

SuperKlean’s Chemical Resistance Guide

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Purpose of Guide

The purpose of this guide is to provide comprehensive chemical resistance information for SuperKlean's DH150X chemical and bacterial resistant nozzle and DH150D dairy nozzle, which are integral components in washdown applications across various industries. This guide is meticulously crafted to serve as a reliable resource for determining the compatibility of a wide array of chemicals with the aforementioned nozzles. It aims to assist industry professionals in making informed decisions regarding the safe and effective use of SuperKlean's products for cleaning and sanitation processes.

By detailing the general and specific industry uses of each chemical, along with recommendations for washdown suitability and typical use cases, this guide endeavors to enhance operational safety, optimize cleaning efficiency, and extend the longevity of the nozzles. It is designed to be an indispensable tool for industries served by SuperKlean, ensuring that their washdown practices meet the highest standards of purity and compliance.

****Please note: this guide only refers to the potential chemical resistance of SuperKlean's X Nozzle and Dairy Nozzle. The suitability of each chemical for washdown applications depends on various factors like concentration, safety measures, regulatory compliance, and your specific application. Please exercise caution.****

For more information, please call 800-769-9173 or email sales@superklean.com.



SuperKlean
Environmentally Exceptional Washdown Products

DH150X: Chemical and Bacteria Resistant Nozzle

Presenting the DH150X Series, the epitome of meticulous engineering in the realm of industrial hot water washdown apparatus. Following an intensive research period spanning over three years, SuperKlean has augmented the specifications of its esteemed DuraFlow industrial nozzles, thereby achieving an unparalleled standard in both bacterial and chemical resistance.

Historically speaking, the DuraFlow nozzle design has been the preferred choice for a multitude of industrial settings, consistently delivering exceptional performance as a preeminent hot water washdown nozzle for over fifteen years.



The introduction of the X Series DuraFlow nozzle represents SuperKlean's unwavering dedication to advancing industrial sanitation standards. This nozzle is specifically designed to address and reduce bacterial and pathogenic contaminants across an array of more than 30 distinct industrial sectors on a global scale. This innovation is a testament to SuperKlean's endeavor to amalgamate rigorous hygiene standards with cutting-edge technological advancements.

Further emphasizing its chemical adaptability, the X Series nozzles are meticulously crafted to effectively manage a diverse array of chemicals, which are essential in maintaining the sanctity of food and various other products from potential pathogens. Their range of applications is vast, enveloping industries from pharmaceuticals to food processing, beverages, dairying, and agriculture.

To facilitate clear identification and to underscore their augmented bacterial and chemical resistance capabilities, the X Series DuraFlow nozzles are equipped with a distinct dark blue trigger mechanism. These nozzles are available in a selection of three refined colors.

Technical Specifications:

- **Chemical Adaptability:** Designed for sustained durability, ensuring compatibility with an extensive array of chemical solutions.
- **Bacterial Mitigation:** Exemplary resistance against bacterial growth, surpassing the commendable standards set by its predecessor, the DH Series nozzle.
- **Material Construction:** Constructed using the robust 304 Stainless Steel, it is primed to withstand rigorous environments and extensive wear and tear.
- **Ergonomic Design:** Weighing a mere 1.53 lbs., its design prioritizes operator comfort, further complemented by its versatile four-position locking mechanism.
- **Safety Protocols:** Retains the DuraFlow series' hallmark safety features, inclusive of a front trigger guard and equilibrated handling.
- **Inlet Configuration:** Incorporated with a ½" female NPT inlet.

DH150D: Dairy Nozzle

Introducing the DH150D DuraFlow Dairy Nozzle: An advanced milking parlor applicator tailored specifically to meet rigorous demands in dairying environments. Originating from our distinguished DuraFlow series, this model has been a reliable choice for leading food, beverage, and pharmaceutical establishments for close to two decades.



Historically, specialists from the milking parlor sector approached SuperKlean with the objective of developing a durable stainless steel nozzle tailored to their unique needs. In response, SuperKlean's engineering team crafted an efficient applicator designed to be compatible with a comprehensive array of pre-dip and post-dip chemicals.

The DuraFlow Dairy Nozzle boasts precise fluid application, optimizing teat coverage and conserving valuable time with each use. Furthermore, its specialized construction not only ensures reduced chemical consumption but also extends the device's longevity. Constructed using specialized stainless steel, the DuraFlow Dairy Nozzle is presented in both dark blue and red shades, facilitating easy differentiation between pre and post-dip applications. Additionally, its refined spray tips, right-angle attachment, and mounting hook further enhance its functionality in a professional milking setting.

To procure the DH150D DuraFlow Dairy Nozzle, please contact SuperKlean at 800-769-9173. Expedited delivery options are available.

Technical Specifications:

- **Chemical Compatibility:** Designed for prolonged usage, ensuring compatibility with a diverse array of milking parlor chemicals.
- **Efficiency:** Its precision spray pattern minimizes chemical wastage, translating to considerable savings over its operational lifespan.
- **Durability:** Superior construction minimizes the need for replacements, thereby maximizing operational uptime.
- **Construction:** Crafted with proven 304 Stainless Steel, it is adept at withstanding challenging milking parlor conditions and robust handling.
- **Safety Features:** Retains the distinguished safety features of the DuraFlow series, including a front trigger guard and balanced handling.
- **Additional Components:** Comes equipped with a stainless steel ¼" hose barb accompanied by a specialized filter. Immediate shipping options are available.

Chart

Key	Rating
Superior	Best
Excellent	2nd Best
Good	3rd Best
Poor	4th Best

Chemical	Rating
1-Butanol	Superior
1-Chloro-1-Nitro Ethane	Good
1-Hexene	Superior
1,1,1-Trichloroethane	Superior
1,2,3-Trichlorobenzene	Superior
1,2,3-Trichloropropane	Superior
1,3-Butadiene	Superior
1,4-Butanediol	Superior
2-Chloro-p-Toluidine	Excellent
2-Ethyl Hexanol	Superior
2-Ketobutyric Acid (20% Solution)	Superior
2-Undecanone (20% Solution)	Superior
2,2,4-Trimethylpentane	Superior
2,4-dimethoxybenzaldehyde (20% Solution)	Superior
3, 4-Dichloroaniline	Superior
Abietic Acid	Superior
Acetaldehyde	Good
Acetamide	Superior
Acetanilide	Superior
Acetic Acid	Excellent
Acetic Anhydride	Good
Acetoacetic Acid	Good
Acetone	Excellent
Acetone Cyanohydrin	Excellent
Acetone/Toluene (50%/50%)	Excellent
Acetonitrile	Excellent
Acetophenone	Good
Acetyl Chloride	Superior
Acetyl Hydroperoxide	Superior
Acetylacetone	Superior
Acetylacetone (20% solution)	Superior
Acetylene	Superior
Acetylene Tetrabromide	Superior
Acetylene Tetrachloride	Superior

Chemical	Rating
Acetylsalicylic Acid	Superior
Acids, non-organic	Superior
Acids, organic	Superior
Acrolein	Good
Acrylic Acid	Excellent
Acrylonitrile	Good
Adipic Acid	Superior
Adiprene L-167	Superior
Aero Lubriplate	Superior
Aero Shell 100	Superior
Aero Shell 17 Grease	Superior
Aero Shell 1AC Grease	Superior
Aero Shell 750 Grease	Superior
Aero Shell 7A Grease	Superior
Aero Shell Fluid No.4	Superior
Aero Shell Turbine Oil 560	Superior
Aero Shell Turbine Oil 760	Superior
Aerosafe 2300	Good
Aerosafe 2300W	Good
Aerozene 50 (50% Hydrazine, 50%UDMH)	Good
Air, <200°C	Superior
Alkaline detergents	Not tested
Alkanes (Paraffin Hydrocarbons)	Superior
Alkazene	Superior
Alkenes (Olefin Hydrocarbons)	Superior
Alkyl Acetone	Good
Alkyl Alcohol	Superior
Alkyl Amine	Excellent
Alkyl Benzene	Superior
Alkyl Chloride	Superior
Aluminum Acetate	Good
Aluminum Bromine	Superior
Aluminum Chloride	Superior
Aluminum Fluoride	Superior

Chemical	Rating
Aluminum Formate	Good
Aluminum Hydroxide	Superior
Aluminum Nitrate	Superior
Aluminum Oxide	Not tested
Aluminum Phosphate	Superior
Aluminum Potassium Sulfate	Superior
Aluminum Salts	Superior
Aluminum Sodium Sulfate	Superior
Aluminum Sulfate	Superior
Alums	Superior
AMBREX 33	Superior
AMBREX 830	Superior
Amines	Good
Ammonia Gas, cold	Excellent
Ammonia Gas, hot	Excellent
Ammonia Liquid	Excellent
Ammonia, Anhydrous	Excellent
Ammonium Acetate	Good
Ammonium Bicarbonate	Good
Ammonium Bifluoride	Superior
Ammonium Carbonate	Superior
Ammonium Chloride (Sal Ammoniac)	Superior
Ammonium Diphosphate	Superior
Ammonium Fluoride	Superior
Ammonium Hydroxide	Superior
Ammonium Hydroxide, (saturated)	Superior
Ammonium Nitrate	Superior
Ammonium Nitrite	Superior
Ammonium Persulfate	Superior
Ammonium Phosphate	Superior
Ammonium Phosphate (Dibasic)	Superior
Ammonium Phosphate (Monobasic)	Superior
Ammonium Phosphate	Superior

Chemical	Rating
(Tribasic)	
Ammonium Salts	Excellent
Ammonium Sulfamate	Good
Ammonium Sulfate	Superior
Ammonium Sulfide	Superior
Ammonium Sulfite	Superior
Ammonium Thiocyanate	Superior
Ammonium Thiosulfate	Superior
Amphoteric detergents	Not tested
AMS 3021	Superior
AMS 3023	Superior
Amyl Acetate	Excellent
Amyl Alcohol	Superior
Amyl Borate	Superior
Amyl Butyrate	Superior
Amyl Chloride	Superior
Amyl Chloronaphthalene	Superior
Amyl Cinnamic Aldehyde	Good
Amyl Laurate	Superior
Amyl Naphthalene	Superior
Amyl Phenol	Superior
Amyl Propionate	Superior
AN-0-3 Grade M	Superior
AN-0-366	Superior
AN-0-6	Superior
AN-VV-0-366B Hydraulic	Superior
Anderol 774	Superior
Anderol L-774 (diester)	Superior
Anderol L-826	Superior
Anderol L-829	Superior
ANG-25 (diester base)	Superior
ANG-25 (glycerol ester)	Superior
Aniline	Superior
Aniline Dyes	Superior
Aniline Hydrochloride	Superior
Aniline Oils	Excellent

Chemical	Rating
Animal Fats (lards)	Superior
Animal Fats (Oils)	Superior
Anionic detergents	Not tested
Anisole	Superior
Ansul Ether 161 or 181	Good
Anthracene	Superior
Anthranilic Acid	Superior
Anthraquinone	Superior
Antifreeze Solutions	Superior
Antimony Chloride	Superior
Antimony Pentachloride	Superior
Antimony Trichloride	Superior
Aqua Regia	Superior
Arachidic Acid	Superior
Argon	Superior
ARM200	Superior
AROCLOR 1248	Superior
AROCLOR 1254	Superior
AROCLOR 1260	Superior
Aromatic Fuels	Superior
Arsenic Acid	Superior
Arsenic Trichloride	Good
Ascorbic acid	Superior
Askarel Transformer Oil	Superior
Aspartame	Not tested
Aspartic Acid	Excellent
Asphalt	Superior
Aspirin	Superior
ASTM Diesel Fuel Oil 1-D(S15)	Superior
ASTM Diesel Fuel Oil 1-D(S500)	Superior
ASTM Diesel Fuel Oil 1-D(S5000)	Superior
ASTM Diesel Fuel Oil 2-D(S15)	Superior
ASTM Diesel Fuel Oil 2-	Superior

