

SAFETY DATA SHEET

in accordance with Regulation EU 453/2010 and Regulations on safety data sheet content ("Official Gazette RS", 100/11)

RAFFINATE 2

Version: 4 – this version supersedes all the previous ones

Revision: 1

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PETROHEMIJA

1. IDENTIFICATION OF THE CHEMICAL AND DATA ON THE PERSON SELLING THE CHEMICAL

1.1 IDENTIFICATION OF THE CHEMICAL

| | |
|------------------------|---|
| Chemical name | Hydrocarbons, C4, without 1,3-butadiene and iso -butene |
| Index number | 649-118-00-X |
| CAS number | 95465-89-7 |
| EC number | 306-004-1 |
| Commercial name | Raffinate 2 |
| REACH registration no. | n.a. |

1.2. IDENTIFIED WAYS OF USING THE CHEMICAL AND THE WAYS OF USING NOT RECOMMENDED

| | |
|-------------------------------|------------------------------|
| The way of using the chemical | It is used as fuel (B 55300) |
|-------------------------------|------------------------------|

1.3. DATA ON SUPPLIER

| | |
|--------------------------|---|
| Producer's name | „HIP-Petrohemija“ Pančevo Spoljnostarčevačka 82 26000 Pančevo Republic of Serbia +381 13 30 70 00 |
| Address and phone number | |

| | |
|--|--|
| e-mail address of a person in charge for safety data sheet | iboja.rasa@hip-petrohemija.rs |
|--|--|

1.4. EMERGENCY TELEPHONE NUMBERS

| | |
|-------------------------|---|
| Emergency Contact (24h) | See Section 16. for the list of telephone numbers of poison centers in the European Economic Area |
|-------------------------|---|

2. HAZARD IDENTIFICATION

2.1. CHEMICAL CLASSIFICATION

Rulebook on classification, packing, marking and advertising of the chemical and certain product in accordance with Global harmonized system for classification and marking UN („Official Gazette RS“ No. 105/13)

Gas. under pres.
Flam.gas. 1; H220

For full name of hazard class and information on hazard see Section 16

| | |
|------------------------------|--|
| Environmental harmful effect | The product is not classified as dangerous for environment. The product is volatile. Emissions into environment should be avoided whenever possible. |
|------------------------------|--|

| | |
|----------------------------------|--|
| Harmful physical-chemical effect | Very easily flammable. Upon leakage, the product creates static electricity, and as a consequence it could happen that sparks may lead to inflammation or cause explosion. Upon usage, it may form flammable/explosive mixtures with air. Steams are heavier than air. |
|----------------------------------|--|

2.2. LABELING ELEMENTS

| | |
|---------------------------------------|--|
| Danger pictogram |  |
| Word of warning | Danger! |
| Information on danger | H220 |
| Information on precautionary measures | P210, P243, P377, P381, P403, P410+P403 |

For full name of information on precautionary measures see Section 16

2.3. OTHER HAZARDS

Ethylene does not fulfill the criteria for identification as persistent – bioaccumulative-toxic (PBT) or very persistent – very bioaccumulative (vPvB).

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1. DATA ON SUBSTANCE INGREDIENTS

| Chemical name | Index number | Concentration (%(m/m)) |
|---------------|--------------|------------------------|
| 1- butene | 601-012-00-4 | 49,1 – 56,2 |
| 2-butene | 601-012-00-4 | 23,3 – 35,4 |
| iso-butene | 601-012-00-4 | 1,4 – 2,9 |
| butane | 601-004-00-0 | 4,1 – 9,4 |
| iso-butane | 601-004-00-0 | 4,4 – 7,8 |

4. FIRST AID MEASURES

4.1. DESCRIPTION OF FIRST AID MEASURES

| | |
|-----------------|---|
| General advices | Warning!Very easily inflammable gas! In case of high concentrations or longer influence,call a doctor or urgently seek medical help.Check basic vital functions (blood circulation,breathing,consciousness) and,if necessary,seek medical attention.Undertake necessary safety measures to protect your own health during rescue and first aid providing. |
| Inhalation | Take the victim to fresh air and leave him rest in a comfortable position that makes his breathing easier.Seek medical help.If necessary,give him oxygen.It is necessary to keep him under medical supervision. |
| Skin contact | In case of skin contact with liquid,frostbites occur.It is necessary to immediately take off all contaminated clothes.Wash the skin with great amounts of water.Frostbites should be treated in the same way as burns.In case of severe contamination,take the victim instantly for the hospital medical treatment. |
| Eye contact | Rinse the eyes thoroughly with a lot of water for at least 15 minutes even under the eyelids to ensure complete rinsing of eye surface.Use warm water.Immediately seek medical help.Consult an ophthalmologist.Do not wear contact lenses during work. |
| Ingestion | Ingestion is not possible. |

