

Oils, Detergents
and
Maintenance Specialties

OILS, DETERGENTS
and
MAINTENANCE
SPECIALTIES

Volume 2
FORMULARY

by

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Soap and Related Industries*



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chapter 1

AEROSOLS

The aerosol idea has caught on all over the world. It has been predicted that by 1969, there would be 2.2 billion units of non-food aerosols sold.¹

Hair spray holds the record over all other aerosols. Its sales which in 1958 amounted to only 92.5 million, reached 270.2 million units in 1965 (Table 1:1).

The totals given in Table 1:1 include figures for Canada, but the Chemical Specialties Manufacturers Association estimates that a total of 1,365 billion units would be needed to include the output of companies that did not report for their survey.²

In foreign countries the aerosol industry is growing at a greater pace than in the United States. Although they do not equal our production, it can safely be said that the overseas production is rapidly accelerating. The latest compilation shows that room deodorants are now outranked by paints, shaving lather, and starches in that order.

A summary of the production of aerosols in foreign countries is given in Table 1:2.³ The big sellers in many of the countries listed are hair sprays, insecticides, and room deodorants.

Hydrocarbon Propellents for Aerosol

There are many desirable features that make the hydrocarbons attractive propellents for aerosol dispensers.⁴ They are immiscible with water, and lighter than water, which gives them a dispensing advantage in three-phase aerosol systems. As they are non-ionic they do not hydrolyze, and do not corrode. Because of their low specific gravity, the filler receives a relatively large volume to the purchased pound ; or, in other words, a relatively small weight of hydrocarbon propellant is necessary to give sufficient thrust.

TABLE 1:1
DISTRIBUTION OF USE OF AEROSOLS^a

<i>Products</i>	<i>Millions of Units*</i>
INSECT SPRAYS	
Space insecticides	24.7
Residual insecticides (all types except pet products ; includes mothproofers)	17.1
COATINGS AND FINISHES	
All types (pigmented, metallic, clear, protective, decorative, and the like)	139.8
HOUSEHOLD PRODUCTS	
Room deodorants (excludes medicinal)	54.9
Cleaners (all types)	70.3
Shoe dyes, polishes, and leather dressings	7.3
Waxes and polishes (household)	17.7
Starches and laundry products	103.9
Other household products	20.2
PERSONAL PRODUCTS	
Shaving lather	104.4
Hair sprays and dressings	270.2
Medicinals and pharmaceuticals	
Ethical items	14.5
Proprietary items	14.1
Colognes and perfumes	47.6
Other personal products	76.1
MISCELLANEOUS	
Veterinary and pet products	6.5
Automotive, all types (waxes, polishes, deicers, engine- starting fluids, tire inflators, and the like)	28.7
Oils, greases, lubricants, mold releases, and solvents	10.1
Food products, all types	21.5
Other miscellaneous products	4.8
Total of categories too revealing to be released	20.4
Total	1075.1

^aTotals include Canadian production of 61,914,117 units.
Source : Chemical Specialties Manufacturers Asssocation.

Butane or propane or mixtures of the two, will produce excellent aerosols, but because of their flammability, they are not generally practical in formulations requiring a high percentage of propellant.⁵ During World War II, however, when dichlorodifluoromethane (Propellant 12) was in short supply, hydrocarbons were proposed as a diluent. The limits of flammability were determined by the Bureau

of Mines. It was found that approximately 25% by volume could be substituted. This mixture was proposed but not used.

Pentane has been used in much the same way as trichlorofluoromethane (Propellent 11) to reduce the pressure of the propellent. The finished formulation was not flammable. A second use of the hydrocarbon propellents is in the formulation containing a relatively small amount of propellent and a high percentage of water.

TABLE 1:2
FOREIGN PRODUCTION OF AEROSOLS

	<i>Million Units</i>				
	1964	1965	% Gain over 1964	Expected 1966	% Gain over 1965
France	—	150	25	180	—
Great Britain	—	135	17.4	148	9.6
Japan	—	117	20.6	141	—
Italy	—	80	none	85	6.25
Australia & New Zealand	32	36	—	39	8.3
Argentina	5	7	—	9	—
Colombia	0.09	0.2	—	0.5	—
Mexico	—	6.5	18.1	8.0	—

In some formulations the propellent is carried in the dispersed phase and in others it exists as a floating layer. The low density of the hydrocarbon is a distinct advantage in the three-phase aerosols.⁶ The curved dip tube can extend to the bottom of the container without danger of ejecting the propellent.

Hydrocarbons can be used in the non-foaming propellent emulsions where the proportion of water is high enough to minimize the flammability.