Chemical	Rating
D(S500)	
ASTM Diesel Fuel Oil 2-D(S5000)	Superior
ASTM Diesel Fuel Oil 4-D	Superior
ASTM Hydrocarbon Test Fluid	Superior
ASTM Oil No. 1	Superior
ASTM Oil No. 2	Superior
ASTM Oil No. 3	Superior
ASTM Oil No. 4	Superior
ASTM Oil No. 5	Superior
ASTM Reference Fuel A	Superior
ASTM Reference Fuel B	Superior
ASTM Reference Fuel C	Superior
ASTM Reference Fuel C/1-Butanol (80%/20%)	Superior
ASTM Reference Fuel C/DIPE (25%/75%)	Superior
ASTM Reference Fuel C/DIPE (85%/15%)	Superior
ASTM Reference Fuel C/ETBE (25%/75%)	Superior
ASTM Reference Fuel C/ETBE (50%/50%)	Superior
ASTM Reference Fuel C/ETBE (75%/25%)	Superior
ASTM Reference Fuel C/ETBE (90%/10%)	Superior
ASTM Reference Fuel C/Ethanol (15%/85%)	Superior
ASTM Reference Fuel C/Ethanol (50%/50%)	Superior
ASTM Reference Fuel C/Ethanol (75%/25%)	Superior
ASTM Reference Fuel C/Ethanol (90%/10%)	Superior
ASTM Reference Fuel C/Methanol (15%/85%)	Superior
ASTM Reference Fuel C/Methanol (50%/50%)	Superior

Chemical	Rating
ASTM Reference Fuel C/Methanol (75%/25%)	Superior
ASTM Reference Fuel C/Methanol (85%/15%)	Superior
ASTM Reference Fuel C/Methanol (90%/10%)	Superior
ASTM Reference Fuel C/Mopar Fuel Injector Cleaner (50%/50%)	Superior
ASTM Reference Fuel C/MTBE (25%/75%)	Excellent
ASTM Reference Fuel C/MTBE (50%/50%)	Superior
ASTM Reference Fuel C/MTBE (75%/25%)	Superior
ASTM Reference Fuel C/MTBE (85%/15%)	Superior
ASTM Reference Fuel C/TAAE (25%/75%)	Superior
ASTM Reference Fuel C/TAAE (85%/15%)	Superior
ASTM Reference Fuel C/TAME (25%/75%)	Superior
ASTM Reference Fuel C/TAME (85%/15%)	Superior
ASTM Reference Fuel D	Superior
ASTM Reference Fuel E	Superior
ASTM Reference Fuel F	Superior
ASTM Reference Fuel G	Superior
ASTM Reference Fuel H	Superior
ASTM Reference Fuel I	Superior
ASTM Reference Fuel J	Superior
ASTM Reference Oil IRM902	Superior
ASTM Reference Oil IRM903	Superior
ASTM Service Fluid 105	Superior
ATREX	Superior
AUREX 903R	Superior
Automatic Transmission Fluid	Superior
Automotive Brake Fluid	Excellent

Chemical	Rating
Automotive Fuel 2B	Superior
Automotive Fuel 60	Superior
Automotive Fuel 60B	Superior
Automotive Fuel RF2	Superior
Avtag (Shell Aerofuel)	Superior
Avtex 903 Hydraulic Oil (Mil-H-6083)	Superior
Azodicarbonamide	Not tested
B.P. Aero Hydraulic Fluid No.1	Superior
B.P. Turbine Oil 2197	Superior
B.P. Turbine Oil 2380	Superior
B100	Superior
B100a	Superior
B2	Superior
B20	Superior
B20a	Superior
B30	Superior
B5	Superior
B5a	Superior
BARDOL B	Superior
Barium Carbonate	Superior
Barium Chlorate	Superior
Barium Chloride	Superior
Barium Cyanide	Superior
Barium Hydroxide	Superior
Barium Nitrate	Superior
Barium Salts	Superior
Barium Sulfate	Superior
Barium Sulfide	Superior
BAYOL 35	Superior
BAYOL D	Superior
Beer	Superior
Beet Sugar Liquors	Superior
Benzaldehyde	Good
Benzanthrone	Superior

Chemical	Rating
Benzene	Superior
Benzene Hexachloride (BHC)	Superior
Benzene Sulfonic Acid	Superior
Benzine	Superior
Benzoic Acid	Superior
Benzophenone	Superior
Benzoyl Chloride	Superior
Benzyl Acetate	Good
Benzyl Alcohol	Superior
Benzyl Amine	Good
Benzyl Benzoate	Superior
Benzyl Butyl Phthalate	Superior
Benzyl Chloride	Superior
Biobor JF (Oil Fungicide)	Superior
Biodiesel (Fatty Acid Methyl Esters)	Superior
Biodiesel a (Fatty Acid Methyl Esters)	Superior
Biphenyl (Diphenyl)	Superior
Bismuth Carbonate	Superior
Black Liquor	Superior
Black Point 77	Superior
Blast Furnace Gas	Superior
Bleach Liquor	Superior
Bone Oil	Superior
Borax Solution	Superior
Bordeaux Mixture	Superior
Boric Acid	Superior
Borneol	Superior
Bornyl Acetate	Excellent
Boron Fluids (HEF)	Superior
Boscan Asphalt (85-100)	Superior
Bray Oil 762	Superior
BRAYCO 885 (Mil-L-6085A)	Superior
BRAYCO 910	Excellent
Brayco Hydraulic Oil 783 (Mil-H-6083)	Superior

Chemical	Rating
Brine	Superior
Bromine	Superior
Bromine Pentafluoride	Good
Bromine Trifluoride	Superior
Bromine, Anhydrous	Superior
Bromobenzene	Superior
Bromochloromethane	Excellent
Bromochloropropane	Excellent
Bromochlorotrifluoroethane (HALOTHANE)	Superior
Bromomethane	Superior
Bromotrifluoroethylene (BFE)	Superior
Bromotrifluoromethane (Freon 13B1)	Excellent
Bunker "C" (Fuel Oil)	Superior
Butane	Superior
Butene	Superior
Butyl Acetyl Ricinoleate	Superior
Butyl Amine	Good
Butyl Benzoate	Superior
Butyl Benzyl Phthalate (BBP)	Superior
Butyl CARBITOL	Superior
Butyl CELLOSOLVE	Excellent
Butyl CELLOSOLVE Acetate	Good
Butyl Ether	Good
Butyl Laurate	Superior
Butyl Mercaptan	Excellent
Butyl Oleate	Superior
Butyl Stearate	Superior
Butylene	Superior
Butyraldehyde	Good
Butyric Acid	Excellent
Cadmium Acetate	Good
Cadmium Cyanide	Superior
Cadmium Nitrate	Superior
Calcine Liquors	Superior

Chemical	Rating
Calcium Acetate	Good
Calcium Bicarbonate	Superior
Calcium Bisulfide	Superior
Calcium Bisulfite	Superior
Calcium Carbide	Superior
Calcium Carbonate	Superior
Calcium Chlorate	Superior
Calcium Chloride	Superior
Calcium Chloride Solution (25%)	Superior
Calcium Cyanide	Superior
Calcium Hydroxide	Superior
Calcium Hypochlorite	Superior
Calcium Magnesium Acetate Solution (20%)	Superior
Calcium Nitrate	Superior
Calcium Oxide	Superior
Calcium Phosphate, monobasic	Superior
Calcium Salts	Superior
Calcium Silicate	Superior
Calcium Stearate	Superior
Calcium Sulfate	Superior
Calcium Sulfide	Superior
Calcium Sulfite	Superior
Calcium Thiosulfate	Superior
Caliche Liquors	Superior
Camphene	Superior
Camphor	Superior
Camphoric Acid	Superior
Cane Sugar Liquors	Superior
Capric Acid	Superior
Caproic Acid	Superior
Caproic Aldehyde	Good
Caprolactam	Good
Carbamate	Superior
CARBITOL®	Excellent

Chemical	Rating
Carbolic Acid (Phenol)	Superior
Carbon Dioxide, dry	Superior
Carbon Dioxide, wet	Superior
Carbon Disulfide	Superior
Carbon Monoxide	Superior
Carbon Tetrachloride	Superior
Carbonic Acid	Superior
Carvacrol (20% solution)	Superior
Carvyl Acetate (20% solution)	Superior
Casein	Superior
Castor Oil	Superior
CAT Extended Life Coolant-1	Superior
Catalene (Isopropyl Nitrate)	Good
Cationic detergents	Not tested
Caustic Lime	Superior
Caustic Soda	Excellent
Caustic Potash	Superior
CE10	Superior
CE25	Superior
CE50	Superior
CE85	Superior
CELLOSOLVE	Good
CELLOSOLVE Acetate	Good
CELLUGUARD	Superior
Cellulose Acetate	Excellent
CELLULUBE (phosphate Esters)	Superior
CELLULUBE 220	Superior
CELLULUBE 550A	Superior
CELLULUBE A60	Superior
CELLUTHERM 2505A	Superior
Cement, Potland	Superior
Cenwax E	Superior
Cetane (Hexadecane)	Superior
Cetyl Alcohol	Superior
Chematic 91 (20% solution)	Excellent

Chemical	Rating
Chematic 9301 (20% solution)	Superior
Chematic 99 (20% solution)	Superior
China Wood Oil (Tung Oil)	Superior
Chloral (Trichloroacetaldehyde)	Good
Chloramine	Good
Chlordane	Superior
Chlorextol	Superior
Chlorhexidine	Superior
Chlorinated Naphthalene	Superior
Chlorinated Salt Brine	Superior
Chlorinated Solvents	Superior
Chlorine	Superior
Chlorine Bleach	Superior
Chlorine Dioxide	Superior
Chlorine Dioxide (1.3 gm/l)	Superior
Chlorine Dioxide (6.3 gm/l)	Superior
Chlorine Trifluoride	Good
Chlorine washes	Superior
Chlorine Water	Superior
Chlorine, dry	Superior
Chlorine, wet	Superior
Chloroacetaldehyde	Good
Chloroacetic Acid	Excellent
Chloroacetone	Excellent
Chlorobenzaldehyde	Good
Chlorobenzene	Superior
Chlorobromo Methane	Superior
Chlorobromo Propane	Superior
Chlorobutadiene (Chloroprene)	Superior
Chlorobutane (Butyl Chloride)	Superior
Chlorodifluoroethane (Freon 142b)	Good
Chlorodifluoromethane (Freon 22)	Good

Chemical	Rating
Chlorododecane	Superior
Chloroethane	Superior
Chloroethylbenzene	Superior
Chloroform	Superior
Chloromethane	Superior
Chloronitroethane	Excellent
Chloropentafluoroethane (Freon 115)	Excellent
Chloropicrin	Superior
Chloroprene	Superior
Chlorosulfonic acid	Excellent
Chlorotrifluoromethane (Freon 13)	Excellent
Chlorox	Superior
Chloroxylene	Superior
Chrome Alum	Superior
Chrome Plating Solution	Superior
Chromic Acid	Superior
Chromic Oxide	Superior
CHX-604 (Hydraulic Fluid)	Superior
Cinnamic Acid	Superior
Cinnamic Alcohol	Superior
Cinnamic Aldehyde	Excellent
Cinnamyl Alcohol (20% solution)	Superior
CIP 150 (20% solution)	Superior
CIP 220 (20% solution)	Superior
Circo Light Process Oil	Superior
Cities XPA-1668 ATF	Superior
Citral (terpene), 20% Solution	Superior
Citric Acid	Superior
Citric Acid (20% Solution)	Superior
City Service 65, 120, 250	Superior
City Service Kool Motor Oil No.140	Superior
City Service Pacemaker No.2	Superior
CLOROX	Superior