4.2. THE MOST IMPORTANT SYMPTOMS AND EFFECTS, ACUTE AND DELAYED

| | |
|--------------|--|
| Inhalation | Narcotic in case of inhalation of high steam concentrations. |
| Skin contact | Can cause irritation. In liquified state can cause serious frostbites. |
| Eye contact | In direct contact with the product can cause cold burns. |
| Ingestion | Ingestion of this product is impossible. However, mouth and throat contact with liquified gas can cause serious injuries and cold burns. |

4.3. URGENT MEDICAL HELP AND SPECIAL TREATMENT

To be treated according to the symptoms. Inhalation of high concentrations can cause suffocation (first of all fatigue, dizziness, concentration loss, with collapse and coma).

5. FIRE FIGHTING MEASURES

5.1. AGENTS FOR FIRE EXTINGUISHING

| | |
|---|---|
| Suitable agents for fire extinguishing: | Agents for fire extinguishing: Use foam, dry powder or carbon-dioxide (CO ₂). |
| Unsuitable agents for fire extinguishing: | Do not use direct water jet. |

5.2. SPECIAL HAZARDS THAT MAY OCCUR FROM SUBSTANCES AND MIXTURES

Dangerous combustion products.: Carbon-monoxide, carbon-dioxide and incombustible hydrocarbons (fume).

5.3. ADVICE FOR FIREMEN

| | |
|--|---|
| Special protection measures during fire extinguishing: | Make only necessary personnel stay. Extinguish fire from the protected location on the maximum possible distance. Avoid inhaling any smoke and combusted material. Immediately withdraw in case of fire upon vessel opening, or upon discoloration of a tank caused by heat. Fire may cause pressure increase and risk of tank cracking and then explosion. |
| Special protective equipment for firemen: | Complete protective equipment for firemen according to ref. Standard SRPS EN 469, protective gloves for firemen (ref. Standard SRPS EN 659) and boots in combination with corresponding means for protection of breathing organs (ref. Standard SRPS EN 137). |

6. MEASURES IN CASE OF AN ACCIDENT

6.1. PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND MEASURES IN CASE OF AN ACCIDENT

Wear personal protective means. Avoid inhaling vapors. Provide an adequate ventilation and absence of ignition source.

6.2. ENVIRONMENTAL PRECAUTIONS

If major spillage occurs, inform the local authorities. Make sure it does not reach drains and environment.

In case of leakage in soil: The product evaporates in the atmosphere. Steams are heavier than air so explosive mixtures may accumulate on lower positions: they may ignite in places distant from the point of leakage. Therefore, cover sewer inlets and prevent steam/liquid to reach drains and waste waters systems – there is risk of explosion. In case of leakage in water: The product evaporates in the atmosphere.

6.3. MEASURES TO BE TAKEN AND MATERIALS FOR SPREADING PREVENTION AND ELIMINATION

Evacuate the zone. Provide ventilation. Eliminate ignition sources. All the equipment should be grounded and ensured in order to eliminate static electricity appearance. Let the product burn out „under control “ in the presence of firemen. In case of cold weather (low temperatures) cover the product with non-combustible absorbing material (sand, universal binders) and place into closed containers (drums) and dispose.

6.4. REFERENCE TO OTHER SECTIONS

See Sections 8. and 13.

7. HANDLING AND STORAGE

7.1. PRECAUTIONS FOR SAFE HANDLING

All measures of precaution should be taken in order to prevent accumulation of static electricity. All electric components and components in usage should be in anti-explosive protection (Ex). Use antistatic personal protective equipment when handling. Ensure sufficient air exchange in work areas. Eliminate all possible ignition sources in the work area.

Avoid any leakage into environment – prevent leakage of product into drains and water systems. Avoid inhalation. Avoid skin and eye contact. Do not handle the product near open flame, heat or ignition source. Smoking while handling is forbidden. Eating and drinking while handling is forbidden. After the completion of work, all work clothes should be taken off and disposed. Handle the product in accordance with good industrial hygiene and safety work procedures.

7.2. CONDITIONS FOR SAFE STORAGE, INCLUDING INCOMPATIBILITIES

Use tanks, pipelines and other equipment made of suitable materials for using gaseous or liquified hydrocarbons under pressure and at very low temperatures.

Do not store it near source of heat or ignition. Tanks must be grounded and have safety valve. Suitable material: stainless steel.

