



## Percent Ethylene Oxide in Igepal CA Surfactants

Igepal Surfactant	Mole Ratio "n"	% Ethylene Oxide	HLB <sup>+</sup>
CA-210	1 1/2	24	4.8
CA-420	3	40	8.0
CA-520	5	50	10.0
CA-620	7	60	12.0
CA-630	9	65	13.0
CA-720	12	73	14.6
CA-887*	30	87	17.4
CA-890	40	90	18.0
CA-897*	40	90	18.0
* 70% Active		hydrophilic-	+ lipophilic balance

### Octylphenol Ethoxylates

#### Product

#### Properties and Applications

CA-210	Effective emulsifiers for nonpolar hydrocarbon solvents and oils, e. g. heptane and mineral oil, in solvent emulsion cleaners and dry cleaning detergents. Widely used as pesticide and floor polish emulsifiers CA-520 is an inexpensive and effective automotive gasoline anti-icing additive. Excellent solubilizer for hair dye preparations.
CA-420	
CA-520	
CA-620	Reported use in all phases of detergent compounding and aqueous processing in the textile and paper industries, in industrial metal cleaners, acid cleaners, floor cleaners, detergent sanitizers and waterless hand cleaners. CA-620 is particularly useful in household and industrial controlled-foam detergents. Effective emulsifiers for solvents such as xylene. Also used in emulsion polymerization.
CA-630	
CA-720	Hard-surface detergent with aqueous solubility at high temperatures. Stable to strong acids and bases. In hot solutions, avoids film formation and soil redeposition; has good rinsability. Used in hot spray, soak, and steam-cleaning systems; electrolytic cleaning and metal picking operations.
CA-887	Primary emulsifier for vinyl acrylate polymerizations and post-stabilizer for synthetic latices; a dyeing assistant and an emulsifier for fats and waxes.
CA-897	Primary emulsifier for vinyl acetate and acrylate

polymerizations and post-stabilizer for synthetic latices; a dyeing assistant and an emulsifier for fats and waxes.

### Solubility

The amount of ethylene oxide combined with octylphenol determines the solubility of the Igepal CA product in water, oil, or organic solvent. Greater solubility in water and water miscible solvents is found in the types which contain larger amounts of ethylene oxide. The products with lower amounts of ethylene oxide are soluble or dispersible in mineral oils and water-immiscible solvents. Gradual variations between these two extremes are found in the series. The types which are soluble in water dissolve to a crystal clear solution. Igepal CA-520 forms dispersions in water and is useful in aqueous and non-aqueous systems. Many applications of these products are based on the variation found in their solubility characteristics.

### Acute Oral Toxicity:

Igepal CA	Approximate LD50 gm/kg (rat)
CA-420	3.9
CA-520	3.8
CA-620	2.0
CA-630	1.7
CA-720	1.8
CA-897	> 28 (as 70% aqueous solution)

### Skin and Eye Irritations:

Tests on humans, as well as rabbits, indicate that the Igepal CA surfactants are not primary skin irritants nor sensitizers.\*

With the exception of Igepal CA-897, all members of the series should be regarded as relatively severe eye irritants. Eye protection should be worn when handling these products. If accidental contact occurs, eyes should be washed with plenty of water for at least 15 minutes and medical attention obtained. It is recommended that concentrations of these materials in shampoos or similar products not exceed 5%.

\* M. Schick, "Non-ionic Surfactants". p. 929, Marcel Dekker, Inc., N.Y. (1967).

<p><b>Surface Activity</b></p> <p>Igepal CA-420 through CA-720 inclusive, exhibit outstanding surface-modifying properties as shown by their surface and interfacial tension measurements. Those from CA-520 to CA-720 are excellent wetting agents, detergents, and emulsifiers for aromatic solvents. Igepal CA-420 and CA-520 are useful as emulsifiers for mineral oils, kerosene, and chlorinated hydrocarbons; products in the series above CA-630 are useful as water-soluble emulsifiers for vegetable oils and solubilizers for essential oils. The water-soluble members of this series exhibit excellent time-soap dispersion.</p>	<p><b>Stability</b></p> <p>All Igepal CA products are stable to storage (Some of these products containing lower mole ratios of ethylene oxide may darken with age but experience no chemical change). Although the liquid products will solidify at low temperatures, this change in physical form is reversible and does not affect performance. Igepal CA surfactants are stable to, and can be used safely with acid and alkali and dilute solutions of many oxidizing and reducing agents. However, the products will discolor when in contact with anhydrous caustic and metasilicate. Moderate quantities may be used with phosphates, carbonates, etc. without excessive color change.</p> <p><b>Caution:</b> Contact with concentrated forms of oxidizing or reducing agents may be hazardous. Because Igepal CA products are organic compounds, they should not be mixed with a concentrated oxidizing or reducing agent without careful investigation of the possibility that an explosive mixture might result.</p>
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