

New Products for Industrial Lubricants

Ether Carboxylates (IV)

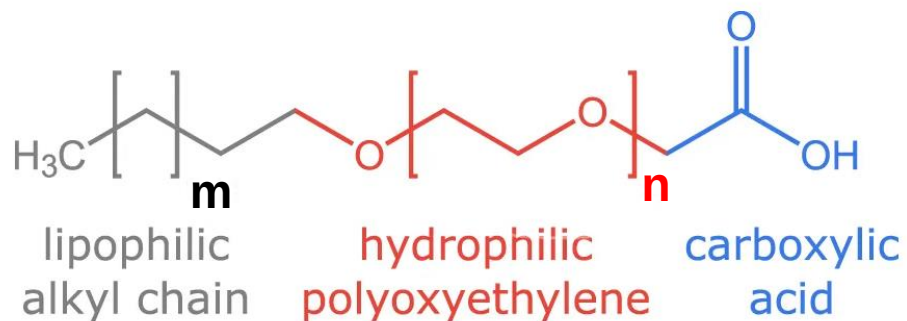
Cola[®]Carb OXC

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June 1, 2022



Ether Carboxylates



Combined anionic & non-ionic surfactants

Key Performance Attributes

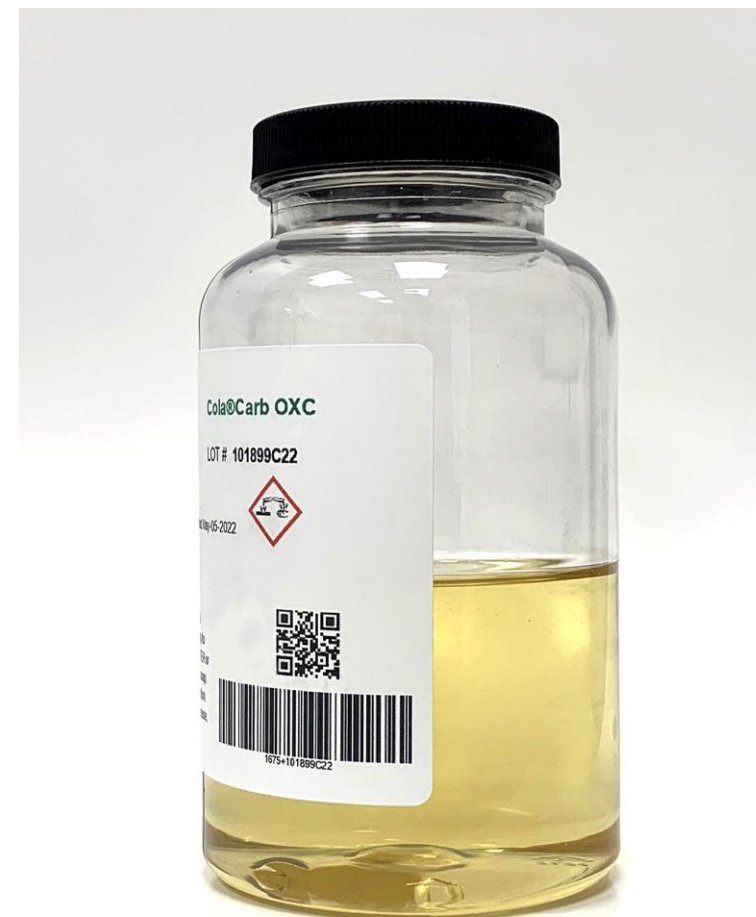
- Multifunctional
 - Emulsification
 - Dispersing
 - Surface wetting
 - Corrosion inhibition
 - Lubrication

- Stabilize emulsions against electrolyte and hard water

- Extend the service life of fluids

Cola®Carb OXC

- Based on long alkyl chain & long EO chain alkoxylates
- HLB: 13
- Pale yellow clear liquid
 - *May turn hazy, cloudy, and pasty with light precipitation through storage and transportation, but will perform satisfactorily.*
- Acid value (mg KOH/g): 59.0 – 79.0
- pH (1 wt% aqueous): 2.5 – 3.5



