T-2 **Trace Oxygen Sensor**

by AMI ADVANCED MICRO INSTRUMENTS INC

4SEN09-1

Safety Data Sheet 4SEN09-1-01

according to U.S. Code of Federal Regulations 29 CFR 1910, 1200, Hazard Communication.

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SECTION 1: Identification of the substance/mixture and the company/undertaking

1.1 Product Identifier

Product Identity	: Oxygen Sensor
Alternate Names	: Electrochemical Oxygen Sensors, T Series: T-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Intended use	: See Technical Data Sheet
Application Method	: See Technical Data Sheet

1.3 Details of the supplier of the Safety Data Sheet

Company Name	: Advanced Micro Instruments, Inc. (AMI) 18269 Gothard Street Huntington Beach, CA 92648 Phone: 714-848-5533 Fax: 714-848-4545 www.amio2.com

1.4 Emergency telephone number : Advanced Micro Instruments, Inc. (AMI): USA 1-714-848-5533

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Skin Corr. 1A;H314	: Causes severe skin burns and eye damage.
Eye Dam. 1;H318	: Causes serious eye damage.
Carc. 1A;H350	: May cause cancer.
Aquatic Acute 1;H400	: Very toxic to aquatic life

2.2 Label elements

The product is labeled as follows:

Danger

H314	: Causes severe skin burns and eye damage.
H318	: Causes serious eye damage.
H350	: May cause cancer.
H400	: Very toxic to aquatic life.

Prevention

P201	: Obtain special instructions before use.
P202	: Do not handle until all safety precautions have been read and understood.
P260	: Do not breathe mist / vapors / spray.
P262	: Do not get in eyes, on skin, or on clothing.
P264	: Wash thoroughly after handling.
P273	: Avoid release to the environment.
P280	: Wear protective gloves / eye protection / face protection.

Response

P301+301 IF SWALLOWED	: Immediately call a POISON CENTER or doctor / physician.
P303+361+353 IF ON SKIN (or hair)	: Remove / Take off immediately all contaminated clothing. Rinse skin with water or shower.
P304+340 IF INHALED	: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+351+338 IF IN EYES	: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do so, and continue rinsing.
P308+313 IF exposed or concerned	: Get medical advice or attention.
P310	: Immediately call a POISTON CENTER or doctor / physician.
P331	: DO NOT induce vomiting.
P363	: Wash contaminated clothing before reuse.
P391	: Collect spillage.

Storage
P405 : Store locked-up.

Disposal
P501 : Dispose of contents / container in accordance with local and/or national regulations

SECTION 3: Composition/information on ingredients

3.1 Substance

This product contains the following substances that present a hazard under the relevant State and Federal Hazardous Substances regulations.

Name	Product Identifier	Classification (GHS-US)
Acetic Acid ($HC_2H_3O_2$)	(CAS No) 64-19-7	Acute Tox. 4;H302 Skin Corr. 1A;H314
Sodium Hydroxide (NaOH)	(CAS No) 1310-73-2	Acute Tox. 4;H302 Skin Corr. 1A;H314
Perchloric Acid ($HClO_4$)	(CAS No) 7601-90-3	Skin Corr. 1A; H314 Eye Irrit. 2; H319
Lead (Pb)	(CAS No) 7439-92-1	Carc. 1A; H350 Aquatic Acute 1;H400

SECTION 4: First aid measures

4.1 Description of first-aid measures

General : In all case of doubt, or when symptons persist, seek immediate medical attention. Never give anything by mouth to an unconscious person.

Inhalation : Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give aritificial respiration. If the patient is unconscious, place in a recovery position and obtain immediate medical attention. Give nothing by mouth.

Eyes : Irrigate copiously with clean water for at least 15 minutes, holding the eyelids apart and seek medical attention.

Skin : Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleaner.

Ingestion : DO NOT induce vomiting. Rinse mouth and slowly drink several glasses of water. Call a physician. DO NOT give anything by mouth to an unconscious or convulsing person.

