



Material Safety Data Sheet Description and Explanation of Terms

Emergency Telephone Number

Medical (708) 920-1510 (24 hours)

General

The Material Safety Data Sheet (MSDS) has, over the years, become the major media for transmitting health and safety information on chemical products. It is therefore natural that it has been included in the new OSHA Hazard Communication Standard (29CFR 1910.1200) as the key document along with the container label to provide hazard information to employees and employers.

These new OSHA regulations require chemical manufacturers to evaluate each chemical produced to determine if it is hazardous. The definition of "hazardous" has been expanded from the usual "flammable, corrosive, oxidizer, explosive, toxic or highly toxic agents, carcinogen, etc." to include combustibles as well as irritants. Consequently, many products that had not previously been classified as "hazardous" now fall into this classification under OSHA.

The new regulations require chemical manufacturers and importers to prepare and distribute an MSDS for all hazardous chemicals and that each container of hazardous chemical leaving the workplace be labeled. In addition, the chemical manufacturer is to provide a copy of the MSDS to the purchaser at the time of shipment or before.

Nalco has established a computerized program to send MSDS's to each purchaser upon receipt of a first order after November 25, 1985. The MSDS will automatically be sent to the attention of the purchasing agent at the "ship to address." A revised MSDS will also be sent to that same address when a change has been made to the MSDS.

MSDS's will also continue to be available through your Nalco Sales Representative or upon request to Nalco.

The Nalco MSDS complies with all of the requirements of the OSHA regulation. In addition, it provides you with all of the important information regarding the safe handling of our products, recommended protection measures, toxicological data, and the status of our products under various federal and state environmental and safety regulations. In short, we have put all of this information into one document for your convenience and easy use.

Nalco, as part of our overall commitment to product safety, is providing MSDS's on all of our chemical products regardless of whether the product is hazardous or not. The OSHA regulations require an MSDS to be prepared only for certain hazardous chemicals.

This MSDS section description and explanation of terms is designed to assist your interpretation of the MSDS so that you may receive full value from the document.

Section 1 — Product Identification

This section identifies the Nalco product by Trade Name or Product Number. This is the same trade name or product number that will appear on the product container allowing you to match up the product label with the MSDS.

Nalco also provides a generic chemical description of all major ingredients, both hazardous and non-hazardous. This is designed to give your health and safety personnel information on the class of chemistry(s) in our product without compromising the proprietary nature of the formulation.

The third part of this section is the National Fire Protection Association (NFPA) 704M rating designation. This popular rating system is used to give you a quick summary of the hazards of the product regarding health, flammability, reactivity and other hazards. Based on NFPA definition, an organic product will always have a flammability rating of at least (1) with inorganics having a rating of (0).

Section 2 — Hazardous Ingredients

We have evaluated our formulations for hazardous properties and identify those chemical ingredients which we believe cause or contribute to the hazard. As required by OSHA, these substances are identified if they are present in quantities greater than 1%, or in the case of carcinogens, greater than 0.1%, or if our hazard evaluation determines a hazard exists at lower concentrations. The hazardous ingredients are identified by specific chemical name and their CAS number (the Chemical Abstract Service number for that specific chemical).

To assist your industrial hygiene and safety personnel, Nalco identifies general or relative concentration ranges into which the exact percentage of the hazardous ingredient falls. This should enable your safety professional to evaluate the need for air sampling, employee monitoring, or other protective measures. Since most of our product formulations are proprietary, exact percentages will be given only when there are no trade secret concerns.

In a few cases where disclosure of specific chemical name and CAS number of a hazardous ingredient would release trade secrets, we have identified the chemical as "proprietary" as permitted by the OSHA regulation. In the event of an injury or accident, procedures are established to communicate the specific identity to health professionals who may have need for this information. In all



cases, the hazard information and safe handling recommendations are provided.