ColaCarb OXC: Stand-alone Evaluation as TEA Salts

- Hard Water Tolerance: > 5000ppm
- K-Value: 33

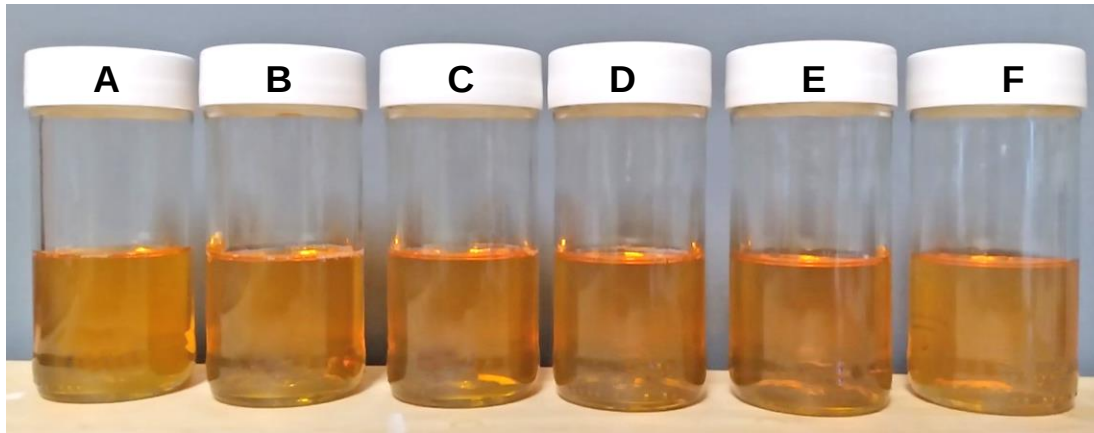
In-Formulation Evaluation in A Low-Oil Semi-synthetic

Ingredient	Wt%	
100 SUS naphthenic oil	20.0	Base Oil
Cola®Lube 3449	5.5	Emulsifiers
High rosin tall oil fatty acids	2.0	
Cola®Dol 91-6	2.0	
Cola®Lube 3440	3.0	Boundary lubricity additives
Cola®Lube 3430	4.0	
Ether Carboxylates	2.0	Emulsifiers
Fungicide (Polyphase FX-40)	1.0	Fungicides
Triethanolamine 99-LFG	3.5	Alkalinity Boosters
Corrguard EXT	0.75	
Cola®Cor 300	4.0	Corrosion Inhibitors
Cola®Cor 232	6.0	
Cola®Cor RP	5.0	
Deionized water	39.25	
Bactericide (Triazine)	2.0	Biocides

Bold Green: from Colonial Chemical

- Blend Study (**Ether Carboxylates**)
 - **A:** Reference EC (mod. EO'ed)
 - **B:** Cola®Carb OXC @ 2.0%
 - **C:** Cola®Carb OXC @ 1.75%
 - **D:** Cola®Carb OXC @ 1.5%
 - **E:** Ethoxylates @ 2.0%
 - **F:** Water blank @ 2.0% (baseline; No EC)
- Blended sequentially from top to bottom