4.2 Most important symptoms and effects, both acute and delayed

Routes of Entry
Inhalation : Highly unlikely.
Ingestion : May be fatal if swallowed.
Skin : The electrolyte (potassium acetate) is corrosive; skin contact may cause irritation or severe chemical burns.
Eyes : The electrolyte (potassium acetate) is corrosive; eye contact may cause irritation or severe chemical burns.

Acute Effects : The electrolyte is harmful if swallowed, inhaled or absorbed though the skin. It is extremely destructive to tissue of the mucous membranes, stomach, mouth, upper respiratory tract, eyes and skin.

Signs and Symptoms of Exposure : Contact of electrolyte with skin or eyes will cause a burning sensation and/or feel soapy or slippery to touch. Other symptoms of exposure to lead include loss of sleep, loss of appetite, metallic taste and fatigue. For additional exposure information refer to 29 CFR 1910.1025, Appendix A - Substance Data Sheet for Occupational Exposure to Lead.

Possible cancer hazard. Contains an ingredient which may cause cancer, based on animal data (see Section 3 and Section 15 for each ingredient). Risk of cancer depends on duration and level of exposure. See section 2 for further details.

4.3 Indication of any immediate medical attention and special treatment needed

Eyes : Causes serious eye damage.
Skin : Causes severe skin burns and eye damage.

Chronic effects	: Prolonged exposure with the electrolyte has a destructive effect on tissue. Chronic exposure to lead may cause disease of blood and blood-forming organs, kidneys and liver, damage to the reproductive systems and decrease in fertility in men and women, and damage to the fetus of a pregnant woman. Chronic exposure from the lead contained in this product is extremely likely.
Carcinogenicity	: Lead is classified by the IARC as a class 2B carcinogen (possibly carcinogenic to humans).
OSHA	: Where airborne lead exposure exceed the OSHA action level, refer to OSHA Lead Standard 1910.1025.
NTP	: N/A
Medical Conditions Generally Aggravated by Exposure	: Lead exposure may aggravate disease of the blood and blood-forming organs, hypertension, kidneys, nervous and possibly reproductive systems. Those with pre-existing skin disorders or eye problems may be more susceptible to the effects of the electrolyte.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Use standard fire-fighting media on surrounding materials, including water spray, foam, and carbon dioxide. (Do not use any dry chemical extinguisher containing ammonium compounds.)

5.2 Special hazards arising from the substance or mixture

Hazardous decomposition : Toxic fumes.

Do not breathe mist, vapors or spray. Do not get in eyes, on skin, or on clothing.

5.3 Advice for fire-fighters

Wear NIOSH/OSHA-approved self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Sealed containers may develop explosive pressures under fire conditions. Use water to cool containers exposed to fire.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Put on appropriate personal protective equipment (see section 8).

6.2 Environmental precautions

Do not allow spills to enter drains or waterways.

Use good personal hygience practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3 Methods and materila for containment and cleaning-up

Wipe down the area several times with a wet paper towel. Use a fresh towel each time. Contaminated paper towels are considered hazardous waste.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Note : Oxygen sensors are sealed, and under normal circumstances, the contents of the sensors do not present a health hazard. The following information is given as a guide in the event that a cell leaks.

Protective measures during cell replacement

Before opening the bag containing the sensor cell, check the sensor cell for leakage. If the sensor cell leaks, do not open the bag. If there is liquid around the cell while it is in the instrument, put on gloves and eye protection before removing the sensor cell.

Refer to section 2 for further information.

7.2 Conditions for safe storage, including any incompatibilities

Containers should be stored in a cool, dry, well-ventilated area. Exercise due caution to prevent damage to or leakage from the container. Keep containers closed when not in use.

Incompatible materials: Aluminum, organic materials, acid chlorides, acid anhydrides, magnesium, copper. Avoid contact with acids and hydrogen peroxide >52%. See section 2 for further details.