Incompatible materials: oxidating agents and strong acids.

7.3. SPECIAL WAYS OF USAGE

No data.

8. EXPOSURE CONTROL

8.1. EXPOSURE CONTROL PARAMETERS

| | | |
|--|-------------------|------------------------|
| Aliphatic hydrocarbon gases: Alkanes (C1-C4) | US (ACGIH (2009)) | TLV - 8h TWA: 1000 ppm |
|--|-------------------|------------------------|

8.2. EXPOSURE CONTROL AND PERSONAL PROTECTION

| | |
|--|--|
| Eye/face protection | Wear goggles. If possible use chemical resistant goggles with shield while in contact with liquified gas (ref. standard SRPS EN 166). |
| Skin protection (hands /other parts of body) | Use impregnated gloves in order to avoid tissue freezing in contact with liquified gas. Use chemically resistant boots with good sole in order to prevent sliding (ref. standard SRPS EN 374). |
| Respiratory Organs Protection | If technical protective measures and ventilation are not sufficient in order to prevent aerosol and vapors creation and/or if oxygen concentration is low there should be used insulation apparatus (ref. standard SRPS EN 137). |
| Environment exposure control | Environmental exposure control should be performed in accordance with current regulations. |

9. PHYSICAL AND CHEMICAL PROPERTIES ⁽¹⁾

9.1. DATA ON BASIC PHYSICAL AND CHEMICAL PROPERTIES OF THE CHEMICAL

| | |
|---------------------------------------|--|
| Physical state | Gas on standard conditions (20°C and 1013 hPa) |
| Colour | Colourless |
| Odour | Slight odour like olephines |
| Odour treshold | Not determined |
| pH | Not applicable |
| Melting point /freezing point | -185 to -105.5 °C |
| Initial boiling point (Boiling range) | -6.26 to 3.71 °C |
| Ignition point | < -56°C |
| Evaporation speed | Immediately at 20°C |

| | |
|--|---|
| Flammability | Very easily flammable |
| Lower flammability limit (explosion) | 1,6% |
| Upper flammability limit (explosion) () | 10% |
| Vapour pressure | 600 – 39000 hPa at 20°C |
| Vapour density (air =1) | 0.555 - 0.616 g/cm ³ at 20°C |
| Relative density | No data |
| Solubility | 222 - 263 mg/l at 25°C |
| Coef.of n-octanole/water distribution(Log Kow) | 2,31 - 2,33 |
| Self-ignition temperature | 324 - 465°C |
| Decomposition temperature | No data |
| Viscosity | Not applicable |
| Explosive properties | Mixture of gas and air is explosive |
| Oxidizing properties | Not applicable |
| 9.2. OTHER DATA | |
| No data | |

10. STABILITY AND REACTIVITY

10.1. REACTIVITY

With air can form flammable/explosive mixtures.

10.2. CHEMICAL STABILITY

The product is stable.

10.3.POSSIBILITY OF APPEARANCE OF DANGEROUS REACTIONS

Avoid contact with: hydrogen, halogens (bromine, chlorine, fluorine), strong oxidating agents, aluminium chloride.

10.4. CONDITIONS TO BE AVOIDED

Heat,spark,open flame and other ignition sources.

10.5. INCOMPATIBLE MATERIALS

Strong oxidating agents.

10.6. HAZARDOUS DECOMPOSITION PRODUCTS

Upon complete combustion,carbon dioxide and water vapor occur. Upon non-complete combustion,carbon monoxide and hydrocarbons occur: aldehydes and ketones .

11. TOXICOLOGICAL DATA ⁽¹⁾

11.1. DATA ON TOXICAL EFFECTS OF THE SUBSTANCE

| | | |
|---|--|--------------|
| Acute toxicity | LC ₅₀ inhalation, rat, for gases and vapours | 23 mg/l (4h) |
| Corrosive damage of skin/irritation | No data. | |
| Heavy eye damage/eye irritation | Does not cause heavy eye damage/eye irritation. | |
| Sensitivity of respiratory organs or skin | No data. | |
| Mutagenicity of germinative cells | Does not cause mutagenicity of germinative cells. | |
| Carcinogenicity | Does not cause cancer appearance. | |
| Reproduction toxicity | NOAEC: 5000 ppm (inhalation, rat, male and female, 6h/day). | |
| Specific toxicity for target organ - II | No data. | |
| Specific toxicity for target organ - VI | NOAEL: 4489 ppm (inhalation, rat, male and female, 6h/day,5 days in a week). | |
| Aspiration danger | No data. | |

