Material Safety Data Sheet
Electrochemical Sensors

MANUFACTURER SemeaTech (Shanghai) Co., Ltd.
1355 Chengbei Road, Bldg 1, Suite #801
Jiading District, Shanghai, China 201807
Email: info_cn@semetech.com · Website: www.semeatech.com · Phone: +86-21-59547013

PRODUCTS

All SemeaTech electrochemical sensors in the table below are used to detect gases and measure gas concentrations.

4-Series Gas Sensors

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
051-1200-000	4CO-50	051-0100-000	4CO-2000	051-0400-000	4CO-500S
051-1600-000	4CO-1000S	051-0800-000	4CO-10000	051-0900-000	4CO-5000
051-0100-000	4CO-20000	051-1100-000	4CO-100		
052-0000-000	4H2S-100	052-0100-000	4H2S-1000	052-0400-000	4H2S-50
052-0600-000	4H2S-2000	052-0700-000	4H2S-5000	052-1500-000	4H2S-500
054-0000-000	4H2-1000	054-0400-000	4H2-2000	054-0100-000	4H2-40000
055-0000-000	4ETO-10	055-0100-000	4ETO-100	055-0200-000	4ETO-500
056-0000-000	4SO2-20	056-0100-000	4SO2-2000	056-0400-000	4SO2-5
056-0500-000	4SO2-100				
057-0300-000	4NO2-5	057-0000-000	4NO2-20	057-0100-000	4NO2-2000
058-0300-000	4NO-5	058-0000-000	4NO-250	058-0100-000	4NO-2000
059-2100-000	4NH3-500S	059-1900-000	4NH3-100S	059-2200-000	4NH3-1000S
059-0900-000	4NH3-20	059-0600-000	4NH3-2000	059-1500-000	4NH-5000L
059-1200-000	4NH3-100L	059-1100-000	4NH3-500L	059-1300-000	4NH3-1000L
060-0400-000	4PH3-2000	060-0000-000	4PH3-20	060-0100-000	4PH3-1000
061-0400-000	4CLO2-10	061-0000-000	4CLO2-50	061-0100-000	4CLO2-1
062-0200-000	4CL2-200	062-0000-000	4CL2-50	062-0100-000	4CL2-10
063-0000-000	4HCL-50	063-0200-000	4HCL-200		
064-0000-000	4HCN-50				
065-0000-000	4CH3SH-10				
067-0200-000	4C2H3CL-20	067-0000-000	4C2H3CL-100		
068-0400-000	4O3-1	068-0000-000	4O3-10	068-0100-000	4O3-100
068-0800-000	4O3-1000				
069-0000-000	4HF-10	069-0100-000	4HF-100		
072-0000-000	4CH2O-10	072-0100-000	4CH2O-50		

7-Series Gas Sensors

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
051-0200-000	7CO-1000	051-0600-000	7CO-2000	051-0700-000	7CO-10000
051-1300-000	7CO-50				
052-0200-000	7H2S-200	052-0300-000	7H2S-50	052-0500-000	7H2S-100
052-1300-000	7H2S-500	052-0800-000	7H2S-1000	052-0900-000	7H2S-2000

052-1100-000	7H2S-5000	052-1400-000	7H2S-10000		
054-0200-000	7H2-1000	054-0300-000	7H2-10000	054-0500-000	7H2-20000
055-0300-000	7ETO-100	055-0400-000	7ETO-20		
056-0200-000	7SO2-100	056-0300-000	7SO2-2000	056-0600-000	7SO2-5
056-0700-000	7SO2-20				
057-0200-000	7NO2-20	057-0400-000	7NO2-5	057-0500-000	7NO2-100
057-0600-000	7NO2-500	058-0200-000	7NO-100		
059-2300-000	7NH3-100S	059-2500-000	7NH3-1000S	059-2400-000	7NH3-500S
059-0700-000	7NH3-2000	059-0800-000	7NH3-200		
060-0200-000	7PH3-2000	060-0300-000	7PH3-5		
061-0200-000	7CLO2-1	061-0300-000	7CLO2-20		
062-0300-000	7CL2-20	062-0400-000	7CL2-50		
063-0100-000	7HCL-50	063-0300-000	7HCL-100	063-0400-000	7HCL-20
065-0100-000	7CH3SH-10	064-0100-000	7HCN-50		
067-0100-000	7C2H3CL-100	067-0300-000	7C2H3CL-50		
068-0200-000	7O3-20	068-0300-000	7O3-1	068-0500-000	7O3-100
069-0200-000	7HF-50	069-0300-000	7HF-10		
072-0200-000	7CH2O-10	072-0300-000	7CH2O-50		

3-Series Gas Sensors

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
051-3000-000	3CO-10000	051-3100-000	3CO-20000	056-3100-000	3SO2-500
056-3000-000	3SO2-2000	057-3000-000	3NO2-500	058-3000-000	3NO-2000

Commercial Gas Sensors

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
051-0300-000	Commercial CO				

4Series Combustible Gas Sensors

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
090-R000-000	4LEL-D-3.0				

NDIR CO2 Sensors

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
A960-0000-000	IRM-300				

Gamma Sensor

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
001-0100-000	3cc Gamma				

Sensor Receptacles

Part No.	Product Name	Part No.	Product Name	Part No.	Product Name
051-2017-000	4-Series Sensor Receptacle	051-2018-000	7-Series Sensor Receptacle		

HAZARDOUS COMPONENTS

The typical product has polycarbonate ABS plastic housing that encloses acid and proprietary catalyst alloy electrodes with attached metal connections.

