CHEMTROL IV

PRODUCT DESCRIPTION

CHEMTROL IV is a water-soluble, liquid, surfactant that has come to be recognized as the performance standard among similar products. It is an octylphenol ethoxylate with an average of nine to 10 moles of Ethylene oxide and is a 100-percent active product.

SPECIAL FEATURES

- Excellent detergency
- Excellent grease and oil removal from hard surfaces
- Good thermal stability

TYPICAL PHYSICAL PROPERTIES

Actives Content, wt%	100
Appearance	Clear liquid
Colour, APHA	100
Viscosity, at 25ºC, cP	240
Pour Point, ºC (ºF)	7 (45)
Specific gravity at 25/25ºC	1.065
pH, 5% aqueous solution	6
Cloud Point, 1% aqueous solution, ºC	65 (149)
Density at 25ºC, lb/gal	8.9
Flash Point, Tag Open Cup, ºF	>149 (>300)
HLB Value	13.5

PERFORMANCE PROPERTIES

Solubility and Compatibility

Chemtrol IV is soluble at 25ºC in all proportions in water, toluene, xylene, trichloroethylene, ethylene glycol, ethyl ether, ethyl alcohol, isopropyl alcohol, ethylene dichloride, and many other solvents. Chemtrol IV is insoluble in kerosene, mineral spirite, and VM&P naphtha, unless a coupling agent is used. Oleic acid is an effective coupling agent in systems based on kerosene. Solutions containing up to five-percent Chemtrol IV in 40-percent phosphoric acid or 30-percent hydrochloric acid are stable for least 48 hours at room temperature. Chemtrol IV is compatible with anionic, cationic, and nonionic surface-active agents. Like other alkylaryl polyether alcohols, this surfactant will discolor on dry caustic and anhydrous metasilicate. However, it can be used in formulations containing moderate quantities of these alkalis with sufficient stability. It is completely stable in liquid formulations containing sodium hydroxide, showing no change in color or physical properties, and in the presence of mild, alkaline builders normally used in the preparation of metal cleaners and cleaning compounds.

Detergency
Chemtrol IV is a highly effective detergent. It is effective in textile cleaning applications and is used in "built" formulations designed for home and industrial laundering.

Foaming Properties
Chemtrol IV has moderate foaming properties. Where higher foaming is important, Chemtrol IV can be used in combination with certain high-foaming, anionic surfactants, such as alkyl sulfates, alkylarl sulfonates, or fatty acid amide condensates. Foam date are presented in Table 1.

Table 1 * foam Heights (1)

Chemtrol Surfactant	Concentrations, wt%	Foam height, mm Initial	5 min
IV	1.0	228	23
	0.1	110	25
	0.01	20	20

(1) At 120ºF

Surface Activity
Chemtrol IV exhibits good surface activity, as indicated by the lowering of the surface tension of water and the interfacial tension between water and mineral oil. The data presented in Table 2 were obtained with a Du Nouy tensiometer.

Table 2 * Surface Activity of Chemtrol IV (1)

Concentration, wt%	Surface Tension dynes/cm	Interfacial Tension dynes/cm (2)
1.0	30	1.0
0.1	30	2.5
0.01	31	10.0
0	72	52

(1) At 25ºC.
(2) mineral oil.

Viscosity
The data in table 4 show the viscosity of aqueous systems containing Chemtrol IV at various concentrations and temperatures.

Table 4 * Viscosity of Chemtrol IV Aqueous Solutions

	Viscosity, cP				
	Surfactant Concentration, wt%				
Temperature, °C	**10**	**30**	**50**	**70**	**90**
25	2	80	Gel	530	280
50	3	40	110	100	80
25 (1M NaCl)	7	150	640	470	260
25 (1M $CaCl_2$)	7	240	101	560	310

Increased viscosity and gel formation at concentrations around 50 percent are probably due to interference with the flow that results from hydration of the oxyethylene ether linkages in the aggregates. The effect of increasing temperature or salt concentration is to dehydrate these linkages partially to promote freer flow.

Thermal Stability
Thermogravimetric analysis has been used to determine the thermal stability of Chemtrol IV, since it is sometimes used for high-temperature applications. Weight losses were determined at a programmed heating rate of 10ºC/min, starting at 35ºC under conditions of air or an inert (N_2) atmosphere.

Table 5 * Thermogravimetric Analysis of Chemtrol IV

	Temperature, ºC	
Weight Loss, %	**Air**	**N_2**
1	221	210
10	291	310
50	347	380

Additional testing with thermogravimetric analysis (TGA) in conjunction with Fourier Transform Infrared Spectroscopy (TGA-FTIR) revealed that under inert (N_2), conditions, observed weight loss is due to product volatilization. Under an air atmosphere, oxidative by products are chiefly responsible for observed weight loss.

APPLICATIONS
Chemtrol IV can be added to powdered products to reduce dust and to improve detergency; concentrations as low as 0.25 percent are effective. Powdered formulations, containing up to 10-percent Chemtrol IV, can retain their free-flowing characteristics. Specific recommendations for adding liquid surface-active agents to powdered preparations are available upon request.

PRODUCT SAFETY

When considering the use of any Chemtech product in a particular application, you should review our latest Material Safety Data Sheets and ensure that the use you intend can be accomplished safely. For Material Safety Data Sheets and other product safety information, contact Chemtech M&D Ltd, 9, Markantoniou Vragadinou – Office 103, 8035 Paphos, Cyprus, phone: +357-26-955354, fax: +357-26-955334. Before handling any product mentioned in the text, you should obtain available product safety information and take necessary steps to ensure safety of use.