12. ECO-TOXICOLOGICAL DATA ⁽¹⁾

12.1. TOXICITY

| | | |
|------------------|--------------------------------------|--------------------|
| Acute toxicity | 96 h LC ₅₀ (for fish) | 19 mg/l |
| | 48 h LC ₅₀ (for crayfish) | 11 mg/l |
| | 96 h EC ₅₀ (for alga) | 7,7 mg/l |
| | M - factor | / |
| Chronic toxicity | 96 h LC ₅₀ (for fish) | Not available data |
| | 48 h LC ₅₀ (for crayfish) | Not available data |
| | 96 h EC ₅₀ (for alga) | Not available data |
| | M - factor | / |

12.2. PERSISTENCY AND DEGRADABILITY

Biodegradability The quick biodegradability is expected.

12.3. BIOACCUMULATION POTENTIAL

Bioaccumulation Bioaccumulation ability is determined by coefficient of distribution of octanol/water, log Kow is 2,31-2,33, which means that the product has no bioconcentration potential.

12.4. MOBILITY IN SOIL

Product evaporates into air and there is almost no entering into ground .

12.5. RESULTS OF PBT AND vPvB ASSESSMENT

PBT AND vPvB The substance does not fulfill the criteria for identification as persistent – bioaccumulative-toxic or very persistent – very bioaccumulative.

12.6. OTHER HARMFUL EFFECTS

| | |
|---------------------------------|-------------------------|
| Environmental effects | The data not available. |
| Creation of photochemical ozone | The data not available. |
| Endocrine system disorder | The data not available. |


13. DISPOSAL

13.1. WASTE TREATMENT METHODS


Disposal of unused product and package Disposal of unused product is performed in accordance with regulations on waste management – the rest of the unused product is delivered to the authorized operator or to the place determined for gathering dangerous waste. Taking care of unused product – thermal treatment in installation for incineration. The product is not packed in package.

14. DATA ON TRANSPORT


Road (ADR) / Rail (RID) / Water (ADN) transport

| | | |
|------------------------------|---|---|
| Propper shipping name | HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. MIXTURE A | Labeling |
| UN number | 1965 |  |
| Hazard class in transport | 2 (2.1 Flammable gas) | |
| Classification code | 2F | |
| Identification danger number | 23 | |
| Packing group | / | |

International Marine Transport (IMDG)

| | | |
|-----------------------|---|---|
| Propper shipping name | HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. MIXTURE A | Labeling |
| UN number | 1965 |  |
| IMDG class | 2 (2.1 Flammable gas) | |
| EmS classification | F-D, S-U | |
| Packing group | / | |

International air transport (IATA/ICAO)

| | | |
|-----------------------|---|---|
| Propper shipping name | HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. MIXTURE A | Labeling |
| UN number | 1965 |  |
| ICAO/IATA class | 2 (2.1 Flammable gas) | |
| Packing group | / | |

14.1. UN NUMBER

UN 1965

14.2. UN NAME FOR CARGO IN TRANSPORT

HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. MIXTURE A

14.3. HAZARD CLASS IN TRANSPORT

2 (2.1 Flammable gas)

14.4. PACKING GROUP

/

14.5. ENVIRONMENTAL DANGERS

| | |
|------|-----|
| ADR | yes |
| RID | yes |
| ADRN | yes |
| IMDG | yes |

14.6. SPECIAL PRECAUTIONS FOR USER

Observe the same measures as described in Section 7. Handling and storage

14.7. TRANSPORT IN BULK

Not applicable.

15. REGULATORY DATA**15.1. REGULATIONS CONCERNING SAFETY, HEALTH AND ENVIRONMENT**

Regulations on the List of dangerous substances and their quantities and criteria for determining kind of documents made by operator of seveso installation, i.e. complex. („Official Gazette RS.“ No.41/10) Table II:

List of hazards classes and limit quantities of dangerous substances On. 8, limit quantity in tons: 10-50

15.2. ASSESSMENT OF THE CHEMICAL SAFETY

No assessment of the chemical safety has been made.

