

Safety Data Sheet

1. Product and company identification

Product name : AQUALYTE RO
Part No. : E327338-A, E327338-B
Company information
Name of supplier : HIRANUMA Co., Ltd.
Address : 1739 Motoyoshida, Mito, Ibaraki, 310-0836, JAPAN
Name of section : Quality assurance department
Telephone number : +81-29-247-7343
Facsimile number : +81-29-240-0381
Mail address : info-f2@hiranuma.com
Name of Manufacturer : KANTO CHEMICAL CO., INC.
Address : 2-1, Nihonbashi, Muromachi 2-Chome, Chuo-Ku, Tokyo,
103-0022, JAPAN
Recommended use : For research use only
Restrictions on use : Seek expert judgment when using the product for
applications other than those recommended.

2. Summary of danger and Hazard

GHS classification
Physical hazards
Flammable liquids : Category 2
Human health hazards
Acute toxicity (oral)
: Category 4
Acute toxicity (inhalation: vapors)
: Category 3
Skin corrosion/irritation
: Category 2
Serious eye damage/eye irritation
: Category 1
Skin sensitization : Category 1
Germ cell mutagenicity
: Category 2
Carcinogenicity : Category 2
Reproductive toxicity
: Category 1B

Specific target organ toxicity (single exposure)

: Category 1 (central nervous system, visual organs, systemic toxicity, liver, kidney, respiratory organs, cardiovascular)

Category 3 (narcosis)

Specific target organ toxicity (repeated exposure)

: Category 1 (central nervous system, visual organs, liver, kidney, respiratory organs, respiratory tract)

Category 2 (blood, thyroid)

Environmental hazard

Aquatic acute : Category 2

Aquatic chronic : Category 1

Pictograms or symbols



Signal word : Danger

Hazard statements : Highly flammable liquid and vapor
Harmful if swallowed
Causes skin irritation
May cause an allergic skin reaction
Causes serious eye damage
Toxic if inhaled
May cause drowsiness or dizziness
Suspected of causing genetic defects
Suspected of causing cancer
May damage fertility or the unborn child
Causes damage to organs (central nervous system, visual organs, systemic toxicity, liver, kidney, respiratory organs, cardiovascular)
Causes damage to organs (central nervous system, visual organs, liver, kidney, respiratory organs, respiratory tract) through prolonged or repeated exposure
May cause damage to organs (blood, thyroid) through prolonged or repeated exposure
Toxic to aquatic life
Very toxic to aquatic life with long lasting effects

Precautionary statements

Prevention	: Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take action to prevent static discharges. Do not breathe mist/vapors. Wash hands, forearms and face thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Contaminated work clothing should not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.
Response	: IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell. IF ON SKIN: Wash with plenty of water. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water . IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF exposed or concerned: Call a POISON CENTER or doctor. IF exposed or concerned: Get medical advice/attention. Immediately call a POISON CENTER or doctor. Call a POISON CENTER or doctor. Call a POISON CENTER or doctor if you feel unwell. Get medical advice/attention if you feel unwell. Rinse mouth. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. Collect spillage.

- Storage : Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.
- Disposal : Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

3. Composition/Information on ingredients

Substance/Mixture : Mixture

Chemical name	Concentration (%)	Formula	TSCA	EC-No.	CAS RN
Methanol	29	CH ₃ OH	Listed	200-659-6	67-56-1
Chloroform	53	CHCl ₃	Listed	200-663-8	67-66-3
2,2'-Iminodiethanol	10-15	(HOCH ₂ CH ₂) ₂ NH	Listed	203-868-0	111-42-2
Sulfur dioxide	5-10	SO ₂	Listed	231-195-2	7446-09-5
Iodine	1-5	I ₂	Listed	231-442-4	7553-56-2

4. First aid measures

First aid measures

- After inhalation : Remove the victim to fresh air, and make him blow his nose and gargle. If necessary, get medical treatment.
- After skin contact : Wash the affected areas under running water.
- After eye contact : Wash the affected areas under running water for at least 15 minutes. Get medical treatment.
- After ingestion : Rinse mouth with water. Give the victim one or two glasses of water or milk. Do not induce vomiting. Get medical treatment as soon as possible.
- Self protection of the first aider : Rescuers wear proper protective equipment like rubber gloves, goggles.

