



## Safety Data Sheet

### R-438A

#### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: R-438A  
OTHER NAME: None  
USE: Refrigerant Gas  
DISTRIBUTOR: National Refrigerants, Inc.  
661 Kenyon Avenue  
Bridgeton, New Jersey 08302

FOR MORE INFORMATION CALL:  
(Monday-Friday, 8:00am-5:00pm)  
1-800-262-0012

IN CASE OF EMERGENCY CALL:  
CHEMTREC: 1-800-424-9300

#### 2. HAZARDS IDENTIFICATION

CLASSIFICATION: Gas under pressure, Compressed Gas  
SIGNAL WORD: Warning  
HAZARD STATEMENT(S): Contains gas under pressure, may explode if heated,  
SYMBOL(S): Gas Cylinder



**PRECAUTIONARY STATEMENT(S):** Storage: Protect from sunlight, store in a well ventilated place.

**EMERGENCY OVERVIEW:** Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures, (>250°C), decomposition products may include Hydrochloric Acid (HCl), Hydrofluoric Acid (HF) and carbonyl halides.

#### POTENTIAL HEALTH HAZARDS:

**Skin:** Frost Bite if exposed to leaking gas under pressure.

**Eyes:** Frost Bite if exposed to leaking gas under pressure.

**Inhalation:** Acts as simple asphyxiate.

**Ingestion:** Ingestion is not a normal route of exposure for gases.



Ingredients found on one of the OSHA designated carcinogen lists are listed below.

**INGREDIENT NAME****NTP STATUS****IARC STATUS****OSHA LIST**

No ingredients listed in this section

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**3. COMPOSITION / INFORMATION ON INGREDIENTS**

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INGREDIENT NAME(S)	CAS NUMBER	WEIGHT %
Pentafluoroethane	354-33-6	45
1,1,1,2-Tetrafluoroethane	811-97-2	44.2
Difluoromethane	75-10-5	8.5
Butane	106-97-8	1.7
Isopentane	78-78-4	0.6

**COMMON NAMES and SYNONYMS**

R-438A Refrigerant

There are no impurities or stabilizers that contribute to the classification of the material identified in Section 2

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**4. FIRST AID MEASURES**

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**SKIN:** In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention.

**EYES:** Immediately flush eyes with plenty of warm water for at least 15 minutes. Get medical attention.

**INHALATION:** If inhaled, remove to fresh air. Get medical attention if symptoms occur.

**INGESTION:** Ingestion is not considered a potential route of exposure.

**ADVICE TO PHYSICIAN:** May cause cardiac arrhythmia. Other symptoms potentially related to misuse or inhalation abuse are cardiac sensitization anesthetic effects. Light-headedness, dizziness, confusion, lack of coordination, drowsiness, unconsciousness. Contact with liquid or refrigerated gas can cause cold burns and frostbite.

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**5. FIRE FIGHTING MEASURES**

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**FLAMMABLE PROPERTIES:** Not applicable Will not burn.

**UNUSUAL FIRE HAZARDS:** Exposure to combustion products may be a hazard to health. If the temperature rises dramatically there is danger the vessels bursting due to the high vapor pressure.

**HAZARDOUS COMBUSTION PRODUCTS:** Fluorine compounds, carbon oxides, hydrogen fluoride, carbonyl fluoride.

**FIRE FIGHTING INSTRUCTIONS:** Fog spray should be used to cool pressurized containers from a safe distance. Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face piece positive pressure.



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## **6. ACCIDENTAL RELEASE MEASURES**

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**SPILL AND LEAK PROCEDURES:** Evacuate personnel to safe areas. Avoid skin contact with leaking liquid (frostbite). Product dissipates upon release. Ventilate the area. Avoid low lying areas. Always wear recommended personal protective equipment. Protected personnel should shut off leak if possible to do without risk and provide ventilation. Unprotected personnel should not return to the affected area until it has been determined to be safe to do so.

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## **7. HANDLING AND STORAGE**

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**NORMAL HANDLING:** Do not breathe gas. Avoid breathing gas. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment. Wear insulating gloves/ face shield/ eye protection when there is a potential for exposure. Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Prevent backflow into the gas tank. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Close valve after each use and when empty. Do NOT change or force fit connections. Prevent the intrusion of water into the gas tank. Never attempt to lift cylinder by its cap. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Keep away from heat and sources of ignition. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize releases to the environment.

**STORAGE RECOMMENDATIONS:** Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present. Keep in properly labeled containers. Keep in a cool, well-ventilated place. Recommended storage temperature < 126 °F / < 52 °C. Keep away from direct sunlight. Store in accordance with the particular national regulations.

