



Material Safety Data Sheet

MSDS/SDS Number: 00000040MSDS
Latest Revision Date: May 18, 2009
Revision: A

SECTION 1 IDENTIFICATION OF THE SUBSTANCE OR PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name: Anti-NR2A (Rabbit Polyclonal IgG)
Catalogue Number(s): 07-632
Chemical Name: Aqueous solution of Glycerol, Trometamol (Tris), Sodium Chloride, Sodium Azide and Protein.
Synonyms: None
Intended Product Use: Cellular Research
Manufacturer/Distributor: Millipore Corporation (Corporate Headquarters) Millipore S.A.S. (European Headquarters)
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SECTION 2 HAZARDS IDENTIFICATION

GHS Hazard Class:  Eye Irritation: Category 2A

Acute Toxicity: Category 5 (oral)

Skin Irritation: Category 3

Signal Word and Hazard Statement: Warning: Causes serious eye irritation
Warning: May be harmful if swallowed
Warning: Causes mild skin irritation

EU Hazard Symbol Pictogram:



Xi: (R36/38)

SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

Identification of Dangerous Components: This product contains the substances listed below, which are defined as dangerous substances or hazardous chemicals as defined in European Community Directives 67/548/EEC or 1999/45/EC, and Hazard Communication Standard 29 CFR 1910.1200.

Dangerous Component	EINECS or ELINCS No.	CAS No.	Content (weight percent)	EU Hazard Symbol Letters*†	R Phrases** †
Glycerol:	200-289-5	56-81-5	30 %	N/A	N/A
Trometamol (Tris):	201-064-4	77-86-1	< 2 %	N/A	N/A
Sodium Chloride:	231-598-3	7647-14-5	< 1 %	N/A	N/A
Sodium Azide:	247-852-1	26628-22-8	< 0.1 %	T+ N	R28 R32 R50/53

Identification of Components Not Classified as Dangerous: This product contains the substances listed below, which are not defined as dangerous substances or hazardous chemicals as defined in European Community Directives 67/548/EEC or 1999/45/EC, and Hazard Communication Standard 29 CFR 1910.1200.

Non-Dangerous Component	EINECS or ELINCS No.	CAS No.	Content (weight percent)	EU Hazard Symbol Letters *	R Phrases**
Protein:	N/A	N/A	Proprietary	N/A	N/A
Water:	231-791-2	7732-18-5	< 65 %	N/A	N/A

* Symbol letters and categories of danger: **T+** = Very toxic, **T** = Toxic, **C** = Corrosive, **Xn** = Harmful, **Xi** = Irritant, **E** = Explosive, **F+** = Extremely flammable, **F** = Very flammable, **N** = Dangerous for the environment, **O** = Oxidising.

** The full text of each R phrase is listed in Section 2.

† Symbols letters and R Phrases are assigned to each dangerous component for the highest concentration range as defined in 67/548/EEC and 1999/45/EC.

SECTION 4 FIRST AID MEASURES

	Treatment Measures:	Symptoms of Exposure:
Contact with Eyes:	If the product contacts the eyes, promptly wash (irrigate) the eyes with large amounts of tepid water for at least 15 minutes, occasionally lifting the lower and upper lids. Seek medical attention immediately.	Possible eye irritation
Ingestion:	Seek medical attention immediately. Never give an unconscious person anything by mouth.	Possible gastrointestinal irritation causing nausea and vomiting.
Inhalation:	If a person inhales large amounts of the product move the exposed person to fresh air at once. If breathing is difficult or stops seek immediate medical attention.	Possible respiratory tract and mucous membrane irritation.

Skin Contact: If the product contacts the skin, immediately flush the contaminated skin with mild soap and water. If this chemical penetrates clothing immediately remove the clothing and flush the skin with water. Seek medical attention immediately. Possible skin irritation.

SECTION 5 FIRE FIGHTING MEASURES

Suitable Extinguishing Media: Use extinguishing media appropriate for the surrounding fire. This product is compatible with commercially available extinguishing media.