Chemical	Rating
CM10	Superior
CM15	Superior
CM25	Superior
CM50	Superior
CM85	Superior
Coal Tar	Superior
Cobalt Chloride	Superior
Cobaltous Acetate	Good
Coconut Oil	Superior
Cod Liver Oil	Superior
Coke Oven Gas	Superior
COOLANOL	Superior
Copper Acetate	Good
Copper Carbonate	Superior
Copper Chloride	Superior
Copper Cyanide	Superior
Copper Nitrate	Superior
Copper Salt	Superior
Copper Sulfate	Superior
Corn Oil	Superior
Corn Syrup	Superior
Cottonseed Oil	Superior
Coumarin	Not tested
Creosote Oil	Superior
Creosote-Coal Tar	Superior
Cresol (Methyl Phenol)	Superior
Cresylic Acids	Superior
Crotonaldehyde	Excellent
Crotonic Acid	Superior
Crude Oil (Asphalt Base)	Superior
Cumene	Superior
Cummins Extended Life Coolant	Superior
Cupric Sulfate	Superior
Cutting Oil	Superior
Cyclohexane	Superior

Chemical	Rating
Cyclohexanol	Superior
Cyclohexanone	Superior
Cyclohexene	Excellent
Cyclohexylamine	Good
Cyclopentadiene	Excellent
Cyclopentane	Superior
Cyclopentanone	Good
Cyclopolyolefins	Superior
Cyclopropane	Superior
d-Limonene (20% Solution)	Superior
D.P. 47	Superior
DBE (Dibasic Esters)	Excellent
DC-200 Silicone Oil	Superior
DDT (Dichlorodiphenyltrichloroethane)	Superior
Decalin	Superior
Decyl Acetate (20% Solution)	Superior
Deionized Water	Superior
Denatured Alcohol	Superior
Detergent Bleach Solutions (1%)	Superior
Detergent Solutions	Superior
Developing Fluids	Superior
Dexron ATF	Superior
Dexron ATF (Kendale)	Superior
Dexron ATF (Quaker State)	Superior
Dexron ATF (Texaco)	Superior
Dexron III ATF (Petrocanada)	Superior
Dexron VI ATF	Superior
Dextrin	Superior
DEXTRON	Superior
Dextrose	Superior
Diacetone	Excellent
Diacetone Alcohol (Diacetol)	Excellent
Diallyl Ether	Excellent
Diallyl Phthalate (DAP)	Superior

Chemical	Rating
Diamylamine	Good
DIAZINON	Superior
Dibenzyl (sym-Diphenylethane)	Superior
Dibenzyl Ether	Good
Dibenzyl Sebacate	Superior
Dibromoethylbenzene	Superior
Dibromotetrafluoroethane (Freon 114B2)	Excellent
Dibutyl Ether	Excellent
Dibutyl Phthalate (DBP)	Superior
Dibutyl Sebacate (DBS)	Superior
Dicapryl Phthalate	Superior
Dichlorethane	Superior
Dichloroacetic Acid	Good
Dichlorobutane	Superior
Dichlorobutene	Superior
Dichlorodifluoromethane (Freon 12)	Excellent
Dichloroethylene	Superior
Dichlorofluoromethane (Freon 21)	Poor
Dichloroisopropyl Ether	Excellent
Dichloromethane	Superior
Dichloropentane	Superior
Dichlorophenol	Superior
Dichloropropane	Superior
Dichloropropene	Superior
Dichlorotetrafluoroethane (Freon 114)	Excellent
Dicyclohexylamine	Excellent
Dicyclopentadiene	Superior
Dieldrin (HEOD)	Excellent
Diesel (Connediesel RME)	Superior
Diesel (low Sulfur-50ppm)	Superior
Diesel Fuel #2/Rapeseed Methyl Ester (70%/30%)	Superior

Chemical	Rating
Diesel Fuel #2/Rapeseed Methyl Ester (80%/20%)	Superior
Diesel Fuel #2/Rapeseed Methyl Ester (95%/5%)	Superior
Diesel Fuel #2/Rapeseed Methyl Ester (98%/2%)	Superior
Diesel Fuel #2/Soy Methyl Ester (80%/20%)	Superior
Diesel Fuel No.1	Superior
Diesel Fuel No.2	Superior
Diesel Fuel No.2/Ethanol (90/10)	Superior
Diesel Fuel No.2/Methanol (90/10)	Superior
Diesel Oil	Superior
Diester Lubricant (Mil-L-7808)	Superior
Diester Synthetic Lubricating Oils	Superior
Diethyl Ether	Excellent
Diethyl ether	Excellent
Diethyl Methyl Benzenediamine	Not tested
Diethyl Phthalate	Superior
Diethyl Sebacate	Superior
Diethylamine	Excellent
Diethylbenzene	Superior
Diethylcarbonate	Excellent
Diethylene Glycol	Superior
Diethylene Glycol Butyl Ether	Excellent
Diethylene Glycol Methyl Ether	Excellent
Diethyleneamine	Excellent
Diethylenetriamine	Good
Diethylhexyl Phthalate (DOP)	Superior
Diethylhexyl Sebacate (DOS)	Superior
Diethylhexylamine	Good
Difluoroethane (Freon 152A)	Poor
Difluoroethylene	Superior

Chemical	Rating
Diisobutyl Ketone	Good
Diisobutylene	Superior
Diisooctyl Sebacate (DISO)	Superior
Diisopropyl Ether (DIPE)	Superior
Diisopropyl Ketone	Good
Diisopropylbenzene	Superior
Diisopropylidene Acetone	Good
Dimethyl Acetamide (DMAC)	Superior
Dimethyl Amine (DMA)	Excellent
Dimethyl Aniline	Excellent
Dimethyl Ether	Good
Dimethyl Formaldehyde	Good
Dimethyl Formamide (DMF)	Superior
Dimethyl Heptanol	Superior
Dimethyl Hydrazine	Excellent
Dimethyl Phenol	Superior
Dimethyl Phthalate	Superior
Dimethyl Suloxide (DMSO)	Good
Dimethyl Terephthalate (DMT)	Superior
Dimethylcarbonate	Excellent
Dimethylpolysiloxane	Not tested
DIN Reference Fuel FAM A	Superior
DIN Reference Fuel FAM B	Superior
DIN Reference Fuel FAM C	Superior
Dinitrotoluene (DNT)	Good
Diocetyl Phthalate (DOP)	Superior
Diocetyl Sebacate (DOS)	Superior
Dioxane	Good
Dioxolane	Good
DIPE (Diisopropyl Ether)	Superior
Dipentene	Superior
Diphenyl (Biphenol)	Superior
Diphenyl Ether (Diphenyl Oxide)	Superior
Diphenyl Oxide	Superior

Chemical	Rating
Diphenyl Propane	Superior
Diphenylamine (DPA)	Excellent
Dodecanal (20% Solution)	Superior
Dodecylbenzene	Superior
Dow Chemical 50-4, ET588	Good
Dow Corning 1208, 4050, 6620, F-60, XF-60	Superior
Dow Corning 3, 4, 11	Superior
Dow Corning 5, 33, 44, 200, 220, 510, 550, 705, 710	Superior
Dow Corning 55	Superior
Dow Corning F-61	Superior
Dow Corning FS-1265	Superior
DOW GUARD	Superior
DOWTHERM 209	Superior
DOWTHERM 209/Water (54%/46%)	Superior
DOWTHERM A	Superior
DOWTHERM E	Superior
Drinking Water	Superior
Dry Cleaning Fluids	Superior
DTE Light Oil	Superior
Durad EHB	Superior
DV-4079	Excellent
ELCO 28 EP Lubricant	Superior
ELCO L-14374	Superior
ELCO M2C-105A	Superior
ELCO M2C-108A	Superior
ELCO M2C-111A	Superior
ELCO M2C-119A	Superior
EnviroTemp FR3 Transformer Heat Exchanger Fluid	Superior
Epichlorohydrin	Good
Epoxy Resins	Excellent
Esam-6 Fluid	Excellent
ESSO 20W50 Oil	Superior
ESSO Aviation No.100 Oil	Superior

Chemical	Rating
ESSO Fuel 208	Superior
ESSO Golden Gasoline	Superior
ESSO Motor Oil	Superior
ESSO Transmission Fluid, Type A	Superior
ESSO WS812 (Mil-L-7808A)	Superior
ESSO XP90-EP Lubricant	Superior
ESSTIC 42, 43	Superior
ETBE (Ethyl tert-Butyl Ether)	Superior
Ethane	Superior
Ethaneperoxoic acid	Superior
Ethanethiol	Superior
Ethanol	Superior
Ethanolamine (MEA)	Good
Ether	Good
Ethyl 2-Benzylacetoacetate (20% Solution)	Superior
Ethyl Acetate	Excellent
Ethyl Acetoacetate	Good
Ethyl Acrylate	Good
Ethyl Acrylic	Good
Ethyl Alcohol	Superior
Ethyl Aluminum Dichloride	Excellent
Ethyl Amine	Good
Ethyl Benzene	Superior
Ethyl Benzoate	Superior
Ethyl Bromide	Superior
Ethyl Butyrate	Superior
Ethyl Cellosolve	Excellent
Ethyl Cellulose	Good
Ethyl Chloride	Superior
Ethyl Chlorocarbonate	Superior
Ethyl Cyanide	Good
Ethyl Cyclopentane	Superior
Ethyl Ether	Good
Ethyl Formate	Superior

Chemical	Rating
Ethyl Isovalerate	Superior
Ethyl lactate	Not tested
Ethyl Mercaptan	Superior
Ethyl Morpholinestannous Octotate (50/50 mixture)	Good
Ethyl Oxalate	Superior
Ethyl Pentachlorobenzene	Superior
Ethyl Silicate	Superior
Ethyl tert-Butyl Ether (ETBE)	Superior
Ethylcyclopentane	Superior
Ethylene	Superior
Ethylene Chloride	Superior
Ethylene Chlorohydrin	Superior
Ethylene Diamine	Superior
Ethylene Dibromide	Superior
Ethylene Dichloride	Superior
Ethylene gas	Not tested
Ethylene Glycol	Superior
Ethylene Glycol Butyl Ether	Good
Ethylene Glycol Butyl Ether Acetate	Good
Ethylene Glycol Ethyl Ether Acetate	Good
Ethylene Glycol/Distilled Water (50%/50%)	Superior
Ethylene Oxide	Poor
Ethylene Trichloride	Superior
Ethylhexyl Acrylate	Good
Exxon FN-1973 ATF	Superior
Exxon FN-1975 ATF	Superior
Exxon WSX-8762B AFT	Superior
F-60 Chlorinated Silicone Oil	Superior
F-61 Chlorinated Silicone Oil	Superior
FAEE (Fatty Acid Ethyl Esters)	Superior
FAME (Fatty Acid Methyl Esters)	Superior