**INCOMPATIBILITIES:** Do not store with the following product types: self-reactive substances and mixtures, organic peroxides, oxidizing agents, flammable liquids, flammable solids, pyrophoric liquids, pyrophoric solids, self-heating substances and mixtures, substances and mixtures which in contact with water emit flammable gases and explosives.

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## **8. EXPOSURE CONTROLS / PERSONAL PROTECTION**

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**ENGINEERING CONTROLS:** Use only with adequate ventilation. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Close valve after each use and when empty. Do NOT change or force fit connections. Use back flow preventer in piping.

**PERSONAL PROTECTION:** Wear insulating gloves/ face shield/ eye protection. Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point.

**SKIN PROTECTION:** Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**EYE PROTECTION:** Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.



**RESPIRATORY PROTECTION:** Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93.

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Pentafluoroethane	354-33-6	TWA	1,000 ppm	US WEEL
1,1,1,2-Tetrafluoroethane	811-97-2	TWA	1,000 ppm	US WEEL
Difluoromethane	75-10-5	TWA	1,000 ppm	US WEEL
Butane	106-97-8	TWA	800 ppm 1,900 mg/m <sup>3</sup>	NIOSH REL
		STEL	1,000 ppm	ACGIH
Isopentane	78-78-4	TWA	1,000 ppm	ACGIH

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>APPEARANCE:</b>	Clear, colorless liquid and vapor
<b>PHYSICAL STATE:</b>	Gas at ambient temperature
<b>ODOR:</b>	Slight, Ether like.
<b>SOLUBILITY IN WATER:</b>	No data available
<b>BOILING POINT:</b>	-44.1°F (-42.3°C)
<b>VAPOR PRESSURE:</b>	11,171hpa (77°F/25°C)
<b>FLASHPOINT:</b>	Not Applicable
<b>EVAPORATION RATE:</b>	Not Applicable
<b>FLAMMABILITY:</b>	Will not burn under normal conditions.
<b>LEL/UEL:</b>	None.
<b>DECOMPOSITION TEMPERATURE:</b>	Data not available
<b>VISCOSITY:</b>	Not applicable
<b>VAPOR DENSITY:</b>	1.5 (77°F/25°C) (Air=1)
<b>pH:</b>	Not applicable
<b>MELTING/FREEZING POINT:</b>	No data available

## 10. STABILITY AND REACTIVITY

**CHEMICAL STABILITY:** The product is stable.

**REACTIVITY:** Not classified as a reactivity hazard.

**INCOMPATIBILITIES:** Can react with strong oxidizing agents.

**CONDITIONS TO AVOID:** This substance is not flammable in air at temperatures up to 100 °C (212 °F) at atmospheric pressure. However, mixtures of this substance with high concentrations of air at elevated pressure and/or temperature can become combustible in the presence of an ignition source. This substance can also become combustible in an oxygen enriched environment (oxy- gen concentrations greater than that in air). Whether a mixture containing this substance and air, or this substance in an oxy- gen enriched atmosphere become combustible depends on the inter-relationship of 1) the temperature 2) the pressure, and 3) the proportion of oxygen in the mixture. In general, this substance should not be allowed to exist with air above atmospheric pressure or at high temperatures; or in an oxygen enriched environment. For example, this substance should NOT be mixed with air under pressure for leak testing or other purposes. Heat, flames and sparks.



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## 11. TOXICOLOGICAL INFORMATION

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### TOXICITY DATA:

Chronic effects on humans: Causes damage to the following organs: the nervous system.

Acute toxic effects on humans: No specific information is available in our database regarding the other toxic effects of this material for humans.

### SPECIFIC EFFECTS:

Carcinogenic effects: No known significant effects or critical hazards.

Mutagenic effects: No known significant effects or critical hazards.

Reproductive toxicity: No known significant effects or critical hazards.

### Pentafluoroethane:

Acute inhalation toxicity: LC50 (Rat): > 800000 ppm

Exposure time: 4 h Test atmosphere: gas

Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 75000 ppm Remarks: Cardiac sensitization

Cardiac sensitization threshold limit (Dog): 368.159 mg/m<sup>3</sup> Remarks: Cardiac sensitization

### 1,1,1,2-Tetrafluoroethane:

Acute oral toxicity: Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity: LC50 (Rat): > 567000 ppm

Exposure time: 4 h Test atmosphere: gas

Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 40000 ppm Test atmosphere: gas

Remarks: Cardiac sensitization

Lowest observed adverse effect concentration (Dog): 80000 ppm

Test atmosphere: gas

Symptoms: May cause cardiac arrhythmia.

Cardiac sensitization threshold limit (Dog): 334,000 mg/m<sup>3</sup> Test atmosphere: gas

Symptoms: May cause cardiac arrhythmia.