Special Exposure Hazards: Hazardous decomposition products that form when the substance or mixture burns

Special Protective Equipment for Firefighters: This product does not require the use of any additional fire fighting equipment beyond what is appropriate to the surrounding fire.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal Precautions: Wear chemical resistant boots, clothing, eye protection, and gloves to prevent skin contact. (See Section 8)

Small Spills: Identify the spilled material(s). Barricade the spill area and notify others in the surrounding areas. Control all sources of ignition if the substance is flammable. Don the appropriate personal protective equipment (See section 8). Control the movement of the spilled product (into drains, soil, across floors etc.) with absorbent spill materials. Collect contaminated spill material and place in container meeting appropriate U.N. packaging requirements. Decontaminate used equipment and affected spill area appropriately.

Large Spills: In addition to small spill precautions, determine personnel evacuation distances. Notify appropriate authorities if necessary.

Environmental Precautions: Collect and dispose of contaminated materials according to international, federal, state and local regulations. Keep away from surface and ground water, drains, and soil.

SECTION 7 HANDLING AND STORAGE

Handling: Seek appropriate training to safely handle this product under normal conditions. Use the recommended personal protective equipment (See Section 8) to prevent chemical exposures. Wash hands with soap and water before eating, drinking, or touching common items (phone, computer, etc.) to prevent cross contamination. Use this product with adequate ventilation. See product technical data sheet for details.

Storage: See product technical data sheet for details.

Specific use: See product technical data sheet for details.

SECTION 8 EXPOSURE CONTROL AND PERSONAL PROTECTION

Exposure Limit Values: OSHA PEL NIOSH REL ACGIH TLV Other

	Total Dust: 15 mg/m ³ (TWA); Respirable Fraction: 5 mg/m ³ (TWA)	Not Listed	10 mg/m ³	None
Glycerol				
Trometamol (Tris)	Not Listed	Not Listed	Not Listed	See Below
	Russia: OEL- STEL 5 mg/m ³ , JUN2003			
Sodium Chloride	Not Listed	Not Listed	Not Listed	None
	0.3 mg/m ³ as sodium azide (Ceiling)	0.1 ppm skin as HN ₃ , 0.3 mg/m ³ skin as NaN ₃ (Ceilings)	0.11 ppm as HN ₃ , 0.29 mg/m ³ as Na N ₃ (Ceilings), A4 Not classifiable as a human carcinogen.	See Below
Sodium Azide	0.1 ppm as hydrazoic acid (Ceiling)			
	Australia: TWA 0.1 ppm (0.3 mg/m ³), JAN1993			
	Belgium: STEL 0.11 ppm (0.3 mg/m ³), JAN1993			
	Finland: TWA 0.1 ppm (0.3 mg/m ³), STEL 0.3 ppm (0.9 mg/m ³), JAN1999			
	France: VME 0.1 mg/m ³ , VLE 0.3 mg/m ³ , Skin, FEB2006			
	Germany: MAK 0.2 mg/m ³ (inhalable), 2005			
	United Kingdom: TWA 0.1 mg/m ³ ; STEL 0.3 mg/m ³ (skin), 2005			

Normal Handling Conditions**Emergency Response Conditions**

Engineering Controls:	General room ventilation is adequate for the use of this product.	Provide negative pressure ventilation.
Respiratory Protection	Use appropriate respiratory protection.	Use appropriate respiratory protection.
Eye Protection:	Safety glasses with side shields.	Chemical splash goggles or other face protection as appropriate.
Skin Protection:	Laboratory coat, adequate chemical-resistant gloves.	Chemically resistant boots, clothes, and impermeable gloves as appropriate.
Environmental Exposure Controls:	Not available.	Not available.
Other Equipment:	Safety shower, eyewash stations, and hand washing equipment should be available close to the work area as needed.	

