines can provide for greater fluid stability than a single amine can on its own. Synergex LA can provide for greatly extended fluid life when combined with MIPA (monoisopropanolamine).

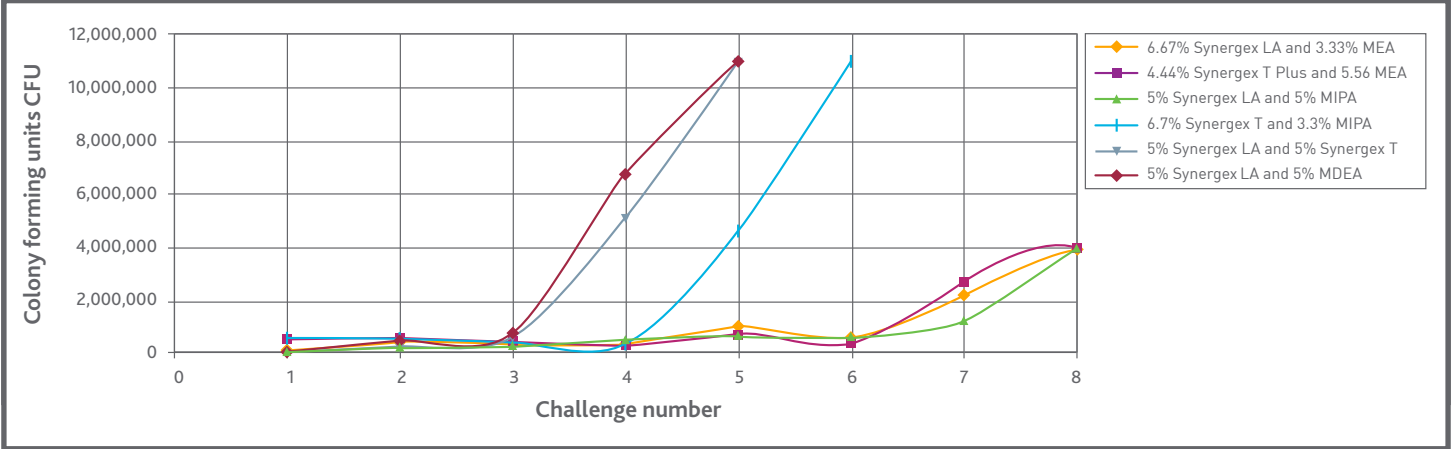
| Component | Grams | Percent |
|--|---------------|----------------|
| 1 Naphthenic oil (Hygold 100) | 75.00 | 50.00% |
| 2 Soap sulfonate emulsifier (IdaMix D42) | 15.00 | 10.00% |
| 3 Non-sulfonate emulsifier (Tas-Sol 37N) | 21.00 | 14.00% |
| 4 DIPA TOFA amide 2:1 (amide 5) | 5.50 | 3.67% |
| 5 TOFA 28 | 7.50 | 5.00% |
| 6 Lipophilic amine | 7.50 | 5.00% |
| 7 Hydrophilic amine or double dose of lipophilic amine | 7.50 | 5.00% |
| 8 Polymeric ester (Syn-Ester GY-25) | 3.00 | 2.00% |
| 9 Toly triazole 50% (Preventol CI 7-50) | 0.50 | 0.33% |
| 10 Antifoam (Surtec KE-131) | 0.30 | 0.20% |
| 11 Biocide (Bioban P-1487) | 1.00 | 0.67% |
| 12 Odorant (Ida-Soil SM 101) | 0.60 | 0.40% |
| 13 Fungicide (Troy Shield FX 40) | 0.60 | 0.40% |
| 14 Carboxylate rust inhibitor (Aqualox 232H) | 5.00 | 3.33% |
| Grand totals | 150.00 | 100.00% |



Synergex™ LA is an ideal hydrophobic amine for metalworking

As table 4 illustrates, Synergex LA provides faster wetting time on aluminium when compared to many other amines. A balanced combination of Synergex LA with MIPA can provide for greatly extended fluid life (see formula below).

Table 3 — CFU vs challenge number



Initially there is 100 ml of fluid. At each challenge, 10 ml is taken for the CFU testing and 6 ml is taken for the rust testing; for the 4th & 8th challenge, an additional two drops is taken for the aluminum wetting test. About 5 ml is returned to the jar after soaking in the cast iron chips for 30 minutes. CFU is taken by the HMB method and pH is taken with a pH meter. Finally, 11 ml of challenge solution is charged to the jar for the next challenge. The jars are incubated at 95°F.

Table 4

| Cast iron chips on paper | Aluminum wetting time (seconds) hard water | Aluminum wetting time (seconds) soft water |
|--------------------------|--|--|
| TEA (control) | 450 | 49 |
| DCHA | 155 | 40 |
| Synergex LA | 141 | 29 |
| Synergex T Plus | 210 | 43 |
| Synergex T | 389 | 79 |
| MDEA | 908 | 210 |
| HBHEBA | 179 | 67 |

TEA = triethanolamine

DCHA = dicyclohexylamine

HBHEBA = N-2-hydroxyethyl N-2-hydroxybutyl butylamine

MDEA = methyldiethanolamine

MIPA = monoisopropanolamine

MEA = monoethanolamine

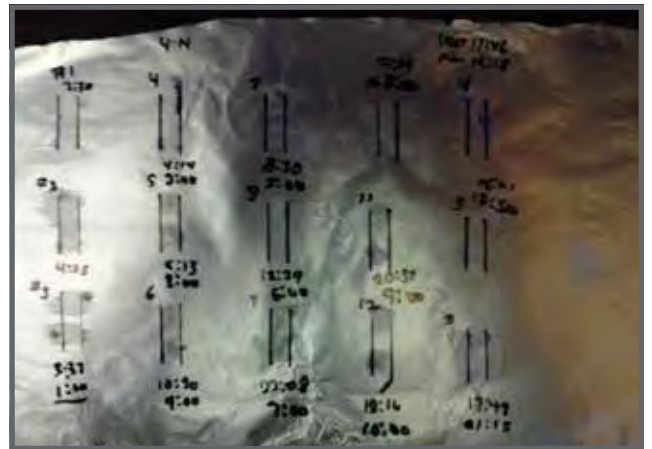
Two drops of diluted fluid are deposited on the aluminum foil and the time to spread out to the prescribed lines is timed and reported as the "seconds aluminum wetting time."

* HOSS emulsion fluid used for studies

Table 5

| Coolant formula | Percent | Parts |
|--------------------------------------|----------------|---------------|
| Hygold 100 naphthenic base oil | 55.00% | 55.00 |
| Ida-Mix D42M sulfonate emulsifier | 15.00% | 15.00 |
| Tas Sol 37N non-sulfonate emulsifier | 15.00% | 15.00 |
| Tall oil fatty acid | 5.00% | 5.00 |
| Amine | 10.00% | 10.00 |
| | 100.00% | 100.00 |

6% dilution to 6000 ppm amine in fluid



To learn more about Synergex, visit www.SynergexAmine.com

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