Concentrate Stability Study



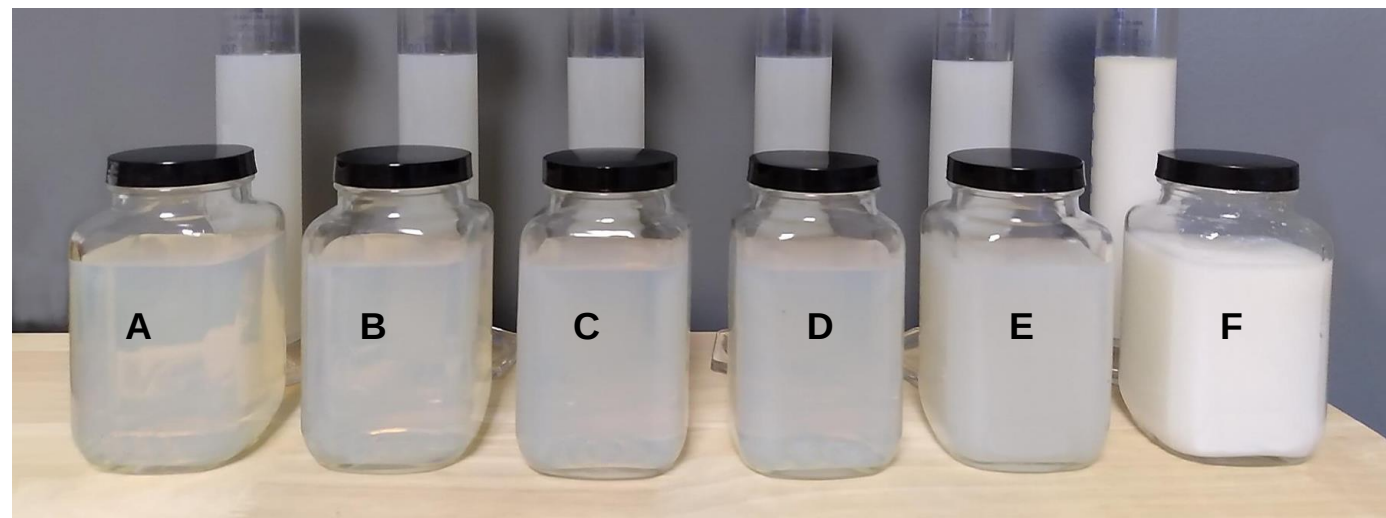
Reference EC OXC @ 2.0% OXC @ 1.75% OXC @ 1.5% Ethoxylates @ 2.0% Water blank

- Concentrate Stability Study
 - Stable in the 24-hr low-T (0 °C) study
 - Stable in the 24-hr high-T (60 °C) study
 - Stable for > 50 day @ RT
- No visible difference in concentrate stability

Cola®Carb OXC: Emulsification Capability

- Diluted Fluids
 - 5 wt% in tap water
 - pH: 9.3 – 9.5
 - Water hardness @ 125 ppm
- The relative emulsification capability or emulsion stability is visually ranked by the milkiness/turbidity of emulsions
- Less milky/turbid → better emulsification or more stable emulsion

5 wt% in Tap Water



Reference EC OXC @ 2.0% OXC @ 1.75% OXC @ 1.5% Ethoxylates @ 2.0% Water blank

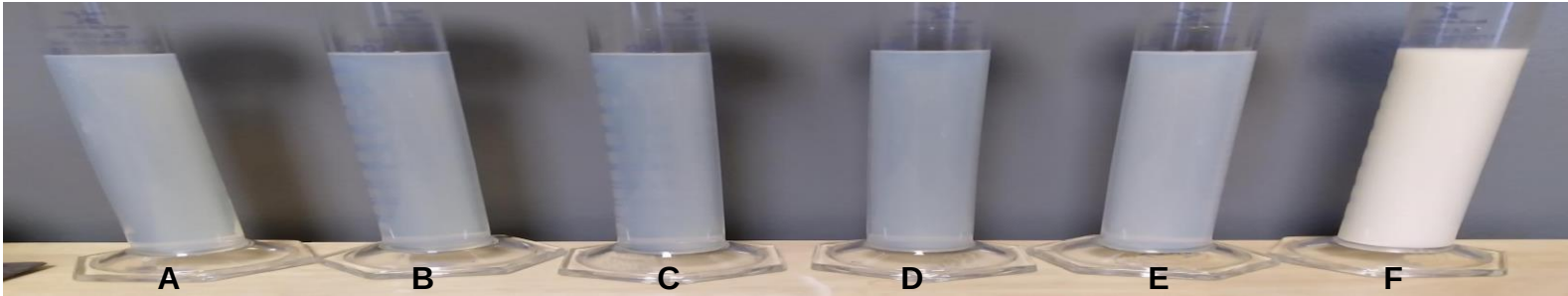
B > C > D ≈ A > E > F

Cola®Carb OXC offers outstanding emulsification performance.