7.3 Specific end use(s)

No data available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

EXPOSURE

CAS No.	Ingredient	Source	Value
0000064-19-7	Acetic Acid ($HC_2H_3O_2$)	OSHA	TWA: 10 ppm
		ACGIH	TWA: 10 ppm
		NIOSH	TWA: 10 ppm
		Supplier	No Established Limit
0001310-73-2	Sodium Hydroxide (NaOH)	OSHA	2 mg/m3
		ACGIH	2 mg/m3
		NIOSH	2 mg/m3
		Supplier	No Establsihed Limit
0007601-90-3	Perchloric Acid ($HClO_4$)	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit
		Supplier	No Established Limit
0007439-92-1	Lead (Pb)	OSHA	[1910.1025] TWA 0.050 mg/m3
		ACGIH	TWA 0.05 mg/m3R, 2B, 2A
		NIOSH	TWA (8-hour) 0.050 mg/m3
		Supplier	No Established Limit

CARCINOGEN DATA

CAS No.	Ingredient	Source	Value
0000064-19-7	Acetic Acid ($HC_2H_3O_2$)	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No
0001310-73-2	Sodium Hydroxide (NaOH)	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No
0007601-90-3	Perchloric Acid ($HClO_4$)	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No, Group 2a: No; Group 2b: No; Group 3: No; Group 4: No
0007439-92-1	Lead (Pb)	OSHA	Select Carcinogen: Yes
		NTP	Known: No; Suspected: Yes
		IARC	Group 1: No; Group 2A: No, Group 2b: Yes; Group 3: No; Group 4: No

8.2 Exposure controls

Respiratory	: If workers are exposed to concentrations above the exposure limit, they must use the appropriate, certified respirators.
Eyes	: Chemical splash goggles.
Skin	: Apron, face shield, gloves. Gloves must be resistant to corrosive materials. Nitrile or PVC gloves are suitable. Do not use cotton or leather gloves.
Engineering Controls	: Provide adequate ventilation. Where reasonable pratical, this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits, suitable respiratory protection must be worn.
Other Work Practices	: Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

Refer to Section 2 for further details.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	: Article - Solid
Odor	: None
Odor threshold	: Not measured
pH	: Not measured
Melting point/freezing point	: > 328˚C
Initial boiling point and boiling point	: > 1320˚C
Flash Point	: Not measured
Evaporation rate (Ether = 1)	: Not measured
Flammability (solid, gas)	: Not Applicable
Upper/lower flammability or explosive limits	: **Lower Explosive Limit**: Not measured : **Upper Explosive Limit**: Not measured
Vapor pressure (Pa)	: Not measured
Vapor density	: Not measured
Specific gravity	: Not measured
Solubility in Water	: Not measured
Partition coefficient n-octanol/water (Log Kow)	: Not measured
Auto-ignition temperature	: Not measured
Decomposition temperature	: Not measured
Viscosity (cSt)	: Not measured

9.2 Other information

No other relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity

Hazardous polymerization will not occur.

10.2 Chemical stability

Stable under normal circumstances.

10.3 Possibility of hazardous reactions

Incompatible with strong oxidizers, leather and halogenated compounds. Product will react with 'soft' metals such as aluminum, tin, magnesium, and zinc-releasing, flammable hydrogen gas.

10.4 Conditions to avoid

Excessive heat and open flame.

10.5 Incompatible materials

Aluminum, organic materials, acid chlorides, acid anhydrides, magnesium, copper. Avoid contact with acids and hydrogen peroxide > 52%.

10.6 Hazardous decomposition products

Toxic fumes.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

CAS No.	Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LD50, mg/L/4hr	Inhalation Dust/ Mist LD50, mg/L/4hr	Inhalation Gas LD50, ppm
0000064-19-7	Acetic Acid ($HC_2H_3O_2$)	3310	No data available	No data available	No data available	No data available
0001310-73-2	Sodium Hydroxide (NaOH)	3250	No data available	No data available	No data available	No data available
0007601-9-3	Perchloric Acid ($HClO_4$)	No data available	No data available	No data available	No data available	No data available
0007439-92-1	Lead (Pb)	No data available	No data available	No data available	No data availabe	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	None	N/A
Acute toxicity (dermal)	None	N/A
Acute toxicity (inhalation)	None	N/A
Skin corrosion/irritation	1A	Causes severe skin burns and eye damage
Serious eye damage/irritation	1	Causes serious eye damage
Respiratory sensitization	None	N/A
Skin sensitization	None	N/A
Germ cell mutagenicity	None	N/A
Carcinogenicity	1A	May cause cancer
Reproductive toxicity	None	N/A
STOT - single exposure	None	N/A
STOT - repeated exposure	None	N/A
Aspiration hazard	None	N/A

SECTION 12: Ecological information

12.1 Toxicity

Very toxic to aquatic life.