Chemical	Rating
Fatty Acid Ethyl Esters (FAEE)	Superior
Fatty Acid Methyl Esters (FAME)	Superior
Fatty Acids	Superior
FEEON 31	Poor
Ferric Acetate	Good
Ferric Chloride	Superior
Ferric Hydroxide	Superior
Ferric Nitrate	Superior
Ferric Sulfate	Superior
Ferrous Ammonium Sulfate	Superior
Ferrous Chloride	Superior
Ferrous Sulfate	Superior
Fish Oil	Superior
Fluorine	Superior
Fluorobenzene	Superior
FLUOROLUBE	Superior
Fluorothane (Ethyl Fluoride)	Good
Fluosilicic Acid	Superior
Formaldehyde	Good
Formic Acid	Good
Formic Acid (88%)	Good
FR Fluid 20 (Hydraulic Fluid)	Superior
FREON 11 (Trichlorofluoromethane)	Excellent
FREON 11/Sunsiso 3G (50%/50%)	Excellent
FREON 112	Excellent
FREON 113 (Trichlorotrifluoroethane)	Good
FREON 114 (Dichlorotetrafluoroethane)	Excellent
FREON 114B2 (Dibomotetrafluoroethane)	Excellent
FREON 115 (Chloropentafluoroethane)	Excellent
FREON 12	Excellent

Chemical	Rating
(Dichlorodifluoromethane)	
FREON 12/ASTM No.2 Oil (50%/50%)	Excellent
FREON 12/Sunsiso 4G (50%/50%)	Excellent
FREON 13 (Chlorotrifluoromethane)	Excellent
FREON 13B1 (Bromotrifluoromethane)	Excellent
FREON 14 (Tetrafluoromethane)	Excellent
FREON 142B (Difluorochloroethane)	Poor
FREON 143A (1,1,1- Trifluoroethane)	Excellent
FREON 152A (Difluoroethane)	Poor
FREON 21 (Dichlorofluoromethane)	Poor
FREON 218	Excellent
FREON 22 (Chlorodifluoromethane)	Poor
FREON 32	Poor
FREON 502	Poor
FREON BF	Excellent
FREON C316	Excellent
FREON C318 (Octafluorotetraethylene)	Excellent
FREON MCA	Good
FREON PCA	Excellent
FREON SMT	Poor
FREON T-P35	Excellent
FREON T-WD602	Excellent
FREON TA	Poor
FREON TC	Excellent
FREON TF	Excellent
FREON TMC	Excellent
FRYQUEL 220 (Mil-G-23652 Type I)	Superior

Chemical	Rating
FRYQUEL 220 (Mil-G-23652 Type II)	Superior
FRYQUEL A60	Superior
FRYQUEL EHC	Superior
FS-1280 Fluorosilicone	Superior
FS-1281 Fluorosilicone	Superior
Fuel C	Superior
Fuel Oil (No. 1)	Superior
Fumaric Acid	Superior
Furaldehyde	Good
Furan	Good
Furfural	Good
Furfuraldehyde	Good
Furfuryl Alcohol	Superior
FYRQUEL 90, 100, 150, 220, 300, 500, 550	Superior
Gallic Acid	Superior
Gasoline (Esso Golden)	Superior
Gasoline (Regular)	Superior
Gasoline (Shell Super)	Superior
Gasoline Antioxidant No.22	Superior
Gasoline Premium (Leaded)	Superior
Gasoline Premium (Unleaded)	Superior
Gear Lubricant (GL-4A)	Superior
Gear Lubricant (GL-4B)	Superior
Gear Lubricant (HD-90)	Superior
Gear Lubricant (Lead Soap Active)	Superior
Gear Lubricant (SCL)	Superior
Gear Lubricant (Sulfur Mil-L-2105)	Superior
Gelatin	Superior
Girling Crimson (Brake Fluid)	Excellent
Glauber's Salt	Superior
Gluconic Acid	Excellent
Glucose	Superior

Chemical	Rating
Glue	Superior
Glutamic Acid	Excellent
Glutaraldehyde	Superior
Glycerol (Glycerin)	Superior
Glycol Ethyl Ether	Good
Glycols	Superior
Grease (Machine Oil No.120)	Superior
Grease (Magnet)	Superior
Grease (Shallow)	Superior
Green Sulfate Liquor	Superior
GULF ENDURANCE OILS	Superior
Halocarbon Oil 27	Excellent
HALOTHANE (Bromoclorotrifluoroethane)	Superior
HALOWAX OIL	Superior
Hanover (Mil-H-83282)	Superior
Heating Oil	Superior
Heavy Water	Superior
HEF-2 (Trialkyl Pentaborane)	Superior
HEF-3	Superior
Helium	Superior
Heptachlor	Superior
Heptaldehyde (Heptanal)	Good
Heptanoic Acid	Superior
Hercoflex 600	Superior
Hexachloroacetone	Excellent
Hexachloroethane	Superior
Hexamethylenediamine	Good
Hexamethylenetetramine	Good
Hexanone	Good
Hexone (Methyl Isobutyl Ketone)	Good
Hexyl Acetate	Good
Hexyl Alcohol (Hexanol)	Superior
Hexylene Glycol	Superior
Hexylresorcinol	Superior

Chemical	Rating
High Viscosity Lubricant H2	Superior
High Viscosity Lubricant U4	Superior
Houghto Safe 1010	Superior
Houghto Safe 1055	Superior
Houghto Safe 1120	Superior
Houghto Safe 520	Superior
Houghto Safe 62	Superior
Houghton Vital 29 FM (Hydraulic Fluid)	Superior
Hydraulic Oils (Petroleum Base)	Superior
Hydraulic Oils (Synthetic Base)	Superior
Hydrazine	Good
Hydrazine Dihydrochloride	Good
Hydrazine Hydrate	Good
Hydriodic Acid	Superior
Hydrobromic Acid	Superior
Hydrochloric Acid	Superior
Hydrochloric Acid (20%)	Superior
Hydrochloric Acid (37%)	Superior
Hydrochloric Acid (70%)	Superior
Hydrochloric Acid, conc.	Superior
Hydrochloric Acid/Chlorine Gas	Superior
Hydrocyanic Acid	Superior
Hydrofluoric Acid (48%)	Good
Hydrofluoric Acid (75%)	Good
Hydrofluoric Acid, Anhydrous	Good
Hydrofluoric Acid, conc. (hot)	Good
Hydrofluosilicic Acid	Superior
Hydrogen	Superior
Hydrogen Cyanide	Superior
Hydrogen Fluoride (Gaseous in Water)	Good
Hydrogen Fluoride (Gaseous, 40%)	Good

Chemical	Rating
Hydrogen Fluoride, Anhydrous	Good
Hydrogen Peroxide (36%)	Superior
Hydrogen Peroxide (90%)	Superior
Hydrogen Sulfide	Good
Hydrogen Sulfide Gas (At 2.0 Mpa)	Good
HYDROLUBE	Superior
Hydrolubric 120B	Superior
Hydroquinone	Superior
Hydroxyacetic Acid	Excellent
Hydyne (Uns-dimethyl Hydrazine/Diethylene Triamine)	Poor
HYJET S, W, III	Good
Hypochlorite	Superior
Hypochlorous Acid	Superior
HyVolt II Transformer Heat Exchanger Fluid	Superior
INDUSTRON	Superior
Iodine	Superior
Iodine Pentafluoride	Good
Iodophor (Iodoform)	Excellent
Ionone (20% Solution)	Superior
ISO 1817 Liquid 1	Superior
ISO 1817 Liquid 2	Superior
ISO 1817 Liquid 3	Superior
ISO 1817 Liquid 4	Superior
ISO 1817 Liquid A	Superior
ISO 1817 Liquid B	Superior
ISO 1817 Liquid C	Superior
ISO 1817 Liquid D	Superior
Iso dodecane	Superior
Isoamyl Acetate	Good
Isoamyl Alcohol	Superior
Isoamyl Butyrate	Excellent
Isoamyl Valerate	Superior

Chemical	Rating
Isobutane	Superior
Isobutene	Superior
Isobutyl Acetate	Good
Isobutyl Acrylate	Good
Isobutyl Alcohol	Superior
Isobutyl Aldehyde	Good
Isobutyl Chloride	Superior
Isobutyl Ether	Good
Isobutyl Methyl Ketone	Good
Isobutyl n-Butyrate	Superior
Isobutylene	Superior
Isobutylphenylacetate (20% Solution)	Superior
Isobutyric Acid	Excellent
Isodecanol	Superior
Isoeugenol	Superior
Isooctane	Superior
Isopentane	Superior
Isophorone (20% Solution)	Superior
Isopropyl Acetate	Excellent
Isopropyl Acetone	Excellent
Isopropyl Alcohol	Superior
Isopropyl Amine	Excellent
Isopropyl Chloride	Superior
Isopropyl Ether	Good
Isovaleric Acid	Superior
Jet Fuel A	Superior
JP-10	Superior
JP-3 (Mil-T-5624)	Superior
JP-4 (Mil-T-5624)	Superior
JP-5 (Mil-T-5624)	Superior
JP-6 (Mil-F-25656)	Superior
JP-7	Superior
JP-8 (Mil-T-83133)	Superior
JP-9 (Mil-F-81912)	Superior
JPX- (Mil-F-25604)	Good

Chemical	Rating
Kearsley Thinners	Superior
KEL-F Liquids	Superior
Kerosene	Superior
Krytox GPL-101	Superior
Krytox GPL-104	Superior
Krytox GPL-106	Superior
Lacquer Solvents	Excellent
Lacquers	Excellent
Lactams (Amino Acids)	Superior
Lactic Acid	Superior
Lactic Acid (85%)	Superior
Lactic Acid (Cold)	Superior
Lactic Acid (Hot)	Superior
Lard (Animal Fat)	Superior
Lauric Acid	Superior
Lavender Oil	Superior
Lead Acetate	Excellent
Lead Chloride	Superior
Lead Dioxide	Superior
Lead Nitrate	Superior
Lead Oxide, Red	Superior
Lecithin	Not tested
Ligroin	Superior
Lime Bleach	Superior
Lime-Sulfur Solution	Superior
LINDOL Hydraulic Fluid	Superior
Linoleic Acid	Superior
Linseed Oil	Superior
Liquid Oxygen	Poor
Liquified Petroleum Gas (LPG)	Superior
Liquor	Superior
Lithium Bromide, Brine	Superior
Lithium Chloride	Superior
Lithium Hydroxide	Excellent
Low Sulfur Diesel (LSD)	Superior

Chemical	Rating
Lubricating Oils, Diester	Superior
Lubricating Oils, Petroleum	Superior
Lye	Superior
Mack Truck Engine Coolant	Superior
Magnesium Carbonate	Not tested
Magnesium Chloride	Superior
Magnesium Hydroxide	Superior
Magnesium Salts	Superior
Magnesium Sulfate (Epsom Salts)	Superior
Magnesium Sulfite	Superior
MALATHION	Superior
Maleic Acid	Superior
Maleic Anhydride	Excellent
Malic Acid	Superior
Mandelic Acid	Good
Manganese Acetate	Excellent
Manganese Chloride	Superior
Manganese Salts	Superior
Manganese Sulfate	Superior
Manganese Sulfide	Superior
Manganous Sulfite	Superior
MEA (Ethanolamine)	Good
MEK/Toluene (50%/50%)	Excellent
Mercaptan	Excellent
Mercuric Acetate	Excellent
Mercuric Chloride	Superior
Mercuric Cyanide	Superior
Mercuric Sulfate	Superior
Mercurous Nitrate	Superior
Mercury	Superior
Mercury Vapor	Superior
Mesityl Oxide	Good
Metaldehyde	Good
Methane	Superior
Methanol	Superior