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear Colorless Liquid
Odor:	None
Odor Threshold:	Not Available
pH:	Not Available
Melting Point/Freezing point:	Not Available

Initial boiling point and boiling range:	Not Available	
Flash Point:	Not Available	
Evaporation Rate, 20 °C:	Not Available	
Flammability (Solid/Gas):	Not Available	
Explosive Limits:	UEL: Not Available	LEL: Not Available
Vapor Pressure:	Not Available	
Vapor Density, 20 °C:	Not Available	
Relative Density (Water = 1.0):	Not Available	
Solubility:	Not Available	
Partition coefficient (n-octanol/water):	Not Available	
Auto Ignition Temperature (ASTM D1929):	Not Available	
Decomposition temperature:	Not Available	
Oxidizing Properties:	Not Available	
Viscosity, centipoise:	Not Available	

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability:	Product is stable under normal operating conditions and use as described in the product technical data sheet.
Conditions to Avoid:	See product technical data sheet for details.
Incompatible Materials to Avoid:	Strong acids or bases, strong oxidizers, extreme temperatures, barium carbonate, trifluoroacetyl fluoride, chromyl chloride, benzoyl chloride, dimethyl sulfate, dibromomalononitrile, ammonium chloride, and trichloroacetonitrile.
Hazardous Decomposition Products:	Sodium azide forms explosion-sensitive materials with some metals such as lead, silver, mercury, and copper. Carbon disulfide and aqueous solutions of metal azides interact to produce metal azidodithioformates most of which are explosive, with varying degrees of power and sensitivity to shock or heat metal azides.

SECTION 11 TOXICOLOGICAL INFORMATION

Toxicology Data: Toxicological information for this product as a whole does not exist, below is data for the individual components.

Glycerol: RTECS #MA8050000

Trometamol: RTECS # TY2900000

Sodium Chloride: RTECS Number #VZ4725000

Sodium Azide: RTECS #VY8050000

	Toxicity Test	Exposure Route	Dose	Observed Effect
Acute Toxicity:	LD ₅₀ (Rat)	Oral	12,600 mg/kg	Behavioral: General anesthetic

Glycerol:				Behavioral: Muscle weakness Liver: Other changes ¹
	Lowest Published Toxic Dose (Human)	Oral	1,428 mg/kg	Behavioral: Headache Gastrointestinal: Nausea or vomiting ²
Trometamol (Tris):	LD ₅₀ (Rat)	Oral	5900 mg/kg	N/A ³
	LD ₁₀ (Rabbit)	Oral	1,000 mg/kg	Behavioral: Somnolence (General Depressed activity) Behavioral: Muscle Weakness Behavioral: Coma ⁴
Sodium Chloride:	LD ₅₀ (Rat)	Oral	3,000 mg/kg	N/A ⁵
Sodium Azide:	LC ₅₀ (Rat)	Inhalation	37 mg/m ³	Eye: Other eye effects Behavioral: Convulsions or effect on seizure threshold Lung, Thorax, or Respiration: Structural or functional change in trachea or bronchi ⁶
	LD ₁₀ (Human)	Oral	29 mg/kg	Brain and Coverings: Increased intracranial pressure Cardiac: Pulse rate decreased with fall in BP Lung, Thorax, or Respiration: Acute pulmonary edema ⁷
	LD ₅₀ (Rat)	Skin	50 mg/kg	N/A ³
	LD ₅₀ (Rabbit)	Skin	20 mg/kg	N/A ⁸
Skin Corrosion/Irritation:	Skin Irritation (Rabbit)	Skin	500 mg/24 Hours	Mild ⁹
Glycerol:				
Sodium Chloride:	Skin Irritation (Rabbit)	Skin	500 mg/24 Hours	Mild ¹⁰
Serious Eye Damage/Eye Irritation:	Eye Irritation (Rabbit)	Eye	500 mg/24 Hours	Mild ⁶
Glycerol:				
Sodium Chloride:	Eye Irritation (Rabbit)	Eye	100 mg/24 Hours	Moderate
Respiratory or Skin Sensitization:	Not Available			
Germ Cell Mutagenicity:	Not Available			
Reproductive Toxicity:	Not Available			
STOST-Single Exposure:	Not Available			

STOST-Repeated Exposure: Not Available

Aspiration Hazard: Not Available

Carcinogenicity: Carcinogenic information for this product as a whole does not exist, below is data for the individual components.

Research Agency:	OSHA:	NTP:	IARC:
Glycerol:	Not Listed	Not Listed	Not Listed
Trometamol (Tris):	Not Listed	Not Listed	Not Listed
Sodium Chloride:	Not Listed	Not Listed	Not Listed
Sodium Azide:	Not Listed	Not Listed	Not Listed

SECTION 12 ECOLOGICAL INFORMATION

Ecotoxicity: Ecotoxicity information for this product as a whole does not exist, below is data for the individual components.

