

**ENCYCLOPEDIA OF
SURFACTANTS**

VOLUME II

Compiled by

Michael and Irene Ash

*Chemical Publishing Co.
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Encyclopedia of Surfactants

Volume 2

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PREFACE

This comprehensive, modern encyclopedia of surfactant products has been compiled with the cooperation of the major national and international surfactant manufacturers in order to give the user quick and thorough information on each tradename product that is included. Information from thousands of brochures, technical bulletins, and data sheets has been gleaned in order to make a complete profile on each surfactant product available from one source—this three volume compendium. Though sometimes limited by the information provided by the manufacturers, in most instances, the chemical ingredients, properties, form, applications, etc. of each product are discussed in detail.

The use of surfactants pervades almost every chemical industrial concern—including textiles, paints, pesticides, foods, cosmetics, pharmaceuticals, etc. We hope that because of the universality of surfactants, this reference work will be able to serve as a useful tool to the many chemical engineers and salespeople here and abroad.

We want to extend our thanks to Roberta Dakan for her dedication and tireless efforts in helping make this encyclopedia as accurate and consistent as possible.

When the temperature at which properties such as viscosity, density, surface tension, solubilities, etc., is not included, a standard temperature of 25 C is to be assumed. The information in this publication is reliable to the best of our knowledge. We would be glad to be informed of any errors or omissions so that these can be integrated into subsequent editions of this encyclopedia.

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ABBREVIATIONS

@	at
aq.	aqueous
avg.	average
Be	Baumé
BHA	butylated hydroxyanisole
B.P.	.....	boiling point
C	.....	degrees Centigrade
cc.	.....	cubic centimeter(s)
CC	.....	Closed cup
cm	.....	centimeter(s)
COC	.....	Cleveland open cup
conc.	.....	concentration, concentrated
cps	.....	centipoise(s)
cs or cst.	.....	centistoke(s)
disp.	.....	dispersion, dispersible
dist.	.....	distilled
EO	.....	ethylene oxide
esp.	.....	especially
ETO	.....	ethylene oxide
F	.....	degrees Fahrenheit
F.P.	.....	freezing point
ft ³	.....	cubic feet
g	.....	gram(s)
gal	.....	gallon(s)
HLB	.....	hydrophilic lipophilic balance
ingred.	.....	ingredient(s)
insol.	.....	insoluble
IPA	.....	isopropyl alcohol
kg.	.....	kilogram(s)
l.	.....	liter(s)
lb.	.....	pound(s)
max.	.....	maximum
min.	.....	minimum
ml	.....	milliliter(s)
mm.	.....	millimeter(s)
mN.	.....	millinewton
M.P.	.....	melting point
m.w.	.....	molecular weight

no.	number
OC	Open cup
O/W	oil in water
PEG	polyethylene glycol
pH	hydrogen ion concentration
PM	Pensky-Martens
PMCC	Pensky-Martens closed cup
POE	polyoxyethylated
pt.	point
ref.	refractive
sapon.	saponification
SBR	styrene-butadiene resin
sol.	soluble
solid.	solidification
sol'n.	solution
sp. gr.	specific gravity
Stod.	Stoddard
STPP	sodium tripolyphosphate
SUS	Saybolt Universal Seconds
T/C	tankcar
TCC	Taggart closed cup
tech.	technical
TGA	triglycollamic acid
T/L	tank load
TOC	Taggart open cup
TSP	trisodium phosphate
T/T	tank truck
T/W	tank wagon
USP	United States Pharmacopeia
visc.	viscosity
W/O	water in oil
wt	weight
%	percent
≈	approximately
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
#	number

The following products which are included in this volume, are registered with the U.S. Patent Office.

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Neodol®
Neofat®
Niaproof®
Nopalcol®

G

Gafac BH-650. GAF Corp.

Chemical Description: Free acid of complex organic phosphate ester

Category: Emulsifier, detergent, anionic

Applications: Pesticide emulsifiers with high electrolyte tolerance; industrial and household detergent, hard-surface cleaners

Form: Clear viscous liquid

Properties: Solubility: Sol. in butyl Cellosolve, ethanol, water; Density: 11.4 lb/gal; Sp. gr.: 1.36-1.38 (@ 50 C); Pour Pt.: < 5 C; Acid No.: 370-390; Stability: Stable to alkaline and neutral media; pH: < 3 (10% sol'n.)