Section 3 — Precautionary Label Information

The drum or product container is labeled showing product identity, health and safety precautions as well as other information on handling and use of the product. That portion of the label which covers health and safety precautions is included in this section of the MSDS. In this way, you can easily refer to what is shown on the drum label without actually seeing the container.

Empty drums or containers may contain residual product and should be treated in accordance with the label requirement unless the empty container has been properly reconditioned. By EPA Standards (RCRA - 40CFR 261.7), a container is considered to be "empty" when it contains: 1) no more than 1 inch (2.5 centimeters) of product, or 2) no more than 3% by weight of the total capacity of the container if the container is less than or equal to 110 gallons in size or 3) no more than 0.3% by weight if the container is greater than 110 gallons in size. Empty drums that formerly contained chemicals listed in 40CFR 261.33 (c) must be triple rinsed using a solvent capable of removing the commercial chemical to qualify as "empty." Quantities of chemical greater than those indicated above which remain in the container are considered "wastes" when disposing of the container and appropriate RCRA regulations will apply.

Section 4 — First Aid Information

This section is designed to provide first aid information for the typical routes of exposure. The recommendations should be followed in all cases. If exposure causes unexpected or delayed effects, or severe reaction or injury, you should immediately consult a physician. Nalco ALERT, our medical emergency system (312/920-1510) should be called by the attending physician or others. Nalco ALERT operates 24 hours/day, seven days/week and is staffed by trained professionals.

Section 5 — Health Effects Information

This section describes the nature of the hazardous effect resulting from exposure if no first aid or improper first aid is given. The primary routes of exposure such as eye, skin, inhalation or ingestion are listed along with the effects that could occur from acute (single) exposure and chronic (repeated) exposure. The most likely exposure for our products would be due to unsafe practices which result in skin or eye contact from splashes during handling or feeding of the product.

Section 6 — Toxicology Information

Our health hazard evaluation for a product is based upon one or more of the following:

1. Results of toxicological tests conducted on a product,

2. Toxicological test results for a product ingredient(s),
3. Use of test results on a similar formulation or product and,
4. Use of information obtained in the open literature or supplier information for an ingredient(s).

In this Section, we present summaries of results of such toxicity tests. Explanations of results are given as needed. In most cases, results are those from acute, single exposure tests conducted with laboratory animals. As such, it should be remembered that the test procedures are quite stringent so that direct extrapolation of results to comparable human exposure must be viewed in that context.

The types of acute animal tests which are routinely conducted include oral, dermal and inhalation lethality studies and eye and skin irritancy studies. The lethality studies involve administration of the chemical to groups of test animals at various graded dose levels and recording mortality as one end point. The mortality-dose response allows for the calculation of the LD₅₀ or LC₅₀ by appropriate statistical methods. The LD₅₀ is that dose (amount) of chemical usually expressed in grams or milligrams per kilogram of animal body weight (g/kg or mg/kg) which would produce death in one half of a group of animals administered the chemical. The LC₅₀ is equivalent to LD₅₀ except it uses concentration rather than dose and is expressed as parts per million (ppm), milligrams per liter (mg/l) or milligrams per cubic meter of air (mg/M³). Oral and dermal tests use LD₅₀ while inhalation tests use LC₅₀. In both cases the smaller the value the more "toxic" the chemical.

Eye and skin irritancy tests utilize weighted numerical scores to assess degree of injury or irritation. In many instances, such numerical scores are also given descriptive ratings such as mildly or severely irritating. Most grading systems are modeled after those described by Draize, *et al* (referred to in the Bibliography, Section 17) in their original eye and skin irritation test procedures.

Results of skin sensitization tests conducted primarily on animals are presented. Human data is given if available. Generally, these test results will be for one or more chemicals in a formulation rather than the formulation itself.

When available and applicable, results of tests conducted to assess hazards other than lethality, will be provided in this Section under — "other toxicity results" and "chronic studies." These types of tests include life-time cancer studies, reproduction tests, and tests designed to uncover birth defects (teratology studies). These tests are usually conducted on individual chemical(s) rather than on formulated products.