5. Fire fighting measures

Suitable extinguishing media

- : Water, dry chemical powder, carbon dioxide, dry sand, alcohol resistant foam

Unsuitable extinguishing media

- : Foam extinguisher

Firefighting instructions

- : Move containers from fire area if it can be done without risk, if not possible, apply water from a safe distance to cool and protect surrounding area.
- Fight fire from windward.
- Dry chemical powder, carbon dioxide or dry sand should be used for small fires. Alcohol-resistant foam extinguisher is effective for a large scale fire.

Personal protection (Emergency response)

- : Wear breathing apparatus.

6. Accidental release measures

Cautions for personnel

- General measures : Wear proper protective equipment and avoid contact with skin and inhalation of vapor. Conduct operations from upwind and evacuate people downwind. Keep away personnel except for authorized ones from spillage area by stretching ropes.

Environmental precautions

- : Attention should be given to avoid discharge of spilled product into rivers and resulting environmental damage. When diluting spill with large amounts of water, discharge of untreated wastewater into the environment must be avoided.

Methods and Equipment for Containment and Cleaning up

- For containment : Absorb spill with inert material (e.g., diatomaceous earth, sand) and flush spillage area with copious amounts of water.

Prevention measures for secondary accidents

- : Remove nearby sources of ignition and prepare extinguishing media.

7. Handling and storage

Handling

- Technical measures : Wear proper protective equipment to avoid contact with skin or inhalation of vapor. Fire is strictly prohibited.
- Ventilate well at working places.
- Prevent build-up of electrostatic charges (e.g. by grounding).

Precautions for safe handling

- : Avoid formation of vapor and aerosols.
- Do not allow contact with oxidizing substances.

Storage

Storage condition : Store in a dark, cool place and tightly closed.

Material used in packaging/containers

: Glass, fluorine resin, stainless steel

Do not use vinyl chloride resin, acrylic resin, polystyrene etc.

8. Exposure control/Personal protection

Methanol	
ACGIH TWA	200 ppm
ACGIH STEL	250 ppm
Remark (ACGIH®)	Skin
Chloroform	
ACGIH TWA	10 ppm
2,2'-Iminodiethanol	
ACGIH TWA	1 mg/m ³ (IFV)
Remark (ACGIH®)	Skin
Sulfur dioxide	
ACGIH STEL	0.25ppm
Iodine	
ACGIH TWA	0.001 ppm (IFV)
ACGIH STEL	0.1 ppm (V)
Remark (ACGIH®)	Skin

Appropriate engineering controls

: Use with an enclosed system or a local exhaust ventilation.

Protective equipment

Respiratory protection

: Chemical cartridge respirator with an organic vapor cartage or
airline respirator

Hands protection : Impervious protective gloves

Eyes protection : Safety goggles

Skin and body protection

: Protective clothing, protective boots

9. Physical and chemical properties

Physical state	: Liquid
Color	: Yellow
Odor	: Aromatic
pH	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: 61.15 °C (as chloroform)
Flash point	: 22 °C
Auto-ignition temperature	
	: 470 °C (as methanol)
Decomposition temperature	
	: No data available
Flammability	: Flammable
Vapor pressure	: 212hPa(20°C)(as chloroform)
Relative density	: No data available
Density	: No data available
Relative gas density	: No data available
Solubility	: Water : Soluble
Partition coefficient n-octanol/water (Log Pow)	
	: No data available
Explosive limits (vol %)	
	: No data available
Viscosity, kinematic	: No data available
Particle characteristics	
	: No data available

10. Stability and reactivity

Reactivity	: May react with oxidizing substances. As for methanol, combines with calcium chloride to form a crystalline substance. It also binds to barium oxide to form a compound soluble in methanol. In addition, formaldehyde is produced by air oxidation. As for 2,2'-Iminodiethanol, it has a strong affinity at room temperature with acids and acid gases such as carbon dioxide and hydrogen sulfide.
Chemical stability	: Stable under normal conditions. As for chloroform, decomposes by light or heat and emits harmful phosgene.
Possibility of hazardous reactions	

: Chloroform may explode in some cases when in contact with strong alkaline solutions, particularly in the presence of water. When iodine reacts with ammonia, it forms an explosive adduct of nitrogen triiodide and ammonia.