Acute dermal toxicity: Assessment: The substance or mixture has no acute dermal toxicity

### Difluoromethane:

Acute oral toxicity: Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity: LC50 (Rat): > 520000 ppm

Exposure time: 4 h Test atmosphere: gas

Method: OECD Test Guideline 403

No observed adverse effect concentration (Dog): 350000 ppm Test atmosphere: gas

Remarks: Cardiac sensitization

Lowest observed adverse effect concentration (Dog): > 350000 ppm

Test atmosphere: gas Remarks: Cardiac sensitization

Cardiac sensitization threshold limit (Dog): > 735,000 mg/m<sup>3</sup> Test atmosphere: gas

Remarks: Cardiac sensitization

Acute dermal toxicity: Assessment: The substance or mixture has no acute dermal toxicity

### Butane:

Acute inhalation toxicity: LC50 (Rat): 570000 ppm

Exposure time: 15 min Test atmosphere: gas

Remarks: Based on data from similar materials



**Isopentane:**

Acute oral toxicity: LD50 (Rat): > 2,000 mg/kg Method: OECD Test Guideline 401

Assessment: The substance or mixture has no acute oral toxicity

Remarks: Based on data from similar materials

Acute inhalation toxicity: LC50 (Rat): > 20 mg/l

Exposure time: 4 h Test atmosphere: vapor

Method: OECD Test Guideline 403

Remarks: Based on data from similar materials

**Skin corrosion/irritation**

Not classified based on available information.

**1,1,1,2-Tetrafluoroethane:**

Result: No skin irritation

**Difluoromethane:**

Result: No skin irritation

**Isopentane:**

Species: Rabbit

Result: No skin irritation

Remarks: Based on data from similar materials assessment: Repeated exposure may cause skin dryness or cracking

**Serious eye damage/eye irritation**

Not classified based on available information.

Components:

**1,1,1,2-Tetrafluoroethane:**

Result: No eye irritation

**Difluoromethane:** Result: No eye irritation

**Isopentane:**

Species: Rabbit

Result: No eye irritation

Method: OECD Test Guideline 405

Remarks: Based on data from similar materials

**Respiratory or skin sensitization Skin sensitization**

Not classified based on available information.

Components:

**1,1,1,2-Tetrafluoroethane:**

Routes of exposure: Skin contact

Result: negative

Routes of exposure: Inhalation

Species: Rat

Result: negative

Routes of exposure: Inhalation



Species: Humans  
Result: negative

**Difluoromethane:**

Routes of exposure: Skin contact  
Result: negative

**Isopentane:**

Test Type: Maximization Test  
Routes of exposure: Skin contact  
Species: Guinea pig  
Result: negative

**Germ cell mutagenicity**

Not classified based on available information.

Components:

**Pentafluoroethane:**

Geno toxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)  
Method: OECD Test Guideline 471 Result: negative  
Test Type: In vitro mammalian cell gene mutation test Result: negative  
Remarks: Based on data from similar materials  
Test Type: Chromosome aberration test in vitro Method: OECD Test Guideline 473  
Result: negative  
Geno toxicity in vivo: Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Mouse  
Application Route: inhalation (gas) Method: OECD Test Guideline 474 Result: negative

**1,1,1,2-Tetrafluoroethane:**

Geno toxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)  
Method: OECD Test Guideline 471 Result: negative  
Test Type: Chromosome aberration test in vitro Method: OECD Test Guideline 473  
Result: negative  
Geno toxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Mouse  
Application Route: inhalation (gas) Method: OECD Test Guideline 474 Result: negative  
Test Type: Unscheduled DNA synthesis (UDS) test with mammalian liver cells in vivo  
Species: Rat  
Application Route: inhalation (gas) Method: OECD Test Guideline 486 Result: negative

**Difluoromethane:**

Geno toxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)  
Method: OECD Test Guideline 471 Result: negative  
Test Type: Chromosome aberration test in vitro Method: OECD Test Guideline 473 Result: negative  
Geno toxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Mouse  
Application Route: inhalation (gas) Method: OECD Test Guideline 474 Result: negative  
Germ cell mutagenicity - Assessment: Weight of evidence does not support classification as a germ cell mutagen.

**Butane:**

Geno toxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES)  
Method: OECD Test Guideline 471 Result: negative



Test Type: Chromosome aberration test in vitro Method: OECD Test Guideline 473

Result: negative

Geno toxicity in vivo: Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Rat

Application Route: inhalation (gas) Method: OECD Test Guideline 474 Result: negative

Remarks: Based on data from similar materials

**Isopentane:**

Geno toxicity in vitro: Test Type: Bacterial reverse mutation assay (AMES) Result: negative

Test Type: Chromosome aberration test in vitro Method: Directive 67/548/EEC, Annex V, B.10. Result: negative

Remarks: Based on data from similar materials

Geno toxicity in vivo: Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay) Species: Rat

Application Route: inhalation (vapor)

Method: Directive 67/548/EEC, Annex V, B.12. Result: negative

Remarks: Based on data from similar materials

**Carcinogenicity**

Not classified based on available information.