Chemical	Rating
Methyl Abietate	Superior
Methyl Acetate	Excellent
Methyl Acetoacetate	Excellent
Methyl Acetophenone	Excellent
Methyl Acid	Superior
Methyl Acrylate	Good
Methyl Acrylate	Good
Methyl Alcohol (Methanol)	Superior
Methyl Amine	Good
Methyl Amyl Acetate	Excellent
Methyl Amyl Alcohol	Superior
Methyl Anthranilate	Superior
Methyl Benzoate	Superior
Methyl Benzyl Alcohol	Superior
Methyl Bromide	Superior
Methyl Butyl Ketone	Excellent
Methyl Carbonate	Superior
Methyl CELLOSOLVE	Excellent
Methyl Cellulose	Excellent
Methyl Chloride	Superior
Methyl Chloroacetate	Excellent
Methyl Chloroform	Superior
Methyl Chloroformate	Superior
Methyl Cyclohexanone	Good
Methyl Cyclopentane	Superior
Methyl Ether	Excellent
Methyl Ethyl Ketone (MEK)	Excellent
Methyl Formate	Excellent
Methyl Hexyl Ketone	Excellent
Methyl Isobutyl Ketone (MIBK)	Excellent
Methyl Isocyanate	Excellent
Methyl Isopropyl Ketone	Excellent
Methyl Mercaptan	Superior
Methyl Methacrylate	Excellent
Methyl n-Amylketone	Excellent

Chemical	Rating
Methyl Oleate	Superior
Methyl Phenyl Silicone Fluid	Superior
Methyl Phenylacetate	Excellent
Methyl Salicylate (Oil of Wintergreen)	Superior
Methyl tert-Butyl Ether (MTBE)	Excellent
Methylanisole (20% Solution)	Superior
Methylene Blue	Good
Methylene Bromide	Excellent
Methylene Chloride	Superior
Midcontinent Asphalt (85-100)	Superior
Mil-F-25558 (RJ-1)	Superior
Mil-F-25656 (JP-6)	Superior
Mil-F-81912 (JP-9)	Superior
Mil-F-82522 (RJ-4)	Superior
Mil-H-8446 (MLO-8515)	Superior
Mil-L-23699 Lubricants	Superior
Mil-L-7808 Lubricants	Superior
Mil-R-25576 (RP-1)	Superior
Mil-S-3136 Type I Fuel (ASTM Reference Fuel A)	Superior
Mil-S-3136 Type II Fuel	Superior
Mil-S-3136 Type III Fuel (ASTM Reference Fuel B)	Superior
Mil-S-3136 Type IV Oil Medium Swell	Superior
Mil-S-3136 Type IV Oil, High Swell	Superior
Mil-S-3136 Type IV Oil, Low Swell	Superior
Mil-T-5624 (JP-3, JP-4, JP-5)	Superior
Mil-T-83133 (JP-8)	Superior
Milk	Superior
Mine Fluid 3XF	Superior
Mineral Oil	Superior
MLO-7277, 7557	Superior
MLO-8200, 8515 (Mil-H-8446)	Superior

Chemical	Rating
MOBAL NIVAC 20, 30	Superior
MOBIL DELVAC 1100, 1110, 1120, 1130	Superior
MOBIL HF	Superior
Mobil Jet Oil 254	Superior
Mobil Jet Oil 291	Superior
Mobil Jet Oil II	Superior
MOBIL THERM 600	Superior
Mobile Jet Oil (Mil-L-23699)	Superior
Mobile XRM-206A (Mil-L-83282)	Superior
MOBILJET II Lubricant	Superior
Molybdenum Disulfide Grease	Superior
Mono Bromobenzene	Superior
Mono Chloroacetic Acid	Excellent
Mono Chlorobenzene	Superior
Mono Ethanol Amine	Excellent
Mono Methyl Ether	Superior
Mono Methyl Formamide	Excellent
Monomethyl Hydrazine	Excellent
Monomethylaniline	Superior
Monosodium glutamate	Not tested
Monovinyl Acetylene	Superior
MTBE (Methyl tert-Butyl Ether)	Excellent
Mustard Gas	Superior
Myristic Acid	Superior
n-Butyl Acetate	Good
n-Butyl Acrylate	Good
n-Butyl Alcohol	Superior
n-Butyl Butyrate	Superior
n-Butyl Chloride	Superior
n-Butyl Methacrylate	Excellent
n-Decane	Superior
n-Dibutylamine	Good
n-Heptane	Superior

Chemical	Rating
n-Hexadecane (Cetane)	Superior
n-Hexaldehyde	Good
n-Hexane	Superior
n-Octadecane	Superior
n-Octane	Superior
n-Octyl Acetate	Excellent
n-Octyl Alcohol (Octanol)	Superior
n-Octyl Chloride	Superior
n-Pentane	Superior
n-Propyl Acetate	Good
n-Propyl Acetone	Excellent
n-Propyl Nitrate	Excellent
n-Propyl Propionate	Superior
n-Propylamine	Good
N-Propylbenzene	Superior
n-Propylbromide, 90%	Excellent
n-Valeraldehyde	Good
n,n-Diethylaniline	Good
Naphtha	Superior
Naphthalene	Superior
Naphthalene Chloride	Superior
Naphthenic Acid	Superior
Naphthylamine	Superior
Natural Gas	Superior
Neatsfoot Oil	Superior
Neon	Superior
Nerolidol (20% Solution)	Superior
Neutral detergents (a Superior rating can be inferred for general cleaning agents unless they contain harsh chemicals)	Superior
Neville Acid	Superior
Nickel Acetate	Excellent
Nickel Ammonium Sulfate	Superior
Nickel Chloride	Superior
Nickel Nitrate	Superior

Chemical	Rating
Nickel Sulfate	Superior
Nicotine	Superior
Niter Cakes	Superior
Nitrates	Not tested
Nitric Acid (10%)	Superior
Nitric Acid (20%)	Superior
Nitric Acid (60%)	Superior
Nitric Acid (70%)	Superior
Nitric Acid, Red Fuming	Superior
Nitric/phosphoric mix	Not tested
Nitrobenzene	Superior
Nitroethane	Good
Nitrogen	Superior
Nitrogen Dioxide	Excellent
Nitrogen Oxides	Good
Nitrogen Tetroxide	Good
Nitromethane	Good
Nitropropane	Good
Nitrous Oxide	Excellent
Nonane	Superior
Nonionic detergents	Not tested
o-Chloronaphthalene	Superior
o-Chlorophenol	Superior
o-Dichlorobenzene	Superior
o-Nitrotoluene	Excellent
Octachloro Toluene	Superior
Octanal	Good
Octyl Phthalate	Superior
Oil (American LDO SAE 10W30)	Superior
Oil (Engine EOG-1)	Superior
Oil (Engine EOG-2)	Superior
Oil (Engine EOG-3)	Superior
Oil (Engine EOG-4)	Superior
Oil (Engine EOG-5)	Superior
Oil (Engine EOG-6)	Superior

Chemical	Rating
Oil (Mil-L-23699)	Superior
Oil (Mil-L-8200, Mil-L-2104-B)	Superior
Oil (Mil-L-83282)	Superior
Oil detergents (products designed to remove oil and grease typically contain solvents and surfactants that might be similar to those chemicals rated as Superior or Excellent in this guide).	Superior or Excellent
Olefins	Superior
Oleic Acid	Superior
Olein	Good
Oleum, 67%	Superior
Oleyl Alcohol	Superior
Olive Oil	Superior
Oronite 8200	Superior
Oronite 8515	Superior
Oronite Hyjet (Hydraulic Fluid)	Good
Oronite Hyjet W (Hydraulic Fluid)	Good
Oronite M2V	Superior
Orthochloro Ethyl Benzene	Superior
OS-124	Superior
OS-45 (Type III)	Superior
OS-45 (Type IV)	Superior
Oxalic Acid	Superior
Oxygen, Gas (Hot)	Superior
Oxygen, Liquid	Poor
Ozonated Deionized Water	Superior
Ozone	Superior
p-Benzylphenol	Superior
p-Chlorophenol	Superior
p-Chlorotoluene	Superior
p-Cymene	Superior
p-Dichlorobenzene	Superior
p-Nitrophenol	Good

Chemical	Rating
p-Nitrotoluene	Excellent
p-tert-Butylphenol	Superior
p-Toluidine	Excellent
Paint Thinner-DUCO	Superior
Palmitic Acid (Hexadecanoic Acid)	Superior
Par-al-Ketone	Good
Paraffins	Superior
Paraldehyde	Good
Parapoid 10-C	Good
Paratherm HE	Superior
Paratherm NF	Superior
Peanut Oil	Superior
Pelargonic Acid	Superior
Pentachloroethane	Superior
Pentachlorophenol	Superior
Pentalube TP-653	Superior
Pentoxol	Good
Pentoxone	Good
Peracetic Acid	Superior
Percarbonates	Not tested
Perchloric Acid	Superior
Perchloroethylene	Superior
Perchloryl Fluoride	Good
Peroxyacetic Acid	Superior
Petrolatum	Superior
Petroleum Ether	Superior
Petroleum, <121C/250F	Superior
Petroleum, >121C/250F	Superior
Petroleum, Crude	Superior
Phenol	Superior
Phenolsulfonic Acid (65%)	Superior
Phenyl Acetate	Excellent
Phenylbenzene	Superior
Phenylenediamine (PDA)	Good
Phenylethyl Ether	Excellent

Chemical	Rating
Phenylhydrazine	Excellent
Phenylmercuric Acetate	Good
Phorone	Good
Phosgene	Poor
Phosphoric Acid (20%)	Superior
Phosphoric Acid (60%)	Superior
Phosphoric Acid (85%)	Superior
Phosphorous Trichloride	Superior
Phthalic Acid	Superior
Phthalic Anhydride	Good
Pickling Solution	Superior
Picric Acid	Superior
Pine Oil	Superior
Pine Tar	Superior
Pinene	Superior
Piperidine	Good
Plating Solution, Chrome	Superior
Plating Solution, Others	Superior
Polyethylene Glycol	Superior
Potassium Acetate	Good
Potassium Acetate Solution (20%)	Superior
Potassium Bicarbonate	Superior
Potassium Bisulfate	Superior
Potassium Bisulfite	Superior
Potassium Bromide	Superior
Potassium Carbonate	Superior
Potassium Chlorate	Superior
Potassium Chloride	Superior
Potassium Chromate	Superior
Potassium Copper Cyanide	Superior
Potassium Cyanide	Superior
Potassium Dichromate	Superior
Potassium Ferricyanide	Superior
Potassium Fluoride	Superior
Potassium Hydroxide (30%)	Superior

Chemical	Rating
Potassium Hydroxide (Saturated)	Superior
Potassium Hypochlorite	Excellent
Potassium Iodide	Superior
Potassium Nitrate	Superior
Potassium Perchlorate	Superior
Potassium Permanganate	Superior
Potassium Permanganate (30%)	Superior
Potassium Silicate	Superior
Potassium Sorbate	Not tested
Potassium Stearate	Superior
Potassium Sulfate	Superior
Potassium Sulfide	Superior
Potassium Sulfite	Superior
PRESTONE Antifreeze	Superior
PRL-High Temp, Hydraulic Oil	Superior
Producer Gas	Superior
Propane	Superior
Propionaldehyde	Good
Propionic Acid	Excellent
Propionitrile	Good
Propyl Alcohol (Propanol)	Superior
Propylene	Superior
Propylene Dichloride	Superior
Propylene Glycol	Superior
Propylene Oxide	Poor
PYDRAUL 10E, 29 ELT	Superior
PYDRAUL 115E	Superior
PYDRAUL 150	Superior
PYDRAUL 230C, 312C, 540C	Superior
PYDRAUL 30E, 50E, 65E, 90E	Superior
PYDRAUL 312	Superior
PYDRAUL 60	Superior
PYDRAUL A200	Superior