The first commercially produced low-pressure aerosol was the JET formula of Airosol Inc., which employed pentane up to a point below flammability as part of the propellent, as follows :

Pyrethrum (20%)	0.5
Piperonyl Butoxide	1.0
DDT	2.0
Chlordan	1.0
Soltrol 130 (Phillips)	5.5
<i>n</i> -Pentane	12.0
Propellent 11	39.0
Propellent 12	39.0
	100.0

Formulations that contain large amounts of water and relatively small amounts of propellant are well adapted to the use of hydrocarbon propellents. Shaving cream, shampoos, cold cream, hair conditioner, hand cleaners, and rug cleaners belong to the foam-producing type in which some propellant is dissolved in the dispersed phase. See *Waterless Hand Cleaner*, No. 2.

Many other propellents are used in aerosols, *e.g.*, carbon dioxide, nitrogen, nitrous oxide, isobutane, isopentane, etc.

Loading of Aerosols

The loading of aerosols has become big business. There are many loaders who have acquired experience in many fields. They have the proper equipment and facilities to do the job.

It would be foolhardy for a small manufacturer to go into such a business without adequate experience. The advice of this author is that if one does wish to enter this business, one must confine his activity to compounding the concentrate, whatever it may be, and leave the packaging of the aerosol to the experienced packer. In this way, he can avoid tying up his own capital for a costly installation. The manufacturer of the base can in a measure control the secret of a proprietary compound, perhaps save a little money by compounding his own concentrate, and have the advantage of an experienced aerosol loader to pack it. Lastly, such procedure will avoid the use of hydrocarbon propellents in applications that might result in products hazardous to consumers.

CLEANERS

WATERLESS HAND CLEANERS

No. 1 (Pennsalt)

Concentrate :

Water	67.5
Butyl Cellosolve	2.0
Nonic 300 ¹	20.0
Deodorized kerosine	9.0
Lanogene 41 ²	1.3
Perfume (GD V 4903) ³	0.2

100.0

Fill :

85% Concentrate ; 15% $\left\{ \begin{array}{l} \text{Isotron 12 (40)} \\ \text{Isotron 114 (60)} \end{array} \right.$

1. Pennsalt Chemical Co. 2. Robinson-Wagner 3. Givaudan-Delawanna, Inc.

2-oz lacquer-lined cans⁴
Clayton M-110 Foam Valve

No. 2

Concentrate :

Triethanolamine	2.40%
Oleic Acid	9.70
Monoethanolamine	1.00
Tergitol#4	2.00
Liquid Lanolin fraction	0.80
Propylene Glycol	4.00
Deo-Base	12.20
Distilled Water	67.90
	<hr/>
	100.00%

Fill :

90% Concentrate
10% Propellant hydrocarbon

OVEN CLEANERS

Aerosol formulations for cleaning ovens are described variously as mixtures of solvents and surface-active agents, or of solvents and cleaning additives plus thickening agents to prevent excessive running. Generally these formulations are closely allied to paint removers. The following is an illustration :

No. 1

(General Chemical Div., Allied Chemical Corp.)

	<i>Wt. %</i>
Crude scale wax	2.0
Ethyl cellulose T 100	2.0
Methanol	9.1
Cellulose acetate	9.6
Trichloroethylene	13.3
Methylene chloride	39.0
Genetron 12	25.0
	<hr/>
	100.0 %

The primary objection to such aerosol formulations is their failure to remove burnt-on food from the surfaces of the oven.

⁴ Peerless Aluminium Can Co.

They function primarily as degreasers. Points in favor of aerosol oven cleaners are greater safety, faster action, and greater convenience as compared with the less expensive paste-type non-aerosol products.⁷

No. 2
(USP 3 031 408-9)

This cleaner consists of 25–75% of volatile propellant, dissolved in 75–25% of a cleansing concentrate, consisting of :

1. 1–10% of caustic soda or caustic potash
2. 4–60% by weight of an alcoholic mixture of solvent which contains 4–20% of aliphatic alcohol (1 or 2 C) ; balance is glycol with 2–20 C atoms
3. A flow-retarder, consisting of 0.2–2% of ethyl cellulose.

No. 3
(Dow)

Dow Chemical Company's 9-ounce Aerosol Oven Cleaner contains sodium silicate, alkanolamine, methylene chloride, and ammonia.

The American Gas Association has some qualms about the use of aerosol oven cleaners, because, reportedly, the cleaners corrode the copper capillary bulb or tubing that controls the thermostats in the oven. The labels on some cleaners, warn against use of the cleaners on copper. It is doubtful, however, that many householders know whether their ovens have copper capillaries.⁸

The Aerosol Scientific Committee of the Chemical Specialities Manufacturers Association suggests that the aerosols may not be entirely to blame, because some conventionally packaged cleaners that are strongly alkaline may also corrode.

