Alternatives to Cocamide DEA

California’s Office of Environmental Health Hazard Assessment (OEHHA) has listed Cocamide DEA (CAS No. 68603-42-9) on Proposition 65. For those looking to reformulate, Stepan is providing the following performance comparison and alternative surfactant recommendations to NINOL® 40-CO (1:1 Cocamide DEA) and NINOL® 11-CM (2:1 Cocamide DEA) for use in liquid dish detergents, all-purpose cleaners, degreasers, and vehicle care detergents.

Stepan has a broad amphoteric product line and the technical expertise in hard surface care to assist our customers with product recommendation and reformulation. The recommended surfactants noted below take into consideration performance, handling, typical lead time, and estimated market price. If you require further assistance, please contact your local Stepan sales representative or Stepan U.S. Technical Service at techserv@stepan.com or (800) 745-7837.

LIQUID DISH DETERGENTS (LDL)

For an LDL economy formulation containing Linear Alkylbenzene Sulfonate (LAS) and Sodium Laureth Sulfate (SLES), the following surfactants showed equivalent or improved foam mileage and equivalent foam volume compared to NINOL® 40-CO on an equal actives basis.

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Foam Volume (mL)</th>
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</thead>
<tbody>
<tr>
<td>AMMONYX® LO (Lauramine Oxide)</td>
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<tr>
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<tr>
<td>AMMONYX® CDO SPECIAL (Cocamidopropylamine Oxide)</td>
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</tbody>
</table>

For an LDL premium formulation containing Sodium Lauryl Sulfate (SLS) and Sodium Laureth Sulfate (SLES), the following surfactants showed equivalent or improved foam mileage and equivalent foam volume compared to NINOL® 40-CO on an equal actives basis.

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</table>

Stepan Product Chemical Description Abbreviation
AMMONYX® CDO SPECIAL Cocamidopropylamine Oxide CDO SPECIAL
AMMONYX® DO Decyl Amine Oxide DO
AMMONYX® LMDO Lauramidopropylamine Oxide LMDO
AMMONYX® LO Lauramine Oxide LO
AMMONYX® MO Myristamine Oxide MO

Stepan Product Chemical Description Abbreviation
AMPHOSOL® 810-B Capryl/Capramidopropyl Betaine 810-B
AMPHOSOL® CA Cocamidopropyl Betaine CA
AMPHOSOL® CG-50 Cocamidopropyl Betaine CG-50
AMPHOSOL® CS-50 Cocamidopropyl Hydroxy sulfate CS-50
AMPHOSOL® LB Lauramidopropyl Betaine LB
NINOL® COMF-N Lauramidopropyl Betaine COMF-N
NEUTRAL ALL-PURPOSE CLEANERS

For a concentrated all-purpose cleaner formulation evaluated by the Gardner Straight Line Washability (Stroke-by-Stroke) Test on vinyl tiles with ASTM D4488-95-A5 soil, the following surfactants showed improved cleaning in the first few strokes compared to NINOL® II-CM on an equal actives basis.

### Recommendations

- **AMPHOSOL® CS-50**
  (Cocamidopropyl Hydroxysultaine)

- **AMPHOSOL® CG-50**
  (Cocamidopropyl Betaine)

- **AMPHOSOL® CA**
  (Cocamidopropyl Betaine)

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**Spray & WIPE Degreasers**

For a ready-to-use degreaser formulation tested with the Spray Test on enamel tiles using aged kitchen grease, AMMONYX® LO removed more grease than NINOL® II-CM, and the other surfactants showed equivalent grease removal compared to NINOL® II-CM on an equal actives basis.

### Recommendations

- **AMMONYX® MO**
  (Lauramine Oxide)

- **AMPHOSOL® 810-B**
  (Capryl/Capramidopropyl Betaine)

- **AMMONYX® CDO SPECIAL**
  (Cocamidopropylamine Oxide)

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**Vehicle Care Detergents**

For manual (hand) and automatic car wash detergent formulations the following surfactants had equivalent shake foam compared to NINOL® 40-CO on an equal actives basis.

### Recommendations

- **AMMONYX® LMDO**
  (Lauramidopropylamine Oxide)

- **AMPHOSOL® CG-50**
  (Cocamidopropyl Betaine)