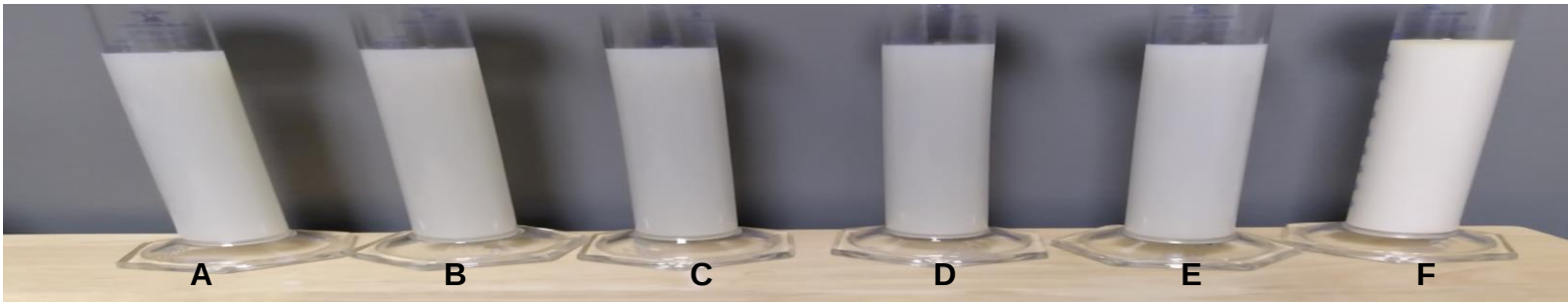
Emulsion Stability @ 650 PPM Water Hardness

Day

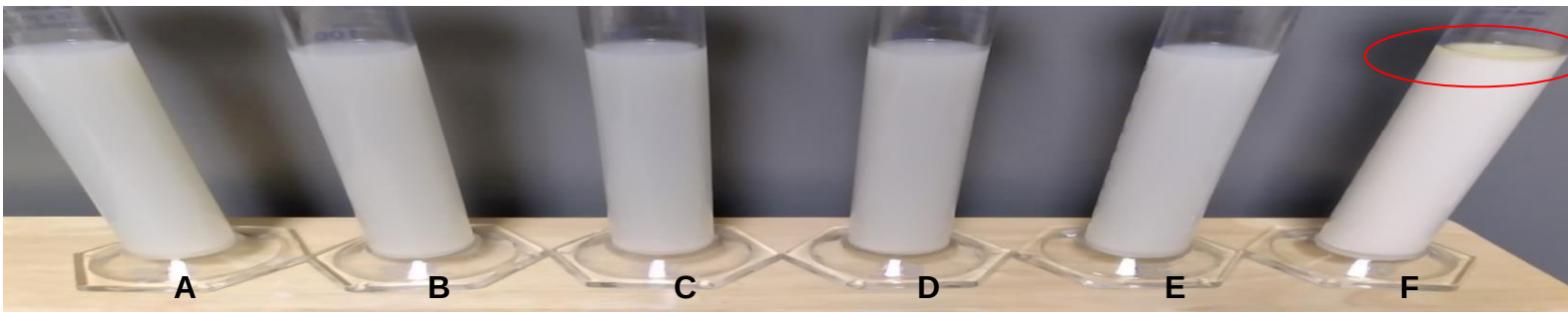
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1



7



Reference EC

OXC @ 2.0%

OXC @ 1.75%

OXC @ 1.5%

Ethoxylates @ 2.0%

Water blank

- NO EC → poor emulsification
→ unstable emulsion
- ECs better in emulsification than ethoxylates
- OXC better than the reference at equal treat rate
- OXC @ reduced treat rates equivalent to or better than moderately ethoxylated EC.

Emulsion Stability @ 1000 PPM Water Hardness

Reference EC

OXC @ 2.0%

OXC @ 1.75%

OXC @ 1.5%

Day 0



Day 7



➤ B > C > D = A

➤ At equal treat rates Cola[®]Carb OXC > moderately ethoxylated EC in stabilizing emulsion

➤ At reduced treat rates, OXC ≥ the reference in stabilizing emulsion

Emulsion Stability @ 2000 ppm Water Hardness: 2 wt% Cola[®]Carb OXC



Day 0



Day 1



Day 7

- Cola[®]Carb OXC can stabilize the emulsion at very high water hardness for an extended period.
- That makes Cola[®]Carb OXC attractive to the machining processes for certain metals, i.e. magnesium.