Aquatic Ecotoxicity

CAS No.	Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
0000064-19-7	Acetic Acid ($HC_2H_3O_2$)	Not Available	Not Available	Not Available
0001310-73-2	Sodium Hydroxide (NaOH)	Not Available	Not Available	Not Available
0007601-9-3	Perchloric Acid ($HClO_4$)	Not Available	Not Available	Not Available
0007439-92-1	Lead (Pb)	0.44, Cyprinus carpio	4.40, Daphnia magna	0.25 (72 hr), Scenedesmus subspicatus

12.2 Persistence and degradability

No data available.

12.3 Bioaccumulative potential

Not measured.

12.4 Mobility in soil

Not data available.

12.5 Results of PBT and vPvB assessment

This product contains no PBT/vPvB chemicals.

12.6 Other adverse effects

Lead is bioaccumulative in most aquatic life and mammals. It is highly mobile as lead dust or fume, yet forms complexes with organic material which limits its mobility.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Do not allow into drains or water courses. Wastes and emptied containers should be disposed of in accordance with regulations made under the Control of Pollution Act and the Environmental Protection Act.

Using information provided in this data sheet, advice should be obtained from the Waste Regulation Authority, where the special waste regulations apply.

SECTION 14: Transport information

Department of Transportation (DOT)

Regulated. Refer to Small Quantity Exceptions: 49 CFR 173.4.

IATA: Regulated. Refer to IATA Dangerous Goods in Excepted Quantities Sec. 2.7.

Environmental hazards
IMDG : Marine Pollutant: Yes (Lead Compounds (as Pb))

SECTION 15: Regulatory information

Regulatory Overview
The regulatory data is Section 15 is not intended to be all-inclusive, only selected regulations are represented.

Toxic Substance Control Act (TSCA)
All components of this material are either listed or exempt from listing on the TSCA Inventory.

WHMIS Classification
D2A E.

US EPA Tier II Hazards

Fire	: No	
Sudden Release of Pressure	: No	
Reactive	: No	
Immediate (Acute)	: Yes	
Delayed (Chronic)	: Yes	
EPCRA 311/312 Chemicals and RQs (lbs)	: Lead Compounds (as Pb) Potassium acetate	(10.00)
EPCRA 302 Extremely Hazardous	: No Product Ingredients listed	
EPCRA 313 Toxic Chemicals	: Lead Compounds (as Pb)	
Proposition 65 - Carcinogens (>0.0%)	: Lead Compounds (as Pb)	
Proposition 65 - Developmental Toxins (>0.0%)	: Lead Compounds (as Pb)	
Proposition 65 - Female Repro Toxins (>0.0%)	: Lead Compounds (as Pb)	
Proposition 65 - Male Repro Toxins (>0.0%)	: Lead Compounds (as Pb)	
N.J. RTK Substances (>1%)	: Lead Compounds (as Pb) Potassium acetate	
Penn RTK Substances (>1%)	: Lead Compounds (as Pb) Potassium acetate	

SECTION 16: Other information

The information and recommendations contained herein this document are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects, which may be caused b exposure to our products. Users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases, appearing in Section 3 is:

H302 Harmful is swallowed.
H314 Causes severe skin burns and eye damage.
H350 May cause cancer.
H400 Very toxic to aquatic life.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

All chemicals may pose unknown hazards and hsould be used with caution. While the information contained in this Material Safety Data Sheet is believed to be correct and is offered for your information, consideration and investigation, Advanced Micro Instruments assumes no responsibility of the completeness or accuracy of the information contained herein.

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