Glycerol:

LC₅₀ Carassius Auratus 24 Hours 5,000,000 ug/L¹¹

LC₅₀ Leuciscus Idus Melanotus 48 Hours 10,000,000 ug/L¹²

LC₅₀ Oncorhynchus Mykiss 96 Hours 54.0 ml/L¹³

Trometamol (Tris):

No Response Selenastrum Capricornutum 72 Hours 200,000 ug/L¹⁴

No Response Selenastrum Capricornutum 72 Hours 300,000 ug/L¹⁴

Sodium Azide:

LC₅₀ Lepomis Macrochirus 24 Hours 2,100 ug/L¹⁵

LC₅₀ Oncorhynchus Mykiss 96 Hours 2,750 ug/L¹⁶

LC₅₀ Pimephales Promelas 96 Hours 5,460 ug/L¹⁷

Sodium Chloride:

LC₅₀ Carassius Auratus 24 Hours 9,750,000 ug/L¹⁸

LC₅₀ Poecilia Latipinna 48 Hours 16,595,000 ug/L¹⁹

LC₅₀ Lepomis Macrochirus 96 Hours 1,294,600 ug/L²⁰

Mobility: Terrestrial Fate: If released to soil, glycerin is expected to undergo rapid biodegradation under aerobic conditions²¹. Biodegradation under anaerobic conditions is also expected to occur^{22,23}. Based on an experimental log octanol/water partition coefficient of -1.76²⁴ and its water solubility, 1,220,000 mg/l at 5 deg C²⁵, soil adsorption coefficients for glycerin can be estimated at 3 and 2(SRC), respectively, using regression-derived equations²⁶.

Glycerol:

Aquatic Fate: If released to water, glycerin is expected to rapidly degrade under aerobic conditions¹⁴. Degradation is also likely in seawater²⁷ and under anaerobic conditions^{15,16}. Based on an experimental log octanol/water partition coefficient of -1.76¹⁵ and its water solubility, 1,220,000 mg/l at 5 deg C¹⁶, bioconcentration factors for glycerin can be estimated at 3 and 0.2(SRC), respectively, using regression-derived equations¹⁷. The magnitude of these values indicate that bioconcentration in fish and aquatic organisms is not likely to occur to a significant extent.

Atmospheric Fate: If released to the atmosphere, glycerin may undergo a gas-phase oxidation with photochemically produced hydroxyl radicals. An estimated rate constant for this reaction of 1.7×10^{-11} cu-cm/molec-sec at 25 deg C²⁸ translates to an atmospheric half-life of 33 hrs(SRC) using an average atmospheric hydroxyl radical concn of 5×10^5 molec/cu-cm²⁹. The water solubility of glycerin, 1,220,000 mg/l at 5 deg C¹⁸, indicates that it may also undergo atmospheric removal by wet deposition processes(SRC).

Trometamol (Tris): Terrestrial Fate: Based on a classification scheme³⁰, an estimated Koc value of 1(SRC), determined from a structure estimation method³¹, indicates that Trometamol is expected to have very high mobility in soil(SRC). However, Trometamol has a pKa of 8.07³² and should exist partially as a cation under environmental conditions (pH 5-9)(SRC).

Aquatic Fate: Based on a classification scheme²³, an estimated Koc value of 1(SRC), determined from a structure estimation method²⁴, indicates that Trometamol is not expected to adsorb to suspended solids and sediment(SRC). However, Trometamol has a pKa of 8.07²⁵ and should exist partially as a cation under environmental conditions (pH 5-9)(SRC). As a result, Trometamol may have greater adsorption to suspended solids and sediment than its estimated Koc value indicates(SRC). Volatilization from water is not expected³³ since cations do not volatilize and the estimated Henry's Law constant for the neutral species (free base) of Trometamol is 8.7×10^{-13} atm cu m/mol(SRC), calculated using a fragment constant estimation method³⁴. According to a classification scheme³⁵, an estimated BCF of 3(SRC), from an estimated log Kow of -1.56³⁶ and a regression-derived equation²⁹, suggests the potential for bioconcentration in aquatic organisms is low(SRC).