Chemical	Rating
PYDRAUL AC	Superior
PYDRAUL F-9	Superior
PYRANOL TRANSFOMER OIL	Superior
Pyridine	Good
PYROGARD 42, 43, 53, 55	Good
PYROGARD C&D (Water&Petroleum)	Good
Pyroligneous Acid	Good
PYROLUBE	Superior
Pyrrole	Excellent
Quaternary Ammonia	Not tested
Quinine	Superior
Quinizarin	Superior
Quinoline	Superior
Quinone	Superior
Radiation	Good
Raffinate	Superior
Rapeseed Methyl Ester	Superior
Rapeseed Oil	Superior
RD-6195	Superior
RED LINE 100 Oil	Superior
RED OIL (Mil-H-5606)	Superior
Reference Oil 300	Superior
Resorcinol	Superior
Riboflavin	Superior
Ricinoleic Acid	Superior
RJ-1 (Mil-F-25558)	Superior
RJ-4 (Mil-F-82522)	Superior
RME	Superior
Rosin	Superior
Royco 808-RH	Superior
Royco 899 (Mil-L-23699)	Superior
RP-1 (Mil-R-25576)	Superior
Sal Ammoniac	Superior
Salicylic Acid	Superior

Chemical	Rating
Salt Water	Superior
SANTOSAFE 300	Superior
Satfa EC-3686 (Transmission Fluid)	Superior
Sebacic Acid	Superior
Sec-Butyl Alcohol	Superior
Service Fluid 101	Superior
Sewage	Superior
Shell Air (GG1034 WTR)	Superior
Shell Air Turbine Oil No. 505 (Mil-L-23699)	Superior
Shell F.R. Fluid	Superior
Shell Iris 902	Superior
Shell Rotella T 15W40 Diesel Oil	Superior
Shell Spirax EP90	Superior
Shell Spirax HD (Rear Axle Additive)	Superior
Shell Super Oil (STP Oil Additive)	Superior
SHELL TELLUS 27 (Petro Base)	Superior
Shell Tellus 33	Superior
Shell Turbine N0.307	Superior
SHELL UMF (5% Aromatic)	Superior
Shellac	Superior
Shinol TWS-R	Superior
Silicate Esters	Superior
Silicone Greases	Superior
Silicone Oils	Superior
Silver Cyanide	Superior
Silver Nitrate	Superior
Silver Sulfate	Superior
SINCLAIR OPALINE CX-EP LUBE	Superior
SKYDROL 500A	Good
SKYDROL 500B	Good
SKYDROL 7000	Superior

Chemical	Rating
SKYDROL LD	Good
Skylube 450	Superior
SME	Superior
Soap Solutions	Superior
SOC-100 (SAE 10W40 Synthetic Engine Oil)	Superior
SOCONY PD959B VACUUM	Superior
Soda Ash	Superior
Sodium Acetate (2.0 M Solution)	Superior
Sodium Aluminate	Superior
Sodium Arsenate	Superior
Sodium Benzoate	Superior
Sodium benzoate	Superior
Sodium Bicarbonate	Superior
Sodium Bisulfate	Superior
Sodium Bisulfite	Superior
Sodium Borate	Superior
Sodium Bromide	Superior
Sodium Carbonate	Superior
Sodium Chlorate	Superior
Sodium Chloride	Superior
Sodium Chlorite	Superior
Sodium Chloroacetate	Excellent
Sodium Chromate	Superior
Sodium Cyanide	Superior
Sodium Diacetate	Excellent
Sodium Dichromate	Superior
Sodium Ferricyanide	Superior
Sodium Ferrocyanide	Superior
Sodium Fluoride	Superior
Sodium Hydrosulfide	Superior
Sodium Hydroxide	Superior
Sodium Hydroxide (30%)	Superior
Sodium Hydroxide (50%)	Superior
Sodium Hypochlorite	Superior

Chemical	Rating
Sodium Hypochlorite (20%)	Superior
Sodium Hypochlorite (5%)	Superior
Sodium Iodide	Superior
Sodium Metaphosphate	Superior
Sodium Metasilicate	Superior
Sodium Nitrate	Superior
Sodium Perborate	Superior
Sodium Peroxide	Superior
Sodium Phosphate, (Dibasic)	Superior
Sodium Phosphate, (Monobasic)	Superior
Sodium Phosphate, (Tribasic)	Superior
Sodium Salts	Superior
Sodium Sesquisilicate	Superior
Sodium Silicate	Superior
Sodium Sulfate	Superior
Sodium Sulfide	Superior
Sodium Sulfite	Superior
Sodium Thiocyanate	Superior
Sodium Thiosulfate	Superior
Sodium, Liquid	Poor
SOLVASOL 1, 2, 3	Superior
Sorbitol	Superior
Sour Crude Oil	Excellent
Sour Natural Gas	Excellent
Soy Methyl Ester	Superior
Soybean Oil	Superior
Spirax 90 EP Oil (STP Additive)	Superior
SR10 Fuel	Superior
SR6 Fuel	Superior
Stannic Chloride	Superior
Stannous Chloride	Superior
Stannous Fluoride	Superior
STAUFFER 7700	Superior
Stauffer Jet II (Mil-L-23699B)	Superior

Chemical	Rating
Steam (>200°C)	Good
Steam (1.4 Mpa)	Superior
Steam, 162 PSIG	Superior
Steam, 80 PSIG	Superior
Steam, Atmospheric	Superior
Stearic Acid	Superior
Sterilization detergents	Excellent
Stoddard Solvent (ASTM D-484-52)	Superior
Strontium Acetate	Good
Styrene, Monomer	Superior
Suberic Acid	Superior
Succinaldehyde	Good
Succinic Acid	Superior
Sucrose Solution	Superior
Sulfamic Acid	Superior
Sulfite Liquors	Superior
Sulfites	Not tested
Sulfole	Superior
Sulfur Chloride	Superior
Sulfur Dioxide (Dry)	Superior
Sulfur Dioxide (Liquified)	Superior
Sulfur Dioxide (Wet)	Superior
Sulfur Hexafluoride	Superior
Sulfur Tetrafluoride	Superior
Sulfur Trioxide, Dry	Superior
Sulfur, Molten	Superior
Sulfuric Acid (20% Oleum)	Superior
Sulfuric Acid (20%)	Superior
Sulfuric Acid (40%)	Superior
Sulfuric Acid (60%)	Superior
Sulfuric Acid (90%)	Superior
Sulfuric Acid (95%)	Superior
Sulfuric Acid (98%)	Superior
Sulfuric Acid (Concentrated)	Superior
Sulfuric Acid (Fuming)	Superior

Chemical	Rating
Sulfurous Acid	Excellent
Sulfurous Acid (5% Sulfur Dioxide)	Good
Sun XSC 71 367 Oil	Superior
SUNOCO SAE 10	Superior
Sunoco Sunomatic 136 ATF	Superior
Sunoco Sunomatic 141 ATF	Superior
Sunoco X5 820 Lube	Superior
Super 284 OS19381 (Transmission Fluid)	Superior
Supermil ASU-06752	Superior
SUPERSHELL Gasoline	Superior
SWANFINCH EP Lubricant	Superior
sym-Diphenylethane	Superior
TAAE (tert-Amyl Ethyl Ether)	Superior
Tallow	Superior
TAME (tert-Amyl Methyl Ether)	Superior
Tannic Acid	Superior
Tar, Bituminous	Superior
Tartaric Acid	Superior
TEL-4081	Superior
Terephthalic Acid	Superior
Terpineol	Superior
Terpinyl Acetate	Excellent
Tert-Amyl Ethyl Ether (TAAE)	Superior
Tert-Amyl Methyl Ether (TAME)	Superior
tert-Butyl Alcohol	Superior
Tetrabromomethane	Superior
Tetrabutyl Titanate	Superior
Tetrachloroethane	Superior
Tetrachloroethylene	Superior
Tetraethyl Lead	Superior
Tetrahydrofuran (THF)	Excellent
TETRALIN (Tetrahydronaphthalene)	Superior

Chemical	Rating
TEXACO 3450 GEAR OIL	Superior
TEXACO TL-8262B ATF	Superior
TEXACO UNI-TEMP GREASE	Superior
TEXAMATIC 1581 Fluid	Superior
TEXAMATIC 3401 Fluid	Superior
TEXAMATIC 3525 Fluid	Superior
TEXAMATIC 3528 Fluid	Superior
THERMINOL 44/45	Superior
THIOKOL TP-90B	Superior
THIOKOL TP-95	Superior
Thionyl Chloride	Superior
Thiophene	Good
Titanium Dioxide	Superior
Titanium Tetrachloride	Superior
Toluene	Superior
Toluene Diisocyanate (TDI)	Good
Toluene-2,4 Diisocyanate/Toluene-2,6 Diisocyanate (80%/20%)	Superior
Toluene/Pyridine (95%/5%)	Superior
Transformer Oil	Superior
Transmission Fluid (ATF 1)	Superior
Transmission Fluid (ATF 2)	Superior
Transmission Fluid (ATF 3)	Superior
Transmission Fluid (ATF 4)	Superior
Transmission Fluid (ATF 5)	Superior
Transmission Fluid (Ford)	Superior
Transmission Fluid Type A	Superior
TREFLAN	Superior
Triacetin	Excellent
Tributoxethyl Phosphate	Superior
Tributyl Citrate	Good
Tributyl Mercaptan	Superior
Tributyl Phosphate	Good
Tributylamine	Good
Trichloroacetic Acid (TCA)	Excellent

Chemical	Rating
Trichloroethylene (TCE)	Superior
Trichloroethylene/Tetrachloroethylene	Superior
Trichlorofluoromethane (FREON 11)	Excellent
Trichlorotrifluoroethane (FREON 113)	Excellent
Triclosan	Not tested
Tricresyl Phosphate	Superior
Triethanolamine (TEA)	Good
Triethylaluminium	Superior
Triethylamine	Good
Triethylborane	Superior
Triethylene Glycol (TEG)	Superior
Triethylenetetramine (TETA)	Good
Trimethylaluminum (TMAI)	Superior
Trimethylamine (TMA)	Good
Trinitrotoluene (TNT)	Superior
Trioctyl Phosphate	Superior
Trioxane	Superior
Tung Oil (China Wood Oil)	Superior
Turbine Oil No.15 (Mil-L-7808A)	Superior
Turbo No. 10 Oil	Superior
Turbo No. 65 Oil	Superior
Turbo No. P-16 Oil	Superior
Turpentine	Superior
Tween 80 (20% solution)	Superior
UCON 300N (Lubricants 50-HB-280X)	Superior
UCON HYDROLUBE J-4	Superior
UCON OIL LB-385, 400X	Superior
UDMH (Unsymmetrical Dimethyl Hydrazine)	Good
Ultra Low Sulfur Diesel (ULSD)	Superior
Uniflex 186	Superior
Uniflex 211	Superior