16. OTHER DATA

| | |
|-----------------|--|
| Training advice | Staff handling the product must be informed on its hazardous characteristics, health and environmental protection principles referring to that product and first aid principles. |
|-----------------|--|

| | | |
|---|--|--|
| Recommendation for usage | The product is intended exclusively for professional usage. It is to be used only in industry. | |
| Full name of hazards classes, information on danger and information on precautions measures | Flam.gas. 1 | Flammable gases, category 1 |
| | Gas. under press. | Gases under pressure |
| | H220 | Very flammable gas |
| | P210 | Keep away from heat sources/sparks/open flame/hot surfaces . – Smoking forbidden |
| | P243 | Precautions measures should be taken in order to avoid static electricity appearance. |
| | P377 | Fire when the gas is leaking: Do not extinguish,except if the leakage can be stopped in a safe way |
| | P381 | Remove all ignition sources,if possible do it safely . |
| | P403 | Storage is to be made on the place with good ventilation. |
| | P410+P403 | Protect from sunlight. Keep it in area with good ventilation. |
| Amendments and additions to safety data sheet | Changes were made in subsection 2.1 and section 16 for the purpose of classification and labeling only with the "Regulation on classification, packaging, labeling and advertising chemicals and certain products in accordance with the Globally Harmonized System for classification and labeling UN" („Sl.glasnik RS“ No. 105/13) | |
| Sources used for key information when making safety data sheet | ⁽¹⁾ ECHA – European Chemicals Agency (http://echa.europa.eu/) ESIS - European chemical Substances Information System (http://esis.jrc.ec.europa.eu/) | |

List of abbreviations

| | |
|-------------------|--|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| ADR | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| ADN | European Agreement concerning the International Carriage of Dangerous Goods by inland Waterways |
| CAS | Chemical Abstract Service – Number of chemical compound and some mixtures |
| ErC ₅₀ | Half maximal effective concentration –concentration of compound at which 50% population gives answer,after certain exposure period |
| EU | European Union |
| IATA | International Air Transport Association |
| ICAO | International Civil Aviation Organization |
| IMDG | International Maritime Dangerous Goods |
| LC ₅₀ | Lethal Concentration – Lethal concentration,chemical concentration which kills 50% of the tested population |
| LD ₅₀ | Lethal Dose – Lethal dose,chemical dose which kills 50% of the tested population |
| LOAEL | Lowest Observed Adverse Effect Level – Level of minimum harmful (adverse) effect, the lowest level of the noticed harmful consequences |

| | |
|----------|---|
| M-factor | M-factor is the coefficient by which there is multiplied the substance concentration which is classified as dangerous for water environment, acute, category 1 or chronic, category 1, and which is used in summing up method for classification of mixture containing that substance |
| NOAEL | No Observed Adverse Effect Level – |
| OEL | Occupational Exposure Limit – |
| RID | International Rule for Transport of Dangerous Substances by Railway |
| TWA | Time Weighted Averages – Average samples concentration in time unit |

LIST OF TELEPHONE NUMBERS OF POISON CENTRES IN THE EUROPEAN ECONOMIC AREA

| | |
|-------------------------------|--|
| AUSTRIA (Vienna Wien) | +43 1 40 400 2222 |
| BELGIUM (Brussels Bruxelles) | +32 70 245 245 |
| BULGARIA (Sofia) | +359 2 9154 409 / +359 887 435 325 |
| CZECH REPUBLIC (Prague Praha) | +42 2 2491 9293 or +42 2 2491 5402 |
| DENMARK (Copenhagen) | +45 35 31 54 04 |
| FINLAND (Helsinki) | +358 9 471 977 |
| FRANCE (Paris) | +33 1 40 05 48 48 |
| GERMANY (Berlin) | +49 30 450 653565 |
| GREECE (Athens Athinai) | +30 10 779 3777 |
| HUNGARY (Budapest) | +36 80 20 11 99 |
| ICELAND (Reykjavik) | +354 525 111, +354 543 2222 |
| IRELAND (Dublin) | +353 1 8379964 |
| ITALY (Rome) | +39 06 305 4343 |
| LATVIA (Riga) | +371 704 2468 |
| LITHUANIA (Vilnius) | +370 2 36 20 52, +370 2 36 20 92 |
| NETHERLANDS (Bilthoven) | +31 30 274 88 88 |
| NORWAY (Oslo) | +47 22 591300 |
| POLAND (Gdansk) | +48 58 301 65 16 or +48 58 349 2831 |
| PORTUGAL (Lisbon Lisboa) | 808 250 143 (for use only in Portugal), +351 21 330 3284 |
| ROMANIA (Bucharest) | +40 21 230 8000; |
| SLOVAKIA (Bratislava) | +421 2 54 77 4 166 |
| SLOVENIA (Ljubljana) | + 386 41 650 500 |
| SPAIN (Barcelona) | +34 93 227 98 33 or +34 93 227 54 00 bleep 190 |
| SWEDEN (Stockholm) | +46 8 33 12 31 (International) 112 (National) |
| UNITED KINGDOM (London) | 0870 243 2241 |