Atmospheric Fate: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere³⁷, Trometamol, which has an estimated vapor pressure of 2.2×10^{-5} mm Hg at 25 deg C(SRC), determined from a fragment constant method³⁸, is expected to exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase Trometamol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 11 hours(SRC), calculated from its rate constant of 3.4×10^{-11} cu cm/molecule-sec at 25 deg C(SRC) that was derived using a structure estimation method³⁹. Particulate-phase Trometamol is removed from the atmosphere by wet and dry deposition(SRC). Trometamol does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight²⁶.

Sodium Azide: Aquatic Fate: Photolysis of sodium azide may result in metal nitrides initially, with the eventual formation of the free metal and nitrogen gas⁴⁰.

Persistence and Degradation: Environmental Abiotic Degradation: An estimated rate constant for the vapor-phase reaction of glycerin with photochemically produced hydroxyl radicals of 1.7×10^{-11} cu cm/molec-sec at 25 deg C²¹ translates to an atmospheric half-life of 33 hr(SRC) using an average atmospheric hydroxyl radical concentration of 5×10^5 molec/cu cm²².

Glycerol:

Trometamol (Tris): Environmental Biodegradation: Tromethamine yielded no oxygen uptake when incubated with pure cultures of different strains of bacteria⁴¹, indicating biodegradation may be slow in the environment.

Sodium Azide: Environmental Abiotic Degradation: The dissipation of azides in soil is not by microbial action but is strictly a chemical process accelerated by

increasing acidity and elevated temperatures. Azides rapidly dissipate in soils by oxidation or by reaction of hydrozoic acid with soil organic acids to form azides of these acids which decompose by the Curtius rearrangement⁴².

Bio Accumulative Potential: Environmental Bioconcentration: Based on an experimental log octanol/water partition coefficient of -1.76¹⁷ and its water solubility, 1,220,000 mg/l at 5 deg C¹⁸, bioconcentration factors for glycerin can be estimated at 3 and 0.2(SRC), respectively, using regression-derived equations¹⁹. The magnitude of these values indicate that bioconcentration of glycerin in fish and aquatic organisms will not be significant(SRC).

Glycerol:

Trometamol (Tris): Environmental Bioconcentration: An estimated BCF of 3 was calculated for tromethamine (SRC), using an estimated log Kow of -1.56⁴³ and a regression-derived equation²⁹. According to a classification scheme⁴⁴, this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

Results of PBT Assessment: Not Available

Other adverse effects: None known.

SECTION 13 DISPOSAL INFORMATION

Substance: Dispose of unused contents in accordance with international, federal, state, and local regulations.

Contaminated Packaging: Dispose of container in accordance with international, federal, state and local requirements.

SECTION 14 TRANSPORTATION INFORMATION

UN Number: Not Listed

Class: Not Listed

Proper Shipping Name: Not Listed

Packing Group: Not Listed

Marine Pollutant: Not Listed

Other Applicable Information: None

SECTION 15 REGULATORY INFORMATION

Australia: Hazchem Code: Not Listed

Poisons Schedule Number: Not Listed

California: Proposition 65 Listed: Not Listed

Canada: WHMIS: D2B

European Union: Indication if Chemical Safety Assessment has been carried out for the substance or substances in the preparation: Not Required

Category of danger: Xi: Irritant

		T+: Very Toxic
		N: Dangerous for the Environment
	Risk phrases:	R28: Very toxic if swallowed. R32: Contact with acids liberates very toxic gas. R36: Irritating to eyes. R36/38: Irritating to eyes and skin. R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
	Safety phrases:	S28: After contact with skin, wash immediately with plenty of soap and tepid water. S45: In case of accident or if you feel unwell, seek medical advice immediately. S60: This material and its container must be disposed of as hazardous waste. S61: Avoid release to the environment. Refer to special instructions/safety data sheets. S36/37/39: Wear suitable protective clothing, gloves and eye/face protection.
	OECD/High Production Volume (HPV) chemicals:	Not Listed
	RoHS:	Not Listed
Japan:	Poisonous and Deleterious Substances Control Law:	Not Listed
United Kingdom	Control of Substances Hazardous to Health Regulations 2002 (COSHH) Rating:	Not Listed

SECTION 16 ADDITIONAL INFORMATION

Training Advice: Seek effective chemical handling training to reduce the hazards associated with this product prior to use.