Composition: 100% active ingred.

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac BI-729. GAF Corp.

Chemical Description: Free acid of complex organic phosphate ester

Category: Emulsifier, detergent, anionic

Applications: Pesticide emulsifier, household and industrial detergents for high-solids formulations

Form: Clear viscous liquid

Properties: Solubility: Sol. in butyl Cellosolve, ethanol, water; Density: 10.3 lb/gal; Sp. gr.: 1.23-1.25 (@ 50 C); Pour Pt.: < 0 C; Acid No.: 250-270 (as 100%); Stability: Stable to alkalis and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 89% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac BI-750. GAF Corp.

Chemical Description: Free acid of complex organic phosphate ester

Category and Applications: See Gafac BI-729

Form: Clear viscous liquid

Properties: Solubility: Sol. in butyl Cellosolve, ethanol, water; Density: 10.6 lb/gal; Sp. gr.: 1.26-1.28 (@ 50 C); Pour Pt.: < 0 C; Acid No.: 250-275; Stability: Sta-

ble to alkaline and neutral media; pH: < 2.5 (10% sol'n.)
Composition: 100% active ingred.
Reaction: Acid
Warnings and Caution: Protect skin and eyes from contact
References: Bulletin 2303-034

Gafac GB-520. GAF Corp.

Chemical Description: Partial sodium salt of a complex organic phosphate ester
Category: Textile antistat, lubricant, emulsifier, anionic
Applications: Formulation of synthetic fiber finishes, esp. heavy denier types (e.g., nylon tire cord)
Form: Hazy viscous liquid
Properties: Solubility: Sol. in xylene, butyl Cellosolve, perchloroethylene, ethanol; sol. (hazy) in mineral oil, kerosene, Stod. solvent, cottonseed oil; dispersible in water; Density: 8.6 lb/gal; Sp. gr.: 1.03-1.04; Pour Pt.: 9 C; pH: 2.5-4.5 (10% sol'n.)
Composition: 98% active ingred.
Reaction: Acid
References: Bulletin 2303-034

Gafac LO-529. GAF Corp.

Chemical Description: Partial sodium salt of a complex organic phosphate ester
Category: Detergent, anionic
Applications: Household and industrial detergent formulations esp. in concentrated alkali and salt media
Form: Clear viscous liquid
Properties: Solubility: Sol. in kerosene, Stod. solvent, cottonseed oil,

xylene, butyl Cellosolve, perchloroethylene, water; sol. (hazy) in ethanol; Density: 9.1 lb/gal; Sp. gr.: 1.05-1.15; Pour Pt.: 6 C; pH: 5-6 (10% sol'n.)
Composition: 88% active ingred.
Reaction: Acid
References: Bulletin 2303-034

Gafac MC-470. GAF Corp.

Chemical Description: Partial sodium salt of a complex phosphate ester
Category: Detergent, emulsifier, textile lubricant, antistat, softener, anionic
Applications: Household and industrial detergents, textile industry
Form: Clear viscous liquid
Properties: Solubility: Sol. in mineral oil, kerosene, xylene, perchloroethylene; dispersible in butyl Cellosolve, ethanol, water; Density: 8.6 lb/gal; Sp. gr.: 1.02-1.04; Pour Pt.: 0 C; pH: 5-6.5 (10% sol'n.)
Composition: 95% active ingred.
References: Bulletin 2303-034

Gafac PE-510. GAF Corp.

Chemical Description: Free acid of complex organic phosphate ester
Category: Emulsifier, detergent, anionic
Applications: Pesticide emulsifier, household, industrial and drycleaning detergent, emulsion polymerization
Form: Clear to slightly hazy viscous liquid

Properties: Solubility: Sol. in kerosene, Stod. solvent, xylene, butyl Cellosolve, perchloroethylene, ethanol; disp. in water and cottonseed oil; Density: 9 lb/gal; Sp. gr.: 1.08-1.09; Pour Pt.: 20 C; Acid No.: 49-59; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RA-600. GAF Corp.