Other short-term bioassays for changes to genetic cells are run with bacterial and other cells. While these tests identify genetic changes in tissue, the usefulness of the information as a prediction of a similar effect to humans

continues to be a scientific uncertainty. If this data is available, it will be provided in this section.

Since OSHA has broadened the criteria for acute health hazards and since the numerical rating is not uniformly accepted by all governmental agencies and scientific bodies, we are including OSHA's definitions below:

Highly toxic substance is one having:

1. An oral LD₅₀ of 50 mg/kg or less.
2. A dermal LD₅₀ of 200 mg/kg or less.
3. An inhalation LC₅₀ of 200 ppm or less of gas or vapor, or 2 mg/l or less of mist, fume or dust.

A **toxic** substance is one having:

1. An oral LD₅₀ between 50 and 500 mg/kg.
2. A dermal LD₅₀ between 200 and 1000 mg/kg.
3. An inhalation LC₅₀ between 200 ppm, 2,000 ppm of gas or vapors, or between 2 and 20 mg/l of mist, fume or dust.

A **corrosive** substance is one which causes third degree burns and scar tissue from 4-hour skin contact to rabbits.

A **skin irritant** is one which causes redness and swelling which does not persist and results in a numerical score of 5 out of 8 in greater than 50% of the animals tested.

An **eye irritant** — under 1910.1200 an eye irritant is one which at a minimum results in a grade 2 redness and/or swelling of the conjunctiva in at least 4 of 6 test animals when tested by the methods described in 16CFR 1500.42 or other appropriate techniques. The maximum attainable score using the Draize procedure is 110 (80 for cornea, 10 for iris, and 20 for conjunctiva).

Use of a finite irritation index to assess a chemical's potential as an eye irritant, i.e. x/110 cannot always be made because of inconsistencies between OSHA's definition and the standard Draize scoring technique. In some instances, an index as low as 2.7/110 is sufficient to warrant the eye irritation hazard statement while in other instances an index of 6/110 would not. In cases of conflict such as this we will point them out on the MSDS.

This rating system tends to classify many substances as irritants which would not be so classified under other regulations.

Section 7 — Physical and Chemical Properties

To assess the physical hazards of our products, we perform appropriate tests using procedures recommended by the American Society for Testing and Materials (ASTM). Their procedure number is identified accordingly. The tests vary depending on the physical form and chemical nature of the product. These physical or chemical test results are one of the factors reviewed in determining the need for or type of subsequent toxicological testing. The results are also used to identify hazardous physical proper-

ties which require labeling according to the Department of Transportation (DOT) regulations or for waste classification for disposal under the Resource Conservation and Recovery Act (RCRA).

Section 8 — Fire and Explosion Information

If the product exhibits flammable characteristics, information is provided on the recommended method for fighting fire. Unusual fire or explosion hazards are also given. OSHA 29CFR 1910.1200 and the Department of Transportation (DOT) consider products with flash points of less than 100 degrees Fahrenheit (F) as flammable materials. Chemicals with flash points between 100 degrees F and 200 degrees F are classified as combustible. On the other hand, the Resource Conservation and Recovery Act (RCRA) — 40CFR 261 subpart C and D define those chemicals with flash points of 140 degrees F and below as ignitable.

Section 9 — Reactivity Information

The potential for our products to aggressively react with other commonly found chemicals or to decompose represents a special hazard. Information is provided on possible interaction with other chemicals as well as reaction of our products on commonly encountered materials of construction used for chemical and feeding handling systems.

Section 10 — Personal Protective Equipment

Handling chemicals such as attaching feed pumps or transferring chemicals from one container to another constitutes the most likely exposure to operating personnel.

Recommendations are provided to protect personnel handling product spills, the type of ventilation needed, and the protective equipment (respirator, gloves, goggles, etc.) that should be used. This is one of the most important sections of the MSDS and the overall hazard communication program and should be well understood and put in practice by operating personnel.