Conditions to avoid

: Light, heat

Incompatible materials : Acids, oxidizing substances, strong alkaline substances.

Hazardous decomposition products

: Carbon monoxide, chlorine, hydrogen chloride, phosgene, sulfur oxides, nitrogen oxides, iodine, hydrogen iodide.

11. Toxicological information

Acute toxicity(oral) : Harmful if swallowed

* 5–10% of the mixture consists of ingredient of unknown toxicity.

ATEmix=562 mg/kg

Acute toxicity(dermal)

: Classification not possible

Acute toxicity (inhalation)

: No classification (gas)

Toxic if inhaled (vapor)

* 15–25% of the mixture consists of ingredient of unknown toxicity.

ATEmix=516 ppm

Classification not possible (dust, mist)

Skin corrosion/irritation

: Causes skin irritation

Chloroform : There is evidence including "In skin irritation tests in rabbits with the application of undiluted solution to abdominal skin for 24 hours, mild hyperemia, moderate necrosis and incrustation were noted.", "Applying undiluted solution caused severe irritation." and "After applying the substance to rabbit ear 1–4 times, slight hyperemia and excoriation were observed." Thus, it was classified into category 2.

2,2'-Iminodiethanol : In the test which is applied undiluted test substance to the skin of rabbits, skin irritation index (PII) is 2.6 (/8) and corresponded to mild irritation. it was the result of evaluating the moderate irritation. In addition, pH of the

substance is 11 at 0.1N aqueous solution, there is considered that EU classification is Xi; R38, it was classified into category 2.

Iodine : Vapors of this substance have been described as irritating to human skin, and there are descriptions of local effects causing skin blisters. From the results above, it was classified as category 2.

Serious eye damage/eye irritation

: Causes serious eye damage

Chloroform: In an eye irritation test using rabbits, application of this substance resulted in severe irritation accompanied by mydriasis, keratitis, and corneal opacity. In 4 animals, symptoms resolved within 2–3 weeks; however, there is a report that corneal opacity persisted in 1 animal beyond 3 weeks.

Additionally, there are reports of minor irritation to the conjunctiva and corneal damage, as well as descriptions stating that this substance is irritating to the eyes. Based on the above findings, as complete recovery was not achieved 3 weeks after administration, it was classified as category 1.

2,2'-Iminodiethanol: In a test where 0.1 g of the test substance was applied undiluted to rabbit eyes, severe irritation was observed in the cornea, iris, and conjunctiva. The ocular irritation index (maximum value 110, corresponding to AOI) was 50–56 from 24 to 72 hours and 41–45 from 96 to 168 hours. In addition, considering that the pH of this substance is 11 in a 0.1N aqueous solution, it was classified as category 1.

Respiratory sensitization

: Classification not possible

Skin sensitization

: May cause an allergic skin reaction

2,2'-Iminodiethanol : This substance is classified by the Japan Society for Occupational Health into group 2 of skin sensitizing substances. Based on the above, it was classified into category 1A.

Iodine : This substance was classified in occupational skin sensitizers Group 2 by Japan Society For Occupational Health. In addition, there are reports of allergic dermatitis and of eruption due to allergic reactions, therefore, it was classified into category 1.