SPOT REMOVERS

No. 1

Chlorothene ¹	75
Propellent 12	25

Use: To clean small motors, typewriters, business machines ; also many types of soil from garments.

No. 2

Chlorothene ¹	65
Perchloroethylene	5
Isopropanol	5
Propellent 12	25

Use : To remove water-insoluble spots from garments

For both :

Can : Standard tin-# or lacquer-lined

Valve : Triple-baked buna gasket

 FOR UPHOLSTERY*

No. 1

(General Chemical Div., Allied Chemical Corp.)

A foam-type aerosol for cleaning and revitalizing colors of rugs and upholstery.

	<i>Wt</i> %
Sarkosyl NL30 (Geigy)	28.704
Triethanolamine lauryl sulfate	4.485
Alrosol C (Geigy)	2.691
Perfume	0.300
Distilled water	53.820
Genetron 12/114a (60 : 40)	10.000

 100.000%
To Apply :

Shake container. Apply a small amount of foam, sufficient to cover the portion being cleaned, to a damp sponge and rub it into the fabric. The sponge should be rinsed periodically.

Packaging Suggestions :

Filling : Pressure fill only

Container : Internally lacquered, 0.5-lb ETP can

Valve : Foam type

Stability : No data available

Flammability : Non-flammable

Pressure : Approximately 49 psig at 70°F.

¹ Dow Chemical Co.'s inhibited 1, 1, 1-trichloroethane; much less toxic than other chlorinated solvents.

*Because of the great variety of textile compositions, one should always try any chemical compound on an inconspicuous portion of the material, to appraise its efficacy.

(ALSO FOR FINE FABRICS)

No. 2

(Union Carbide)

Alrosol C ¹	8.7%
Tergitol NPX ²	78.6
Ucon Propellent 12 ²	12.7
	<hr/>
	100.0%

Pressure : 40 psig**Package Components :***Can* : 16-Oz Continental, $\frac{1}{2}$ -lb tinplate, unlined*Valve* : Aerosol Research K38X, Buna, .020-inch*Button* : K4X*Dip Tube* : None ; discharge downward.**Storage Data :**

6 mos/100°F : Satisfactory

18 mos/70°F : Satisfactory

PRECAUTIONARY LABEL

Avoid contact with the eyes ; if any should enter the eye, wash thoroughly with water for 15 minutes and call a physician.

FOR WALLS

(General Chemical Div., Allied Chemical Corp.)

	<i>Wt %</i>
Tergitol NPX	3.04
Nacconol NRSF	1.42
Tetrasodium pyrophosphate	0.95
Carbitol solvent	3.80
Distilled water	85.79
Genetron 12/114 (30 : 70)	5.00
	<hr/>
	100.00

To Apply :

Shake container before use and hold valve orifice 6-8 inches from surface to be cleaned. Allow foam to remain for a few minutes ; wipe away with a damp cloth or sponge.

Packaging Suggestions :*Filling* : Pressure fill

1 Geigy 2 UCCC

Container : Plastic coated bottle, or lacquered 1-lb tinplate can

Valve : Spray type with three-phase actuator

Flammability : Non-flammable

Pressure : Approximately 40 psig/70°F

FOR WINDOWS
No. 1 (UCCC)

	<i>Wt %</i>
Tergitol NPX	0.30
Ammonia (28%)	1.00
Isopropanol	35.00
Deionized water	59.65
Perfume	0.05
Ucon Propellant 12/11 (50:50)	4.00
	<hr/>
	100.00

Packaging Components :

Container : Crown 6-oz, $\frac{1}{2}$ -pound tin plate, phenolic lacquer lining

Valve : V. C. A. 10-in. body orifice, .030-in. stem orifice ; Nylon housing, neoprene gasket

Actuator : B9-MB

Storage Data : This formulation and package have been satisfactorily stored for 2 mos/130°F, 6 mos/100°F, and 1 yr/rm temp.

No. 2

(General Chemical Div., Allied Chemical Corp.)

This is a water-based aerosol for cleaning windows, mirrors and porcelain surfaces.

	<i>Wt %</i>
Triton X-155	0.08
Ultrawet K	0.08
Silicone 200, 10 cps	0.02
Isopropanol	9.82
Distilled water	86.00
Genetron 12/114a (30:70)	4.00
	<hr/>
	100.00

To Apply :

Shake container before use. Direct spray at surface to be cleaned. Wipe away foam with dry cloth or paper towel

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