Section 11 — Spill and Disposal Information

The disposal of wastes generated at a facility is one of the biggest problems facing industry. This section provides information on how to handle and clean up product spills and guidance for proper disposal should our product be considered a "waste" intended for disposal.

Section 12 — Environmental Information

This section provides information useful for assessing environmental impact of products or product constituents. When available and where applicable, information on partition coefficients, Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD) is presented.

Results of acute aquatic bioassays are presented. These bioassays, usually conducted on rainbow trout and bluegill sunfish are useful in assessing potential for adverse effects on aquatic vertebrates. Results are usually expressed as 96-hour LC₅₀ values in milligrams per liter water (mg/l) or parts per million (ppm). The LC₅₀ is the concentration which is lethal to 50% of a group of fish exposed for the time period indicated. It is synonymous with the term TL₅₀ (the concentration which would result in the survival of 50% of a given test group). In many instances, 24 and 48 hours LC₅₀ values are given. When applicable, a 96-hour, no-observed effect concentration is presented based upon lack of adverse effects and mortality.

While we know of no published list which ascribes a descriptive rating to LC₅₀ values, listed below are ratings we use as internal guidelines:

96-Hour LC ₅₀	Rating
<1.0 ppm	Extremely toxic
>1.0<5.0	Highly toxic
>5<10.0	Toxic
>10<100	Moderately toxic
>100<1000	Slightly toxic
>1000	Essentially non-toxic

Section 13 — Transportation Information

All hazardous chemicals are subject to regulation by the Department of Transportation (DOT). Section 13 identifies the DOT proper shipping name and hazard class for the product, if any. This name will appear on all shipping documents. Many times the name will reflect the hazard and not necessarily the exact chemical name identified in Section 2. DOT hazard classifications are not always in agreement with those of OSHA.

Section 14 — Regulatory Information

Today chemical products are regulated from the time they are manufactured, during use, should any environmental release occur, and when the material is finally ready for disposal. Section 14 provides information on the status of our products under the various federal and state regulations that may govern its manufacture, use or disposal. Specifically, under the OSHA Hazard Communication Rule 29CFR 1910.1200, the reason for classifying the product as being hazardous is provided. A "hazardous classification" is triggered by such things as 1) being combustible (flash point 100–200 degrees F), 2) being flammable (flash point less than 100 degrees F), 3) being a skin or an eye irritant, 4) presenting chronic health hazards such as liver damage, nerve damage, etc., 5) listed on the National Toxicology Program (NTP) Annual Report on Carcinogens or found to be a potential carcinogen by the International Agency for Research on Cancer (IARC), 6) or OSHA having an established workplace exposure limit or recommended limits. Threshold Limit Value (TLV) can be

established by either OSHA [OSHA uses the term Permissible Exposure Limit (PEL)], the American Conference of Governmental Industrial Hygienists (ACGIH) or by the chemical manufacturer.

Three categories of TLV's are recognized: 1) the Threshold Limit Value-Time Weighted Average (TLV-TWA) — the time-weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed day after day, without adverse effect, 2) Threshold Limit Value-Short Term Exposure Limit (TLV-STEL) — the concentration to which workers can be exposed continuously for a short period of time without suffering from a) irritation, b) chronic or irreversible tissue damage, or c) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded. A STEL is defined as a 15-minute time-weighted average exposure which should not be exceeded at any time during a workday even if the 8-hour time-weighted average is within the TLV and 4) Threshold Limit Value-Ceiling (TLV-C) — the concentration that should not be exceeded during any part of the working exposure.

We frequently receive questions on the status of our products under other federal environmental laws. For this reason, when applicable, we are providing information on product status under major laws.