Technical Contact: <http://www.millipore.com/support>

Abbreviations Used

ACGIH	American Conference of Government Industrial Hygienists
ADR	European agreement on the international carriage of dangerous goods on road
CAS	Chemical Abstract Service
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
EPA	United States Environmental Protection Agency
IARC	International Agency for Research in Cancer.
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization

IMDG	Regulations regarding the transportation of dangerous goods on ocean-going vessels issued by the International Maritime Organization.
LC ₅₀	Lethal Concentration 50% is the concentration of a chemical which kills 50% of a sample population
LD ₅₀	Lethal Dose 50% is the dose of a chemical which kills 50% of a sample population.
LDLo	Lowest observed lethal dose
LEL	Lower Explosive Limit
MSFU	Manufacture, Formulation, Supply and Use (Section 13)
NIOSH	National Institute of Occupational Safety and Health (US)
NTP	National Toxicology Program (US)
OSHA	United States Occupational Safety and Health Administration
RID	International regulations concerning the international carriage of dangerous goods by rail.
RTECS	Registry of Toxic Effects of Chemical Substances (US)
STOST	Specific Target Organ Systemic Toxicity
UEL	Upper Explosive Limit
WHMIS	Workplace Hazardous Materials Information System (Canada)

This safety data sheet has been prepared to comply with the requirements of the European Union regulation on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) 1906/2006 and ANSI standard Z400.1-1998.

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¹ Federation Proceedings, Federation of American Societies for Experimental Biology. (Bethesda, MD) V.1-46, 1942-87.

² "Toxicology of Drugs and Chemicals," Deichmann, W.B., New York, Academic Press, Inc., 1969.

³ Bollettino Chimico Farmaceutico. Vol. 110, Pg. 653, 1971.

⁴ Journal of Industrial Hygiene and Toxicology. Vol. 22, Pg. 315, 1940.

⁵ Vrednie chemicheskije veshchestva. Neorganicheskie soedinenia elementov I-IV groopp (Hazardous substances. Inorganic substances containing I-IV group elements), Filov V.A., *Chimia*, 1988.

⁶ "Spravochnik po Toksikologii i Gigienicheskim Normativam (PDK) Potentsial'no Opasnykh Khimicheskikh Veshchestv" Kushneva, V.S., and R.B. Gorshkova, eds. 46, Zhivopisnaya St., 123182, Moscow, Russia, Izdat 1999.

⁷ Medical Toxicology and Adverse Drug Experience. (Adis International Ltd., Private Bag 65901, Mairangi Bay, Auckland 10, N.Z.) V.4- 1989.

⁸ Farm Chemicals Handbook. (Meister Pub., 37841 Euclid Ave., Willoughy, OH 44094).

⁹ "Prehled Prumyslove Toxikologie; Organicke Latky," Marhold, J., Prague, Czechoslovakia, Avicenum, 1986.

¹⁰ Toxicology and Applied Pharmacology. Academic Press, Inc., 1 E. First St., Duluth, MN 55802 V.1- 1959.

¹¹ Bridie, A.L., C.J.M. Wolff, and M. Winter, The Acute Toxicity of Some Petrochemicals to Goldfish, *Water Res.* 13(7):623-626 (OECDG Data File), 1979.

¹² Juhnke, I., and D. Luedemann, Results of the Investigation of 200 Chemical Compounds for Acute Fish Toxicity with the Golden Orfe Test (Ergebnisse der Untersuchung von 200 Chemischen Verbindungen auf Akute Fischtoxizitat mit dem Goldorfe Test), *Z.Wasser-Abwasser-Forsch.* 11(5):161-164 (GER) (ENG TRANSL) (OECDG Data File), 1978.

¹³ Mayer, F.L.Jr., and M.R. Ellersieck, Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals, *Resour.Publ.No.160*, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC :505 p. (USGS Data File), 1986.

¹⁴ Adams, N., K.H. Goulding, and A.J. Dobbs, Toxicity of Eight Water-Soluble Organic Chemicals to *Selenastrum capricornutum*: A Study of Methods for Calculating Toxic Values Using Different Growth Parameters, *Arch. Environ. Contam. Toxicol.* 14(3):333-345, 1985.