Chemical	Rating
Uniflex 212	Superior
Uniflex 215	Superior
Uniflex 31	Superior
Uniflex 33	Superior
UNIVIS 40 Hydraulic Fluid	Superior
UNIVIS J-43	Superior
UNIVOLT NO.35 (Mineral Oil)	Superior
Unleaded Test Gasoline (91 Octane)/1-Butanol 80%/20%	Superior
UPDI (Ultra Pure Deionized Water)	Superior
UTG91/1-Butanol 80%/20%	Superior
Valeric Acid	Superior
Varnish	Superior
Veedol Hypoid Oil	Superior
Vegetable Oils	Superior
VERMAN	Superior
VERSILUBE F44, F50, F55	Superior
Vinegar	Superior
Vinyl Acetate	Good
Vinyl Acetylene	Superior
Vinyl Chloride	Superior
Vinyl Fluoride	Superior
Vinylidene Chloride	Superior
VV-H-910	Superior
WAGNER 21B Brake Fluid	Excellent
Water	Superior
WEMCO C	Superior
Whiskey & Wines	Superior
White Liquor	Superior
White Oil	Superior
White Pine Oil	Superior
Wolmar Salts	Superior
Wood Alcohol	Superior
Xenon	Superior
Xylene	Superior

Chemical	Rating
Xylidine	Good
Xylol	Superior
Yeast	Superior
Zeolites	Superior
Zinc Acetate	Excellent
Zinc Ammonium Chloride	Excellent
Zinc Carbonate	Superior
Zinc Chloride	Superior
Zinc Chromate	Excellent
Zinc Cyanide	Excellent
Zinc Diethyldithiocarbamate	Excellent
Zinc Hydrosulfite	Excellent
Zinc Nitrate	Superior
Zinc Oxide	Superior
Zinc Phenolsulfonate	Excellent
Zinc Phosphate	Superior
Zinc Salts	Superior
Zinc Stearate	Superior
Zinc Sulfate	Superior
Zinc Sulfide	Superior
Zirconium Nitrate	Superior

Industry Information

Dairy industry

The dairy industry employs a wide array of chemicals to ensure the sanitation of equipment and the safety of milk products. These chemicals are used at different stages of dairy production and in various cleaning and sanitation protocols, including pre-dip and post-dip processes for teat sanitation, cleaning milking machines, and maintaining hygiene in calf huts, pens, and calving boxes.

For teat sanitation:

- **Pre-dip chemicals:** These are applied to the cow's teats before milking to clean and disinfect, removing dirt and reducing bacteria. Common pre-dip chemicals include iodine, chlorhexidine, acidified sodium chlorite (ASC), lactic acid, and quaternary ammonium compounds (QACs).
- **Post-dip chemicals:** Used after milking, these help to prevent bacteria from entering the teat canal. Post-dip solutions often consist of iodine, chlorhexidine, peroxyacetic acid (PAA), lactic acid, and QACs. Some dairies also use hydrogen peroxide and sodium hypochlorite for additional teat sanitation.

Cleaning milking machines involves agents such as:

- Sodium hypochlorite
- Sodium hydroxide
- Potassium hydroxide
- Peracetic acid
- Hydrogen peroxide

For maintaining cleanliness in areas where calves are housed and birthed, the following are used:

- Iodine
- Glutaraldehyde

Specific chemicals are also utilized in dairy product processing, such as:

- Alginate (propylene glycol alginate) in products like ice cream and cheese.
- Hydrochloric acid in the production of certain cheeses and yogurts.

Common acids used in various cleaning and processing stages in the dairy industry include:

- Phosphoric acid
- Nitric acid
- Sulfuric acid
- Organic acids (acetic and citric acids)

The effectiveness of pre-dip and post-dip chemicals lies in their broad-spectrum disinfectant properties, with iodine being the most widely used due to its efficacy against bacteria, including those causing mastitis. Chlorhexidine is valued for its long-lasting effects, while ASC is gaining popularity for its broad-spectrum disinfectant capabilities against viruses and yeasts. Lactic acid, often used in organic farming, is effective against bacteria but may not be as potent against some tougher strains.

When choosing the appropriate chemicals for pre-dip and post-dip processes, factors such as the type of milking system, milk quality, and prevalent pathogens should be considered. Consulting with a veterinarian or dairy expert is crucial in selecting the right products.

The FDA and Cornell University recognize teat dips as crucial for controlling mastitis. Science Direct notes that disinfectants for teat dips include iodine, chlorhexidine, chlorine dioxide, hydrogen peroxide, sodium hypochlorite, and quaternary ammonia, with iodine being a common choice for post-dip at a typical 1% concentration.

Covetrus advises washing udders with clean water and a disinfectant such as sodium hypochlorite, while PCC Group mentions the use of hydrochloric acid in product processing. A Hungary Dairy Farm Study lists chlorine and iodine among the chemicals used in dairy farms.

Overall research indicates that the dairy industry frequently uses:

- Sodium hydroxide (NaOH)
- Hydrogen peroxide (H₂O₂)
- Peracetic acid (PAA)
- Chlorine dioxide (ClO₂)
- Nitric acid (HNO₃)
- Phosphoric acid (H₃PO₄)
- Quaternary ammonium compounds (QACs)
- Sodium hypochlorite (NaClO)
- Ethanol
- Sodium carbonate (Na₂CO₃)

These chemicals play a critical role in ensuring that dairy products are safe for consumption and that the equipment used in their production is properly sanitized.

Food industry

In the food industry, a variety of chemicals are utilized for different purposes.

Decon 7 specifies the use of hypochlorite, quaternary ammonium (with nitrogen attached to alkyl chains), peroxyacetic acid (PPA, which is effective in decomposing into acetic acid, oxygen, and water), hydrogen peroxide, and percarbonates for cleaning and sanitation.

Velocity Chemicals lists chemicals such as hypochlorites, chlorine dioxide, iodophor, peroxyacetic acid (PAA), hydrogen peroxide, and quaternary ammonium compounds (QACs or Quats) as commonly used for maintaining hygiene standards.

Livestrong points out that within the foods themselves, preservatives and additives like nitrates, nitrites, sodium nitrate, sulfites, sulfur dioxide, alginate (propylene glycol alginate), and aspartame are frequently found.

Sourcezon classifies food industry chemicals by type and level of processing:

- Organic chemicals such as citric acid, lecithin, and monosodium glutamate.
- Inorganic chemicals including sodium benzoate, chlorine, and sodium hydroxide.
- Natural chemicals like vitamin C, gelatin, and beeswax.
- Synthetic chemicals encompassing aspartame, dimethylpolysiloxane, and azodicarbonamide.
- Chemicals in minimal processing like citric acid and sodium benzoate.
- Chemicals in intermediate processing such as monosodium glutamate and ascorbic acid.
- Chemicals in extensive processing, including azodicarbonamide and dimethylpolysiloxane.

Vichemic identifies sodium carbonate, potassium chloride, coumarin, and ethyl lactate as relevant chemicals within the industry.

Noah Chemicals cites sulfuric acid, phosphoric acid, ethylene, sodium hydroxide, propylene (propene), nitrogen, and ammonia as important industrial chemicals.

PCC Group notes that sodium hypochlorite is often utilized as a disinfectant in the production of alcoholic beverages like wine and beer.

Continental Chemical Company lists phosphoric acid, chlorine, caustic base (sodium hydroxide), potassium, sodium, nitric acid, and glycerin as key chemicals used across the sector for cleaning and processing.

Industry Arc forecasts for 2021-2026 in the Food and Beverage sector include a range of disinfectants and cleaning agents:

- Oxidizing disinfectants such as sodium hypochlorite, chlorine dioxide, hydrogen peroxide, peracetic acid, and iodophors.
- Non-oxidizing disinfectants including quaternary ammonium compounds, triamines, biguanides, and alcohols.
- Cleaning chemicals like acid cleaners, detergents, foaming cleaners, alkaline cleaners, general-purpose cleaners, solvents, among others.

Beverage Industry

Within the beverage industry, many chemicals are commonly employed.

The Asian Beer Network details that commercial breweries regularly utilize caustic soda (sodium hydroxide) due to its effectiveness in cleaning heavily soiled brewing apparatus. Additionally, an acid cleaner, often comprising a nitric/phosphoric blend, is essential for a comprehensive cleaning regimen. The caustic cleaner targets substantial soil, tannins, resins, glucans, and hop oils, while the acid cleaner removes beer stone, water scale (like calcium and magnesium carbonates), and aluminum oxide. Paracetic Acid (PAA) is produced by the reaction of acetic acid with hydrogen peroxide in water, typically catalyzed by sulfuric acid. Ethanol or ethyl alcohol is also a common cleaning agent in this sector.

Extensive research identifies several key chemicals used across the industry:

Sodium hypochlorite (commonly known as bleach): Recognized for its effectiveness against a wide array of microorganisms, this chemical is a standard choice for disinfecting in the industry.

Quaternary ammonium compounds, or quats: These compounds are favored for their antimicrobial properties and versatility in sanitizing different types of surfaces.

Peroxyacetic acid (PAA): As a potent oxidizer and broad-spectrum disinfectant, PAA is frequently chosen for its effectiveness against various microorganisms and its suitability for use on multiple surfaces.

Hydrogen peroxide: Known for its strong oxidizing properties, hydrogen peroxide is used broadly in the industry as a disinfectant against a wide range of microorganisms.

Acid-based cleaners: Cleaners based on acids such as phosphoric and citric acid are prevalent for removing mineral deposits and surface stains.

Alkaline-based cleaners: Cleaners with alkaline compounds like sodium hydroxide and potassium hydroxide are utilized to cleanse organic soils, including fats, proteins, and sugars, from surfaces.

Pharmaceutical industry

In the pharmaceutical sector, many substances are frequently utilized.

Chemicals.Co reports the prevalent use of substances such as acetone, hydrochloric acid, acetic anhydride, benzyl chloride, and diethyl ether.

According to Pharma Guideline, various classes of cleaning agents, including nonionic, anionic, cationic, and amphoteric detergents, along with alkaline-based detergents, are regularly employed.

Machine Design highlights that chemical procedures like chlorine treatments and ethylene oxide fumigation are standard. Pharmaceutical production emphasizes surface cleaning to an extremely fine degree to prevent contamination, unlike the food and beverage industry, which targets larger particulate cleanliness. Both sectors utilize chemical agents for appropriate sanitization. Components such as 300-Series stainless steel shafts can endure the severe conditions of chemical cleaning without degradation. Surfaces made of 316 stainless steel are notably resistant to the corrosive effects of acids and salts, which are especially common in fruit and vegetable processing. It is noted that while 303-grade stainless steel is adequate for intense cleaning conditions, the use of 316-grade steel is advised in environments involving food or pharmaceuticals due to its enhanced molybdenum content, which provides superior resistance to corrosion.

APV states that hypochlorous acid is significantly more potent as a sanitizer compared to hypochlorite, being about 50 times more effective.

Comprehensive research within the field has identified:

Quaternary ammonium compounds (QACs): These compounds are extensively used in pharmaceutical disinfection due to their comprehensive antimicrobial properties and minimal toxicity.

Sodium hypochlorite: Recognized for its strong oxidation capability, sodium hypochlorite is effective against a broad spectrum of microorganisms, including bacteria, viruses, and fungi, and is frequently used to sanitize surfaces and apparatus in pharmaceutical settings.

Hydrogen peroxide: As a potent oxidizer, hydrogen peroxide serves as a disinfectant or sterilant within pharmaceutical environments, combating a variety of microorganisms and applicable to surfaces, equipment, and air filtration systems.

Peracetic acid: This strong oxidizing agent is effective against numerous microorganisms and is often utilized as a disinfectant or sterilant for surfaces and equipment in the pharmaceutical industry.

Ethanol: Owing to its extensive antimicrobial effectiveness and quick evaporation rate, ethanol is a widely used disinfectant in the pharmaceutical sector.

