

## Carbospense™ K-781, K-797, and K-798 Acrylate Terpolymers

### GENERAL

Carbospense K-781, K-797, and K-798 acrylate terpolymers are a family of patented products that were developed specifically for use as high performance deposit control components of cooling and boiler water treatment formulations.

### PRODUCTS

Lubrizol's acrylate terpolymer family includes Carbospense K-781, K-797, K-797D, and K-798.

### FEATURES AND BENEFITS

The attributes of Carbospense K-781, K-797, K-797D, and K-798 acrylate terpolymers as additives in high performance cooling and boiler water treatment programs include:

	Features	Benefits
•	Excellent calcium phosphate inhibition	Reduce the formation of calcium phosphate and associated fouling and thereby enhancing corrosion inhibition
•	Excellent calcium phosphonate inhibition	Broaden the operating ranges (high pH, alkalinity, hardness, and temperature) of cooling water treatment programs by maintaining phosphonates in solution where they would otherwise precipitate
•	Effective dispersant	Reduces the deposition of particulate matter and hardness on heat transfer surfaces
•	Excellent metal ion stabilization	Extend operating ranges of zinc-based cooling water treatment programs
•	Exceptional calcium ion tolerance	Resist the formation of insoluble calcium salts and thereby are well suited for use in high hardness waters and afford more protection in the event of system upsets (e.g., overdosing)
•	Effective at low dosages	Provide protection at suboptimal dosages which could occur during upsets or periods of underfeeding
•	Resist loss of activity in the presence of soluble iron or cationic polymers	Perform in systems where soluble iron or low levels of cationic polymers are present
•	Thermally stable	Suitable for high temperature cooling waters and boiler water applications below 550 psig
•	Hydrolytically stable over broad pH range	Provide wide formulating latitude (pH 2 to 13) and retain activity under storage and use conditions

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**Lubrizol Advanced Materials, Inc.**  
9911 Brecksville Road  
Cleveland, OH 44141-3247  
216-447-5000 Phone  
800-380-5397 USA Toll-Free  
216-447-5238 Fax  
[www.carbospense.com](http://www.carbospense.com)

	<b>Features (continued)</b>	<b>Benefits (continued)</b>
•	Compatible with most water treatment chemicals	Provide formulating latitude and prolonged shelf life
•	Compatible with chlorine	Suitable for use where chlorine is used to control microbiological fouling
•	High total solids and active polymer content	Lower transportation and handling costs
•	Consistent quality	Ensure predictable performance
•	Relatively nontoxic	No unusual environmental issues in water treatment applications

### APPLICATIONS

Carbospense K-781, K-797, and K-798 acrylate terpolymers are intended for use in applications where homopolymers and other copolymers can not provide the desired deposit control performance. These terpolymers are particularly effective at controlling deposition of phosphorus-based salts, stabilizing metal ions (iron, zinc, manganese), and dispersing particulate matter (iron oxide). Carbospense K-781, K-797, and K-798 acrylate terpolymers provide high quality, reliable deposit control performance in many different applications when used by itself or as part of formulations that may include corrosion inhibitors, microbiocides, and other additives.

### TYPICAL PROPERTIES AND CHARACTERISTICS

Carbospense K-781, K-797, and K-798 are water soluble, partially neutralized, acrylic terpolymers supplied as water white to amber, clear to slightly hazy, solutions in water. Carbospense K-797D is the powdered sodium salt of K-797 and is supplied as white, free-flowing powder. The typical properties and characteristics of these products include:

<b>Parameter</b>	<b>K-781</b>	<b>K-797</b>	<b>K-797D</b>	<b>K-798</b>
Total solids, % <sup>(a)</sup>	55	50	88	50
Moisture content (%)	n/a	n/a	12	n/a
Active solids, % <sup>(b)</sup>	52.8	48.5	74.3	48
Neutralization, % <sup>(c)</sup>	10 to 20	10 to 20	>90	10 to 20
pH	2.8	2.7	8.2 <sup>(d)</sup>	2.8
Viscosity, cP at 25°C	750	450	n/a	560
Acid number (mg KOH/g dry polymer) <sup>(e)</sup>	390	450	n/a	400
Specific gravity	1.25	1.15	n/a	1.25
Apparent gravity (gm/cc)	n/a	n/a	0.6	n/a

(a) Determined via Lubrizol's automated computerized microwave oven procedure.

(b) Active solids = total solids - counter ions (sodium) from post polymerization neutralization with sodium hydroxide.

(c) Percent neutralization of available carboxylic acid.

(d) pH of a 1% solution in water.

(e) Measure of free acid present - determined by a potentiometric titration procedure on an as-supplied product basis.

For more information, contact Lubrizol or go to the web site noted on the preceding page.