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- ¹⁵ Mayer, F.L.Jr., and M.R. Ellersieck, Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals, Resour.Publ.No.160, U.S.Dep.Interior, Fish Wildl.Serv., Washington, DC :505 p. (USGS Data File), 1986.
- ¹⁶ Klaverkamp, J.F., A. Kenney, S.E. Harrison, and R. Danell, An Evaluation of Phenol and Sodium Azide as Reference Toxicants in Rainbow Trout, In: Proc.2nd Annual Aquatic Toxicity Workshop, 1975, Ontario Ministry of the Environ., Freshwater Inst., Winnipeg, Manitoba, Canada :73-92, 1975.
- ¹⁷ Geiger, D.L., L.T. Brooke, and D.J. Call, Acute Toxicities of Organic Chemicals to Fathead Minnows (*Pimephales promelas*), Ctr.for Lake Superior Environ.Stud., Univ.of Wisconsin-Superior, Superior, WI 5:332 p., 1990.
- ¹⁸ Adelman, I.R.Jr., Standard Test Fish Development. Part I. Fathead Minnows (*Pimephales promelas*) and Goldfish (*Carassius auratus*) as Standard Fish in, EPA-600/3-76-061A, U.S.EPA, Duluth, MN :77 p, 1976.
- ¹⁹ Dowden, B.F., and H.J. Bennett, Toxicity of Selected Chemicals to Certain Animals, J.Water Pollut.Control Fed. 37(9):1308-1316, 1965.
- ²⁰ Trama, F.B., The Acute Toxicity of Some Common Salts of Sodium, Potassium and Calcium to the Common Bluegill, Proc.Acad.Nat.Sci.Philadelphia 106:185-205, 1954.
- ²¹ Matsui S et al; Wat Sci Tech 20: 201-10 (1988).
- ²² Chou WL et al; Biotech Bioeng Symp 8: 391-414 (1979).
- ²³ Kazanskaya TB, Anyukhina YG; Mikrobiologiya 49: 240-3 (1980).
- ²⁴ Hansch C, Leo AJ; Medchem Project Issue No.26 Claremont,CA: Pomona College (1985).
- ²⁵ Yalkowsky SH et al; Arizona Data Base of Water Solubility (1987).
- ²⁶ Lyman WJ et al; Handbook of Chemical Property Estimation Methods NY: McGraw-Hill Chapt 4, 15 (1982).
- ²⁷ Takemoto S et al; Suishitsu Odaku Kenkyu 4: 80-94.
- ²⁸ Atkinson R; Chem Rev 85: 69-201 (1985).
- ²⁹ Atkinson R; J Chem Phys Ref Data Monograph 1 (1989).
- ³⁰ Swann RL et al; Res Rev 85: 17-28 (1983).
- ³¹ Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992).
- ³² Perrin DD; Dissociation Constants of Organic Bases in Aqueous Solution. IUPAC Chem Data Ser: Suppl 1972. London, England: Butterworth (1972).
- ³³ Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 4-9, 15-1 to 15-29 (1990).
- ³⁴ Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991).
- ³⁵ Franke C et al; Chemosphere 29: 1501-14 (1994).
- ³⁶ Meylan WM et al; Environ Toxicol Chem 18: 664-72 (1999).
- ³⁷ Bidleman T.F.; Environ Sci Technol 22: 361-367 (1988).
- ³⁸ Lyman WJ; p. 31 in Environmental Exposure From Chemicals Vol I, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985).
- ³⁹ Meylan WM, Howard PH; Chemosphere 26: 2293-99 (1993).
- ⁴⁰ USEPA; Chemical Hazard Information Profile: Sodium Azide p.242 (1977) EPA-560/11-80-011.
- ⁴¹ Kersters K, Deley J; Biochim Biophysica Acta 71: 311-331 (1963).
- ⁴² Weed Science Society of America. Herbicide Handbook. 5th ed. Champaign, Illinois: Weed Science Society of America, 1983., p. 440.
- ⁴³ Meylan WM, Howard PH; J Pharm Sci 84: 83-92 (1995).
- ⁴⁴ Franke C et al; Chemosphere 29: 1501-14 (1994).