Germ cell mutagenicity

- : Suspected of causing genetic defects
Chloroform : Positive data on somatic cell mutagenicity tests in vivo (micronucleus and chromosome aberration tests). Therefore, it was classified as category 2.
- Carcinogenicity : Suspected of causing cancer
Chloroform : Japan Society for Occupational Health classifies the chemical as the group 2B (The chemical is possibly carcinogenic to humans). Therefore, it was classified as category 2.
2,2'-Iminodiethanol : IARC classifies group 2B(possibly carcinogenic to humans). Therefore, it was classified as category 2.
- Reproductive toxicity : May damage fertility or the unborn child
Methanol : In a developmental toxicity test by inhalation exposure to mice during organogenesis period, fetal resorptions and exencephaly were observed. Additionally, similar effects including cleft palate were reported in other inhalation and oral exposure tests. For effects of methanol on reproduction, scientific decisions concerning health risks are generally based on what is known as weight-of-evidence approach. Recognizing the lack of human data and the clear evidence of laboratory animal effects, it was concluded that methanol may adversely affect human development if exposures are sufficiently high. Based on the information, the substance was considered to be a presumed human reproductive toxicant and it was classified into category 1B.
Chloroform : A decline in fertility, a decrease in crown-rump length, delayed calcification of the skull and lumbar ribs, an increase in cleft palate, malformation of the interparietal bone, increased incidence of anuria, brachyury and anal atresia within a litter, subcutaneous edema and increased rates of absorbed embryos were observed at dosing levels toxic to parent animals in mouse three-generation tests and rat and mouse teratogenicity tests. Therefore, it was classified as category 2.
2,2'-Iminodiethanol : In developmental toxicity studies by oral administration in pregnancy on 6 to 19 days of the rat, at 125 or 200 mg/kg or more doses, at a dose that was seen general toxicity of the mother animal such as suppression of body weight gain, decrease of food consumption, an increase in kidney weight, as effects on the reproductive, increase of post-implantation mortality and early postnatal death are reported, therefore it was

classified into category 2.

Based on the content of methanol, it was classified as category

1B.

Specific target organ toxicity (single exposure)

: Cause damage to organs (central nervous system, visual organ, systematic toxicity, liver, kidney, respiratory organs, cardiovascular)

May cause drowsiness and dizziness

Methanol : Central nervous system depression is observed as an acute toxicity symptom in humans, leading to metabolic acidosis due to accumulation of formic acid in the blood. Visual impairment, blindness, headache, dizziness, nausea, vomiting, tachypnea, coma, and other symptoms have been described, sometimes resulting in death. Central nervous system damage, particularly extrapyramidal symptoms resembling tremor paralysis, has also been documented, and necrosis of cerebral white matter has been reported as a morphological change. Based on this human information, it was classified as category 1 (central nervous system). As target organs, the visual system was additionally adopted because damage to the eyes is characteristic, and systemic toxicity was also adopted because symptoms supporting metabolic acidosis such as headache, nausea, vomiting, tachypnea, and coma have been documented. On the other hand, "narcosis" was described in findings from inhalation exposure in mice and rats, and findings on acute toxicity in humans also described narcotic effects resulting from central nervous system depression, so it was classified as category 3 (narcosis).

Chloroform : The cis isomer was previously used as an anaesthetic in humans. Reports include narcotic effects, cough, dizziness, somnolence, hypoesthesia, headache, nausea, vomiting, abdominal pain, weakness, loss of consciousness, coma, convulsions, tachypnea, respiratory center paralysis, impaired consciousness, acute respiratory failure, arrhythmia, cardiovascular depression, ventricular fibrillation, jaundice, hepatocyte degeneration/necrosis, renal tubular necrosis, renal failure from inhalation exposure, and abdominal pain, nausea, vomiting, diarrhea, gastrointestinal irritation, respiratory center paralysis, convulsions, coma, oliguria, albuminuria, renal damage, swelling of renal tubular epithelium, hyaline and fatty

degeneration, liver damage, and hepatocyte necrosis from oral ingestion. Based on the above, it was classified as category 1 (respiratory organs, cardiovascular system, liver, kidney), category 3 (narcosis).

2,2'-Iminodiethanol : Oral administration to rats caused mild damage to hepatic parenchymal cells at 200–1600 mg/kg, large fat droplets and focal cytoplasmic degeneration in hepatocytes at 1600 mg/kg, renal tubular cell necrosis at 400 mg/kg and above, and increases in serum urea, SGOT, and LDH at 800 mg/kg. Based on the above, effects on the liver were reported at doses corresponding to guidance value category 1, and effects on the kidney were reported at doses corresponding to category 2, so it was classified as category 1 (liver), category 2 (kidney).