Emulsion Foam Test

- Test Method
 - No defoamers added
 - At 125 ppm Water Hardness
 - Mix for 5 min with a Sunbeam mixer
 - Record the rest time

Sample	t (seconds to settle)
A	80
B	28
C	22
D	18
E	11
F	75

Cola®Carb OXC with higher degree of ethoxylation offers desired low-foaming performance

Cola®Carb OXC: Applications

- Water-dilutable metalworking fluids (emulsions, semisynthetic, & synthetic)
- Fire resistant hydraulic fluids
- Emulsion-based drilling muds
- Personal care and cosmetics
- Household cleaning



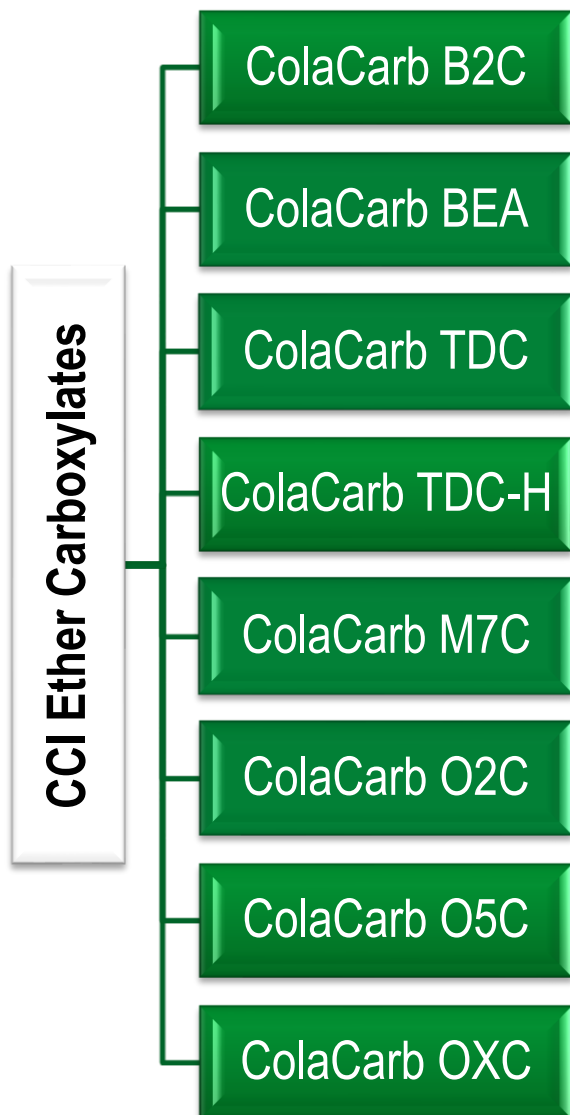
Cola®Carb OXC: Summary

- Offers best-of-the-class emulsification capability and hard water tolerance
- Capable of stabilizing the emulsion at high water hardness (>2000 PPM)
- Outstanding lime soap dispersing capability ($K = 33$)
- Enables the formulation of long-life fluids
- Broad global registration status & REACH compliant



Suggested usage level: 2 wt% (1 to 3 wt%) in concentrates

Colonial's Ether Carboxylate Product Line



- Broad Coverage
 - Alkyl Chains: C4 ~ C18
 - Linear & branched
 - Degree of alkoxylation: 1 – 10
- Commercially available
- More to come...

Status of Colonial's Ether Carboxylates Platform

- Manufactured in US
- Capacity expansion nearly completed
- Integrated global, direct sales channels and distribution systems.
- Extensive global regulatory listings including
 - TSCA
 - REACH
 - DSL
 - IECSC



Thank You!

Thank-you to all collaborators!

Cola® Carb OXC

<https://colonialchem.com/products/colacarb-oxc/>

Colonial chemical Inc.

<https://colonialchem.com/>

Colonial IL/CI Catalog

<https://colonialchem.com/wp-content/uploads/2021/01/Colonial-High-Performance-Additives-for-Metalworking-and-Lubricants.pdf>

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