Components:

**1,1,1,2-Tetrafluoroethane:**

Species: Rat

Application Route: inhalation (gas)

Exposure time: 2 Years

Method: OECD Test Guideline 453

Result: Negative

Carcinogenicity – Assessment:

Weight of evidence does not support classification as a carcinogen

IARC

No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA

No component of this product present at level greater than or equal to .01% is on OSHA's list of regulated carcinogens.

NTP

No ingredient of this product present at level greater than or equal to .01% is identified as a known or anticipated carcinogens by NTP.

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**12. ECOLOGICAL INFORMATION**

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Components:

**Pentafluoroethane:**

Toxicity to fish : LC50 (rainbow trout): > 100 mg/l Exposure time: 96 h  
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l  
Exposure time: 48 h  
Remarks: Based on data from similar material





Toxicity to algae/aquatic plants : ErC50 (Pseudokirchneriella subcapitata (green algae)): > 100 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Remarks: Based on data from similar materials

NOEC (Pseudokirchneriella subcapitata (green algae)): > 1 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Remarks: Based on data from similar materials

**1,1,1,2-Tetrafluoroethane:**

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 450 mg/l  
Exposure time: 96 h  
Method: Regulation (EC) No. 440/2008, Annex, C.1

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 980 mg/l  
Exposure time: 48 h  
Method: Regulation (EC) No. 440/2008, Annex, C.2

Toxicity to algae/aquatic plants : ErC50 (green algae): > 100 mg/l  
Exposure time: 96 h  
Remarks: Based on data from similar materials

**Difluoromethane:**

Toxicity to fish : LC50 (Fish): 1,507 mg/l  
Exposure time: 96 h  
Method: ECOSAR (Ecological Structure Activity Relationships)

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia): 652 mg/l  
Exposure time: 48 h  
Method: ECOSAR (Ecological Structure Activity Relationships)

Method: ECOSAR (Ecological Structure Activity Relationships)

**Isopentane:**

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): > 1 - 10 mg/l  
Exposure time: 96 h  
Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 2.3 mg/l  
Exposure time: 48 h

Toxicity to algae/aquatic plants : NOEC (Scenedesmus capricornutum (fresh water algae)): > 1 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201



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Remarks: Based on  
data from similar  
materials

ErC50  
(Scenedesmu

s capricornutum (fresh water algae)): > 10 - 100 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Remarks: Based on data from similar material



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**13. DISPOSAL CONSIDERATIONS**

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Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, and local regulations.

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**14. TRANSPORT INFORMATION**

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**US DOT ID NUMBER:** UN 1078  
**US DOT SHIPPING NAME:** Refrigerant Gas, N.O.S. (Pentafluoroethane 1, 1,1,2-Tetrafluoroethane)  
**US DOT HAZARD CLASS:** 2.2  
**US DOT PACKING GROUP:** NA

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**15. REGULATORY INFORMATION**

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**U.S. FEDERAL REGULATIONS:**

TSCA 8(b) inventory: Propane  
SARA 302/304/311/312 extremely hazardous substances: No products were found.  
SARA 302/304 emergency planning and notification: No products were found.  
SARA 302/304/311/312 hazardous chemicals: Propane  
SARA 311/312 MSDS distribution – chemical inventory – hazard identification: Propane: Fire hazard, Sudden Release of Pressure  
Clean Water Act (CWA) 307: No products were found.  
Clean Water Act (CWA) 311: No products were found.  
Clean Air Act (CAA) 112 accidental release prevention: Propane  
Clean Air Act (CAA) 112 regulated flammable substances: Propane  
Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

**STATE REGULATIONS:**

Pennsylvania RTK: Propane: (generic environmental hazard)  
Massachusetts RTK: Propane  
New Jersey: Propane

**CANADA**

WHMIS (Canada): Class A: Compressed gas  
Class B-1: Flammable gas  
CEPA DSL: Propane



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**16. OTHER INFORMATION**

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**CURRENT ISSUE DATE:** June 2021  
**PREVIOUS ISSUE DATE:** NA

**OTHER INFORMATION:**

**NFPA RATINGS:**

HEALTH	2
FLAMMABILITY	0
INSTABILITY	0
SPECIAL	None

**HMIS RATINGS:**

HEALTH	0
FIRE HAZARD	0
REACTIVITY	0
PHYSICAL HAZARD	3

**DISCLAIMER:**

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