Additionally, inhalation exposure of rats to 1476 ppm for 105 minutes resulted in somnolence, incoordination, and irregular slow breathing characterized by rales and gasping in fatal cases, with characteristic findings including decreased heart rate followed by increase, marked respiratory distress, and increased systolic blood pressure, with the main histopathological finding being pulmonary edema; since the exposure concentration corresponds to guidance value category 2, it was classified as category 2 (respiratory organs).

Sulfur dioxide : Based on descriptions in EHC, ACGIH, IARC 54, and ATSDR that airway mucosal irritation, increased airway resistance, and loss of airway cilia were observed at concentrations within the category 1 guidance value range in inhalation exposure tests using guinea pigs, dogs, rabbits, or rats, and that decreased respiratory function including increased airway resistance was also observed in human inhalation exposure tests, as well as descriptions in IARC 54 that pulmonary edema was observed in high-concentration accidental exposure cases, it was classified as category 1 (respiratory organs).

Based on the content of methanol, chloroform, 2,2'-iminodiethanol, sulfur dioxide, it was classified as category 1 (central nervous system, visual organs, systemic toxicity, respiratory organs, cardiovascular system, liver, kidney), category 3 (narcosis).

Specific target organ toxicity (repeated exposure)

: Cause damage to organs (central nervous system, visual organs,

liver, kidney, respiratory organs, respiratory tract) through prolonged or repeated exposure

May cause damage to organs (blood, thyroid) through prolonged or repeated exposure

Methanol : category 1 (visual organs) was assigned based on descriptions that the prominent symptoms of long-term low-concentration methanol exposure in humans were extensive eye damage, and that blindness was observed as a chronic toxic effect from occupational methanol exposure. Additionally, it was classified as category 1 (central nervous system) was assigned based on descriptions that headache, dizziness, insomnia, and gastric disorders appeared in chronic toxicity cases from repeated exposure to methanol vapor.

Chloroform : There are descriptions that workers exposed to 14–400 ppm of chloroform for 1–6 months showed symptoms such as progression of hepatitis, jaundice, nausea, and vomiting, and that hepatitis onset also occurred at exposure concentrations of 2–205 ppm. In experimental animals, studies involving 13-week oral gavage or drinking water administration to mice, and 3-week oral gavage administration to rats showed effects on the liver (hepatocyte swelling, degeneration, fatty changes, early cirrhosis-like changes, etc.), kidneys (chronic inflammation, proximal tubule degeneration, necrosis, etc.), and spleen (white pulp atrophy, decrease in antibody-producing cells) at doses equivalent to category 2. Furthermore, via inhalation route, in multiple studies with 13-week or 2-year inhalation exposure (presumed to be vapor) in rats and mice, similar histological changes in the liver and kidneys as described above were observed from concentrations corresponding to category 1, and effects on the nasal cavity (bone thickening, olfactory epithelium atrophy, metaplasia, eosinophilic changes in olfactory and respiratory epithelium) were also seen. Based on the above, considering the central nervous system and liver as target organs from human findings, and respiratory system, liver, and kidneys from experimental animal findings, it was classified as category 1 (central nervous system, respiratory organs, liver, kidney).

2,2'-Iminodiethanol : In a 3-month inhalation exposure study in rats, laryngeal squamous metaplasia was observed at doses of 0.015

mg/L/6h or higher, and severe inflammation of the pharynx and respiratory tract was seen at 0.15 mg/L/6h or higher. Since the doses are within category 1 guidance values, category 1 (respiratory tract). Additionally, in a 49-day drinking water administration study in rats at 42–550 mg/kg/day, normocytic anemia, destruction of tubular epithelial cells, dilation of distal tubules with hyaline casts and various early necrotic changes, and early degenerative changes characterized by cloudy swelling of hepatocytes and loss of basophilia were observed at doses of 155 mg/kg/day or higher. In a 3-month drinking water administration study in rats at 25–436 mg/kg/day, dose-dependent development of microcytic anemia, nephropathy, and increased incidence or severity of tubular necrosis and mineralization were reported. Since the effect doses correspond to category 2 guidance values, it was classified as category 2 (blood, kidney, liver).