1. **OSHA Hazard Communication 29CFR 1910.1200** — These regulations have been discussed previously in this document.
2. **Other OSHA Regulations** — OSHA has established specific regulations for various chemicals. If these regulations apply to our products, the regulation and its applicability is identified.
3. **CERCLA/Superfund 40CFR 117.302** — This Law requires the reporting of spills of certain chemicals when the quantity spilled exceeds certain specified amounts. If Nalco's product contains one of the specified chemicals, the quantity of Nalco product, which must be spilled before the notification requirement is "triggered," is calculated and the chemical is identified.
4. **Toxic Substances Control Act (TSCA)** — Only substances that are included on the TSCA 8(b) Inventory list, have been exempted, or have been cleared through a TSCA premanufacturing notification (PMN) can be legally manufactured and used in the U.S.A. As other sections of TSCA are implemented, other regulations may apply and will be addressed.



5. If our product requires registration or governmental clearances for use in intended applications (examples, pesticides under FIFRA, food additives under FDA, drinking water additives, fuel additives under EPA, use in meat and poultry plants under USDA) the status under the appropriate law is indicated.

6. Resource Conservation and Recovery Act (RCRA) — Our products as sold are not wastes and therefore not covered by this Act. However, should someone decide to declare them a waste and discard them, then they must be evaluated to determine how RCRA might cover the waste. This information is provided on our products should they become "a waste." Please refer to comments in Section 3 of this document regarding empty containers.

7. The Federal Clean Air and Water Acts 40CFR 60 and 61 and 40CFR 401.15 and 116 contain sections which specifically list chemicals for which these regulations apply. If Nalco products contain as ingredients any of the chemicals listed under these sections, they will be identified. This will allow assessment of their impact, if any, on discharge or emission permits.

We also get similar questions regarding the status of our products under state regulations. State laws are becoming more common and it is difficult to cover all the specifics of each state law in this limited space. However, many states (such as Michigan) list those materials which they consider hazardous or use criteria for listing chemicals. Examples of these criteria are the established TLV's by OSHA or ACGIH or the presence of the chemical on a list such as the National Toxicology Program (NTP) Annual Report or International Agency for Research on Cancer (IARC) list for suspect carcinogens. We are identifying those chemicals for which there is an established TLV or that appear on the NTP or IARC lists.

Section 15 — Additional Information

There may be additional information available than what is covered in other sections affecting health, safety and regulation of our product. Section 15 provides space to present this additional information.

Section 16 — User's Responsibility

This section is designed to serve as a reminder that the information provided is of use only if it is transmitted to the persons who handle the product or work in locations where hazardous chemicals are used or stored. The information is developed based on recommended uses for our products. Other applications may warrant additional review.

Section 17 — Bibliography

In addition to this MSDS section description, we may find it of value to know the source material used in evaluating our products other than specific toxicity tests or physical/chemical tests we may have performed. The references below along with this document serve as a brief description of the hazard determination procedure we use in evaluating our products.

Typical Bibliographic Sources Used

Annual Report on Carcinogens, U.S. Department of Health and Human Services, Public Health Service, PB 33-135855, 1983.

Casarett and Doull's Toxicology, The Basic Science of Poisons, Doull, J., Klaassen, C. D., and Amdur, M. O., eds., Macmillan Publishing Company, Inc., N.Y., 2nd edition, 1980.

Chemical Hazards of the Workplace, Proctor, N. H., and Hughes, J. P., eds., J. P. Lipincott Company, N.Y., 1981.

Dangerous Properties of Industrial Materials, Sax, N. Irving, ed., Van Nostrand Reinhold Company, N.Y., 6th edition, 1984.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer, 1972-1977.

Patty's Industrial Hygiene and Toxicology, Clayton, G. D., Clayton, F. E., eds., John Wiley and Sons, N.Y., 3rd edition, Vol. 2 A-C, 1981.

Registry of Toxic Effects of Chemical Substances, U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, 1983 supplement of 1981-1982 edition, Vol. 1-3, OH, 1984.

Title 29 Code of Federal Regulations Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes, American Conference of Governmental Industrial Hygienists, OH.



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