Chemical Description: Free acid of complex organic phosphate ester

Category: Detergent, dispersant, wetting agent, anionic

Applications: Household and industrial detergents esp. for hard surface cleaning; in textile wet processing (boil off, bleaching, etc.) as detergents, dispersants and wetting agents

Form: Clear to slightly hazy viscous liquid

Properties: Solubility: Sol. in kerosene, xylene, butyl Cellosolve, perchloroethylene, ethanol, water; disp. in mineral oil; Density: 8.9 lb/gal; Sp. gr.: 1.06-1.08; Pour Pt.: < 0 C; Acid No.: 100-115; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 98.5% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RB-400. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester

Category: Lubricant, antistat, emulsifier, anionic

Applications: Fiber and metal lubricants, antistats and emulsifiers

Form: Opaque, viscous liquid (separates on standing)

Properties: Solubility: Sol. in mineral oil, kerosene, Stod. solvent, xylene, butyl Cellosolve, perchloroethylene, ethanol; disp. in water; Density: 8.6 lb/gal; Sp. gr.: 1.03-1.04; Pour Pt.: 18 C; Acid No.: 80-90; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 98% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RD-510. GAF Corp.

Chemical Description: Free acid of complex organic phosphate ester

Category: Emulsifier, antistat, lubricant, solubilizer, anionic

Applications: Fiber and metal lubricant; esp. in the formulation of low denier synthetic fiber finishes (i.e., polyesters, polypropylene); cosmetic emulsifier and solubilizer

Form: Clear viscous liquid

Properties: Solubility: Sol. in mineral oil, kerosene, xylene, butyl Cellosolve, perchloroethylene, ethanol; disp. in water; Density:

8.8 lb/gal; Sp. gr.: 1.05-1.06; Pour Pt.: 13 C; Acid No.: 100-115; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 98% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RE-410. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester

Category: Detergent, emulsifier, wetting agent, dispersant, antistat, lubricant, anionic

Applications: Pesticide emulsifier with high electrolyte tolerance; drycleaning detergent (excellent antisoil redeposition in Stod. solvent and perchloroethylene systems); textile wet processing (boil off, bleaching, etc.) for cottons and synthetics; fiber and metal lubricants, antistats and emulsifiers

Form: Clear viscous liquid

Properties: Solubility: Sol. in kerosene, Stod. solvent, cottonseed oil, xylene, butyl Cellosolve, perchloroethylene, ethanol; disp. in water; Density: 9.1 lb/gal; Sp. gr.: 1.00-1.20; Pour Pt.: 18 C; Acid No.: 85-100; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RE-610. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester

Category and Applications: See Gafac RE-410; also in household and industrial detergents; water-repellant fabric finishes; emulsion polymerization

Form: Slightly hazy viscous liquid

Properties: Solubility: Sol. in xylene, butyl Cellosolve, perchloroethylene, ethanol, water; disp. in mineral oil; Density: 9.2 lb/gal; Sp. gr.: 1.10-1.12; Pour Pt.: < 0 C; Acid No.: 62-72; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RE-870. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester

Category and Applications: See Gafac RE-410; also as cosmetic emulsifier and solubilizer and in emulsion polymerization process

Form: Soft, waxy paste

Properties: Solubility: Sol. in xylene, butyl Cellosolve, perchloroethylene (hazy), ethanol, water; Density: 9.6 lb/gal; Sp. gr.: 1.10-1.20 (@ 50 C); Pour Pt.: 29 C; Acid No.: 80-95; pH: < 2.5 (10% sol'n.)

Composition: 99% active ingred.

Reaction: Acid

Warnings and Caution: Protect

skin and eyes from contact
References: Bulletin 2303-034

Gafac RE-960. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester
Category and Applications: See Gafac RE-410; also in emulsion polymerization

Form: Soft, waxy paste

Properties: Solubility: Sol. in cottonseed oil, butyl Cellosolve, ethanol, water; sol. (hazy) in xylene, perchloroethylene; Density: 9.8 lb/gal; Sp. gr.: 1.17-1.18 (@ 50 C); Pour Pt.: 20 C; Acid No.: 98-110; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 90% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RK-500. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester

Category: Lubricant, antistat, emulsifier, anionic

Applications: Fiber and metal treatment

Form: Clear, viscous liquid

Properties: Solubility: Sol. in xylene, butyl Cellosolve, perchloroethylene, ethanol, water; disp. in mineral oil and kerosene; Density: 9.1 lb/gal; Sp. gr.: 1.05-1.15; Pour Pt.: < 0 C; Acid No.: 132-145; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RM-410. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester
Category: Detergent, emulsifier, anionic

Applications: Drycleaning detergent; pesticide emulsifier

Form: Slightly hazy, viscous liquid

Properties: Solubility: Sol. in mineral oil, kerosene, Stod. solvent, cottonseed oil, xylene, butyl Cellosolve, perchloroethylene, ethanol; disp. in water; Density: 8.8 lb/gal; Sp. gr.: 1.05-1.07; Pour Pt.: 19 C; Acid No.: 51-64; Stability: Stable to alkaline and neutral media; pH: < 2.5 (10% sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect skin and eyes from contact

References: Bulletin 2303-034

Gafac RM-510. GAF Corp.

Chemical Description: Free acid of a complex organic phosphate ester
Category: Emulsifier, anionic

Applications: Pesticide emulsifier; cosmetic emulsifier and solubilizer

Form: Hazy viscous liquid

Properties: Solubility: Sol. in kerosene, Stod. solvent, cottonseed oil, xylene, butyl Cellosolve, perchloroethylene, ethanol; disp. in water and mineral oil; Density: 8.8 lb/gal; Sp. gr.: 1.05-1.07;

Pour Pt.: 5 C; Acid No.: 45-55;
Stability: Stable to alkaline and
neutral media; pH: < 2.5 (10%
sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect
skin and eyes from contact

References: Bulletin 2303-034

Gafac RM-710. GAF Corp.

Chemical Description: Free acid of
a complex organic phosphate ester
Category: Emulsifier, solubilizer,
anionic

Applications: Cosmetic emulsifier
and solubilizer; low skin and eye
irritation

Form: Hazy, viscous liquid

Properties: Solubility: Sol. in xy-
lene (hazy), butyl Cellosolve, per-
chloroethylene, ethanol, water;
Density: 8.9 lb/gal; Sp. gr.: 1.06-
1.08; Pour Pt.: 15 C; Acid No.:
33-41; Stability: Stable to alkaline
and neutral media; pH: < 3.0 (10%
sol'n.)

Composition: 100% active ingred.

Reaction: Acid

Warnings and Caution: Protect
skin and eyes from contact

References: Bulletin 2303-034

Gafac RO-310. GAF Corp.

Chemical Description: Free acid of
a complex organic phosphate ester
Category: Emulsifier, anionic

Applications: Cosmetic emulsifier
for lotions, creams and clear oil-
water hair grooming products

Form: Clear, viscous liquid

Properties: Solubility: Sol. in min-

eral oil, kerosene, cottonseed oil,
xylene, butyl Cellosolve, perchlor-
oethylene, ethanol; disp. in water;
Density: 8.4 lb/gal; Sp. gr.: 1.00-
1.02; Pour Pt.: < 0 C; Acid No.:
73-80; pH: < 2.5 (10% sol'n.)

Composition: 98% active ingred.

Reaction: Acid

Warnings and Caution: Protect
skin and eyes from contact

References: Bulletin 2303-034

Gafac RO-660. GAF Corp.

Chemical Description: Free acid
of a complex organic phosphate
ester

Category and Applications: See
Gafac RO-310; more hydrophilic
version of RO-310

Form: Soft, waxy paste

Properties: Solubility: Sol. in min-
eral oil, kerosene, Stod. solvent,
xylene, butyl Cellosolve, perchlor-
oethylene, ethanol, water; Densi-
ty: 8.6 lb/gal; Sp. gr.: 1.03-1.04;
Pour Pt.: 25 C; Acid No.: 52-58;
Stability: Stable to alkaline and
neutral media; pH: < 2.5 (10%
sol'n.)

Composition: 98% active ingred.

Reaction: Acid

Warnings and Caution: Protect
skin and eyes from contact

References: Bulletin 2303-034

Gafac RP-710. GAF Corp.

Chemical Description: Free acid
of a complex organic phosphate
ester

Category: Detergent, anionic

Applications: Household and in-
dustrial detergents, hard surface
cleaners