Sulfur dioxide : category 1 (respiratory organs) was assigned based on descriptions in EHC 8 and ATSDR that pneumonia and bronchitis were observed at concentrations within the category 1 guidance value range in inhalation exposure studies using rats and guinea pigs.

Iodine : It is described that chronic excessive intake of iodine in humans may cause hypothyroidism or hyperthyroidism, and that extreme excess amounts exceeding 8 mg/kg/day cause hyperthyroidism and other conditions. In experimental animals, administration of drinking water containing 0.05% iodine for 8 or 12 weeks to strains of rats prone to autoimmune thyroiditis or thymectomized conventional rats showed increased frequency of autoimmune thyroiditis with increased thyroid weight, increased anti-thyroglobulin antibodies, and histological findings of lymphocyte infiltration. Based on the above, it was classified as category 1 (thyroid).

Based on the content of methanol, chloroform, 2,2'-iminodiethanol, sulfur dioxide, and iodine, it was classified as category 1 (central nervous system, visual organs, respiratory organs, liver, kidney, respiratory tract), category 2 (blood, thyroid).

Aspiration hazard : Classification not possible

12. Ecological information

Ecotoxicity

- Aquatic acute : Toxic to aquatic life
* 5–10% of mixture consists of ingredient of unknown hazards to the aquatic environment.
Based on the summation method, it was classified as category 2.
- Aquatic chronic : Very toxic to aquatic life with long lasting effects
* 5–10% of mixture consists of ingredient of unknown hazards to the aquatic environment. Based on the summation method, it was classified as category 1.

Persistence and degradability

- : No additional information available

Bioaccumulative potential

- : No additional information available

Mobility in soil

- : No additional information available

Hazardous to the ozone layer

- : Classification not possible

13. Disposal consideration

- Residual disposal : Burn in a chemical incinerator equipped with an afterburner and a scrubber. Or entrust approved waste disposal companies with the disposal.
The incinerator should be suitable for burning organic halogen compounds.
Alkaline solution should be used for cleaning liquid of the scrubber.
- Contaminated container and packaging : In case of disposal of empty bottles, dispose bottles after removing the content thoroughly.

14. Transport information

International Regulations

Transport by sea(IMDG)

UN No.(IMDG) : 1992

Proper shipping name(IMDG)

: FLAMMABLE LIQUID, TOXIC, N.O.S.(Methanol, Chloroform, Solution)

Packing group(IMDG)

: II

Transport hazard class(es) (IMDG)

: 3(6.1)

Air transport(IATA)

UN No.(IATA) : 1992

Proper shipping name(IATA)

: Flammable liquid,toxic, n.o.s.(Methanol, Chloroform, Solution)

Packing group(IATA)

: II

Transport hazard class(es) (IATA)

: 3(6.1)

Marine pollutant : Applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollutant category : Y

MFAG-No : 131

15. Regulatory information

Regulatory information with regard to this substance in your country or region should be examined by your own responsibility.

16. Other information

References

- 1) Company data on file (SDS provided by manufacturer)
- 2) NITE Chemical Risk Information Platform (NITE-CHRIP), National Institute of Technology and Evaluation.

* The information contained herein is based on several references and the present state of our knowledge. However the SDS does not always cover all information about the product, handle the product carefully. The information is intended to ordinary usage, in case of particular handlings, conduct appropriate safety measurements. The information herein is only provision of information, and it does not represent a guarantee the properties of the product. The concentrations or ranges of concentrations shown in "3. Composition/Information on ingredients" are examples calculated based on the amounts used at the time of manufacture and do not guarantee the concentrations in the product. The total value may not be 100% due to fractional processing. The Safety Data Sheet(SDS) is prepared based on JIS Z7253.