Applications

Below are the descriptions of chemicals most relevant to their potential use in the dairy, pharma, food, and/or beverage industry:

1. **Acetic Acid (Ethanoic Acid, Vinegar Acid, Methanecarboxylic Acid):** Acetic Acid is a weak organic acid used as a preservative in the food industry due to its antimicrobial properties. It's also utilized in dairy for cleaning and pH adjustment, and in beverage production for flavoring and preservation purposes.
2. **Acetic Anhydride (Acetic Oxide, Acetyl Oxide):** Acetic Anhydride is primarily used as an acetylation agent in pharmaceuticals. It's not typically used in dairy, food, or beverage industries due to its reactive nature.
3. **Acetone (Propanone, Dimethyl Ketone):** Acetone is a solvent used in pharmaceutical manufacturing for cleaning and residue removal. It is not commonly used in the dairy, food, or beverage industries due to its volatile nature.
4. **Acetyl Hydroperoxide (Peroxyacetic Acid, Peracetic Acid):** A strong oxidizing agent used for sanitizing and disinfecting in the dairy, food, and beverage industries. It's also utilized in pharmaceuticals for sterilization purposes.
5. **Alkaline Detergents (Basic Detergents):** These detergents are used for cleaning organic matter from equipment and surfaces in dairy, food, beverage, and pharmaceutical industries due to their ability to break down proteins and fats.
6. **Aluminum Oxide (Alumina, Corundum):** Used as an abrasive or catalyst in various industrial processes, not typically used directly in the dairy, food, beverage, or pharmaceutical industries.
7. **Ammonia (liquid) (Aqua Ammonia, Ammonium Hydroxide):** Used as a cleaning agent in the dairy and food industries, and as a pH adjuster in pharmaceutical manufacturing.
8. **Amphoteric Detergents:** These detergents are utilized for cleaning purposes in dairy, food, beverage, and pharmaceutical industries due to their compatibility with both acidic and alkaline conditions.
9. **Anionic Detergents:** Used for cleaning and sanitizing purposes in dairy, food, beverage, and pharmaceutical industries due to their surfactant properties.
10. **Ascorbic Acid (Vitamin C, L-Ascorbic Acid):** Utilized as an antioxidant in food and beverages, and as a nutrient in pharmaceuticals.
11. **Aspartame (Equal, NutraSweet):** A low-calorie sweetener used in various food and beverage products.
12. **Azodicarbonamide (ADA, Azobisformamide):** Used as a flour bleaching agent in the food industry, although its use is restricted in some regions.
13. **Benzyl Chloride (α -Chlorotoluene, Benzenyl Chloride):** Primarily used in organic synthesis, not typically used in the industries mentioned.
14. **Calcium Carbonate (Limestone, Calcite):** Used as a calcium supplement in dairy and food, and as an antacid in pharmaceuticals.
15. **Cationic Detergents:** Utilized for their antimicrobial properties in the cleaning and sanitizing processes across the dairy, food, beverage, and pharmaceutical industries.

16. **Chlorhexidine (Hibiclens, Peridex):** An antiseptic used for skin disinfection in the pharmaceutical industry and occasionally in the dairy industry for teat dipping.
17. **Chlorine:** Used as a disinfectant in water treatment across all industries.
18. **Chlorine Dioxide (Eka-chlorine, Chlorine Peroxide):** Utilized for sanitation and disinfection purposes in dairy, food, beverage, and pharmaceutical industries.
19. **Chlorine Washes:** Used for disinfecting and sanitizing equipment and surfaces in the food and beverage industries.
20. **Citric Acid (2-Hydroxypropane-1,2,3-tricarboxylic Acid, E330):** Utilized as a preservative and flavor enhancer in food and beverages.
21. **Coumarin (1,2-Benzopyrone, 2H-1-benzopyran-2-one):** Utilized for its aromatic properties in the food industry, although its use is restricted in some regions due to health concerns.
22. **Diethyl Ether (Ether, Ethoxyethane):** Primarily used as a solvent in pharmaceuticals and is not commonly used in dairy, food, or beverage industries.
23. **Diethylmethylbenzenediamine (DETA, Ethacure 100):** Primarily an industrial chemical not typically used in dairy, food, beverage, or pharmaceutical industries.
24. **Dimethylpolysiloxane (Silicone Oil, Polydimethylsiloxane, PDMS):** Used as an anti-foaming agent in food and beverage industries, and as a lubricant or coating in pharmaceutical manufacturing.
25. **Ethaneperoxoic Acid (Peroxyacetic Acid, Peracetic Acid):** A powerful oxidizing agent used for sanitation and disinfection across dairy, food, beverage, and pharmaceutical industries.
26. **Ethanol (Ethyl Alcohol, Alcohol):** Utilized as a solvent in pharmaceuticals, and as a disinfectant in dairy, food, and beverage industries.
27. **Ethyl Lactate (Lactic Acid Ethyl Ester):** Utilized as a solvent in pharmaceuticals and occasionally as a flavoring agent in food and beverage industries.
28. **Ethylene (Ethene):** Primarily used in industrial settings, not typically used directly in dairy, food, beverage, or pharmaceutical industries.
29. **Ethylene Gas:** Used in the ripening of fruits in the food industry.
30. **Gelatin:** Used as a thickener, stabilizer, and texturizer in food and pharmaceutical industries.
31. **Glutaraldehyde (Glutard, 1,5-Pentanedial):** Used as a disinfectant and sterilant in the pharmaceutical and healthcare sectors, not commonly used in dairy, food, or beverage industries.
32. **Hydrochloric Acid (Muriatic Acid, HCl):** Used for pH adjustment and cleaning purposes in dairy, food, beverage, and pharmaceutical industries.
33. **Hydrogen Peroxide (H₂O₂):** Utilized for cleaning, disinfection, and sterilization across dairy, food, beverage, and pharmaceutical industries.
34. **Hypochlorite:** Commonly used as a disinfectant in water treatment across all mentioned industries.
35. **Hypochlorous Acid (HOCl):** Utilized as a sanitizing agent in dairy, food, beverage, and pharmaceutical industries.
36. **Iodine:** Used for disinfection, particularly in dairy for teat dipping, and as an antiseptic in pharmaceuticals.

37. **Iodophor (Iodoform):** Utilized for sanitation in dairy, and as an antiseptic and disinfectant in pharmaceuticals.
38. **Lactic Acid (Milk Acid):** Utilized for pH adjustment, flavoring, and preservation in food and beverage industries, and as a hygiene product in dairy.
39. **Lecithin:** Used as an emulsifier in food and pharmaceutical industries.
40. **Magnesium Carbonate (Magnesite, Hydrated Magnesium Carbonate):** Used as a mineral supplement in food and pharmaceutical industries.
41. **Malic Acid (Hydroxybutanedioic acid):** Utilized as a food additive in the food and beverage industry to provide a tart taste and is also used as a preservative. It's not typically used in dairy or pharma.
42. **Monosodium Glutamate (MSG):** Used as a flavor enhancer in the food and beverage industry, not typically used in dairy or pharmaceutical industries.
43. **Nitrates:** Employed as preservatives and color fixatives in the food and beverage industry, while not commonly used in dairy and pharma.
44. **Nitric Acid (HNO₃, Aqua Fortis):** Used for cleaning and sanitizing equipment in the dairy, food, and beverage industries. It's also used in pharmaceutical manufacturing for various purposes.
45. **Nitric/Phosphoric Mix:** A mixture used for cleaning purposes in dairy, food, and beverage industries, especially for removing mineral deposits.
46. **Nitrogen (N₂):** Used as a packaging gas in the food and beverage industry to extend shelf life, and in pharmaceuticals for various manufacturing processes.
47. **Nonionic detergents:** Used for cleaning purposes across dairy, food, beverage, and pharmaceutical industries because of their mild and non-reactive nature.
48. **Peracetic Acid (PAA, Ethaneperoxyic Acid):** A potent disinfectant and antimicrobial used across dairy, food, beverage, and pharmaceutical industries for sanitation purposes.
49. **Percarbonates:** Utilized as bleaching agents and disinfectants in the cleaning processes across various industries, though not specifically in dairy.
50. **Peroxyacetic Acid (Peracetic Acid, Ethaneperoxyic Acid):** A powerful oxidizing agent used for sanitation and disinfection across dairy, food, beverage, and pharmaceutical industries.
51. **Phosphoric Acid (Orthophosphoric Acid):** Used for cleaning and sanitization in dairy, food, beverage, and pharmaceutical industries, and as a food additive to provide acidity.
52. **Potassium:** This element forms many compounds used across all the mentioned industries for various purposes including cleaning, preservation, and functioning.
53. **Potassium Chloride (KCl):** Used as a salt substitute in food and beverage industry and also finds usage in pharmaceuticals.
54. **Potassium Hydroxide (Caustic Potash, KOH):** Employed for cleaning and sanitization in dairy, food, beverage, and as a base in pharmaceutical manufacturing.
55. **Potassium Sorbate:** Used as a preservative in food, beverage, and occasionally in pharmaceutical industries.
56. **Propylene (Propene):** Primarily an industrial chemical, not typically used directly in dairy, food, beverage, or pharmaceutical industries.

57. **Quaternary Ammonia (Quaternary Ammonium Compounds, Quats):** Utilized as disinfectants and sanitizers across dairy, food, beverage, and pharmaceutical industries.
58. **Sodium Benzoate:** Employed as a preservative in food and beverage industries, and occasionally in pharmaceutical formulations.
59. **Sodium Carbonate (Soda Ash, Washing Soda):** Used for cleaning and water softening in dairy, food, beverage, and pharmaceutical industries.
60. **Sodium Chloride (Table Salt, NaCl):** A fundamental ingredient in the food and beverage industries. Its antimicrobial properties are occasionally utilized in dairy and pharma sectors for preservation or as a part of formulations.
61. **Sodium Chlorite (NaClO₂):** Utilized as a disinfectant and bleach in various industries, including food and beverage. Its antimicrobial properties may also be utilized in the dairy and pharma sectors.
62. **Sodium Hydroxide (Caustic Soda, Lye, NaOH):** A strong alkaline compound used for cleaning and sanitization in dairy, food, beverage, and pharma industries due to its ability to break down organic materials.
63. **Sodium Hypochlorite (Bleach, NaClO):** A common disinfectant and bleach used across dairy, food, beverage, and pharma industries for sanitization and cleaning purposes.
64. **Sodium Nitrate (Chile Saltpeter, NaNO₃):** Employed as a preservative and color fixative in the food and beverage industries. It's not typically used in dairy or pharma.
65. **Sulfites:** Used as preservatives in the food and beverage industry, especially in winemaking. They are not commonly used in dairy or pharma.
66. **Sulfur Dioxide (SO₂):** Utilized as a preservative and antioxidant in the food and beverage industries, especially in winemaking. Not typically used in dairy or pharma.
67. **Sulfuric Acid (H₂SO₄, Oil of Vitriol):** Employed in cleaning and pH adjustment in dairy, food, beverage, and pharma industries.
68. **Triclosan:** An antibacterial and antifungal agent used in personal care products, sometimes used in sanitization within the food, beverage, and pharma industries.
69. **Lecithin:** Utilized as an emulsifier in the food, beverage, and pharmaceutical industries, aiding in the mixing of ingredients that would otherwise separate, such as oil and water.

References

Sources include:

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The data and recommendations presented in this Guide are based on publicly available sources, laboratory tests, and industry standards, which may not cover all possible scenarios, chemicals, and material combinations encountered in the field. Therefore, it is crucial that users of this Guide perform their own due diligence, including but not limited to, conducting in-field testing under actual service conditions to determine the suitability of materials for their specific applications.

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