Components		Formula	CAS. No.	Quantity	Note
Electrolyte	Sulfuric acid	H2SO4	7664-93-9	30%-60%	Each sensor type contains one of the acids
	Ortho phosphoric acid	H3PO4	7664-38-2	50%-80%	
Electrode	Platinum black powder	Pt	7440-06-4		The electrode of each sensor type contains one or more of the listed components
	Ruthenium black powder	Ru	7440-18-8		
	Gold powder	Au	7440-22-4		
	Silver powder	Ag	7440-22-4		
	Iridium black power	Ir	7439-88-5		
	Graphite powder (Carbon/Graphene/CNT)	C	7782-42-5		

PHYSICAL AND CHEMICAL PROPERTIES

Components	H2SO4	H3PO4	Pt	Ru	Au	Ag	Ir	C
Description	Colorless aqueous solution	Colorless aqueous solution	Black powder	Gray powder	Yellow powder	Gray white powder	Black powder	Black powder
Melting Point	NA	NA	1772°C	2334°C	1064°C	962°C	2410°C	NA
Boiling Point	330°C	158°C	3827°C	4150°C	2808°C	2212°C	4130°C	NA
Vapor Pressure	NA	NA	NA	NA	NA	NA	NA	NA
Density	1.29g/cc	1.3g/cc	21.5g/cc	12.5g/cc	19.3g/cc	10.5g/cc	22.6g/cc	2.25g/cc
Water Solubility	miscible	miscible	insoluble	insoluble	insoluble	insoluble	insoluble	insoluble

FIRE AND EXPLOSION HAZARD DATA

None of the components is considered to be a fire or an explosion hazard.

- **Extinguishing Media –** Use extinguishing media appropriate to surrounding fire conditions. No specific agents are recommended.
- **Fire Fighting Equipment –** Wear NIOSH/OSHA approved self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

HEALTH HAZARDS IDENTIFICATIONS

- **Emergency Overview –** Since all hazardous components are enclosed in the plastic housing, users are not exposed to any physical hazard or health risk during normal operations. Improper handling or electrical misuse causing the physical damage to the product may release caustic sulfuric or phosphoric acid that is corrosive and irritating with possible health effects as described below.
- **Potential Health Effects –** ***Eye Contact*** may cause redness, pain, blurred vision, eye burns and possible eye injury. ***Skin Contact*** may cause corrosive damage with burns, severe irritation and pain. ***Ingestion*** may cause sore throat, abdominal pain, nausea, severe burns of the mouth, throat and stomach. ***Inhalation*** is not an expected hazard unless heated to high temperatures. Mist or vapor inhalation can cause irritation to the nose, throat and upper respiratory tract.
- **Aggravation of pre-existing conditions –** Persons with pre-existing skin disorders or eye problems, or impaired respiratory function may be more susceptible to the effects of the substance.

Formula	Acute Toxicity	Mutagen / Teratogen	Carcingen	US 8-hr TWA	NPT
H2SO4	LD: 135 mg/kg	Yes	NA	1mg/m3	NA
H3PO4	NA	NA	NA	1mg/m4	NA
Pt	LD: 5250mg/kg	NA	NA	1mg/m5	NA
Ru	NA	NA	NA	no data	NA
Au	LD:58mk/kg	NA	NA	no data	NA

Ag	LD:49mg/kg	NA	NA	0.1mg/m3	NA
Ir	no data	NA	NA	no data	NA
C	no data	NA	NA	2mg/m3	NA

FIRST AID PROCEDURES

- **Eyes and Skin –** Immediately flush with plenty of water for at least 15 minutes and remove all contaminated clothing. Seek medical attention immediately in severe cases.
- **Ingestion –** Give large amounts of water to drink. Obtain medical attention immediately.
- **Inhalation –** Remove to fresh air and rest. Obtain medical attention immediately.

ACCIDENTAL RELEASE MEASURES

- **Damage of Product –** If the product is severely damaged or tampered with that the leakage of the components occurs, the following procedures should be adopted.
  - ✓ Avoid skin contact with any liquid or internal component through the use of protective gloves.
  - ✓ Disconnect sensor if it is attacted to any equipment.
  - ✓ Use copious amounts of clean water to wash away any spilt electrolyte.
  - ✓ Observe first aid measures in case of eye or skin contact, ingestion or inhalation of electrolyte.
- **Handling and Storage –** Products must not be exposed to temperatures outside the range specified in the product specification sheet. Should not be exposed to organic vapours, which may cause physical damage to the body of the sensor. Must not be stored in areas containing organic solvents or in flammable liquid stores.

STABILITY AND REACTIVITY

- **Stability –** The sulfuric and phosphoric acid are very corrosive. All components are stable under ambient conditions. Very high and low humidity will dilute or dry out the electrolyte, respectively.
- **Conditions to avoid** – Always avoid heat sources and do not apply a potential to the product.
- **Incompatibilities –** Base, oxidizers, halides, organic reductants, powdered non-noble metals.
- **Hazardous Decomposition** – Toxic fumes.
- **Hazardous Polymerization** – Will not occur.

OTHER INFORMATION

- All chemicals may pose unknown hazards and should 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, SemeaTech assumes no responsibility for the completeness or accuracy of the information contained herein.