Material Safety Data Sheet

Product name	TRAVEL GAS (110g & 230g & 450g) Double Valve

1. Product and company identification

a) Product name **TRAVEL GAS (110g & 230g & 450g) Double Valve**

b) Recommended use of product and limitations

Use of product For use only in portable gas appliances

Limitations Extremely flammable

c) Manufacturer / Supplier Information

Company Activent 365 s.r.o

Address Prikop 27/2a Brno 602 00 Czech Republic

Emergency phone number 00420491483039

2. Hazards identification

a) Hazard-Risk Classification

Flammable gases : 1

Gases under pressure : liquefied gas or Refregerated liquefied gas

Specific target organ toxicity (single exposure) : 3 (narcosism)

b) Label elements including precautionary

- Symbol

- Signal word Danger
- Hazard-risk statement

H220 Extremely flammable gas

H280 Contains gas under pressure; may explode if heated

H281 Contains refrigerated gas; may cause cryogenic burns or injury.

H336 May cause drosiness or diziness

- Precautionary statement

Prevention

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking

P261 Avoid breathing dust/fumes/gas/mist/vapours/spray.

P271 Use only outdoors or in a well-ventilated area.

P282 Wear cold insulating gloves/face shield/eye protection.

Response

P308+P313 If exposed or concerned: Get medical advice/ attention.

P315 Get immediate medical advice/attention.

P336 Thaw frosted parts with lukewarm water. Do not rub affected areas.

P362+P364 Take off contaminated clothing and wash it before reuse.

P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely

P381 Eliminate all ignition sources if safe to do so

Storage

P403 Store in a well-ventilated place

P403+P233 Store in a well ventilated place. Keep container tightly closed.

P405 Store locked up.

P410+P403 Protect from sunlight. Store in a well-ventilated place.

Disposal

P501 Dispose of contents or container in accordance with

c) Other Hazard Risk (NFPA)

- Propane
  - Health Flammability: 1 (slightly hazardous)
  - Reactivity: 4 (flash points below 22.7 ℃)
- n-Butane
  - Health: 0 (stable)
  - Flammability: 1
  - Reactivity: 4
- iso-Butane
  - Health: 0
  - Flammability: 1
  - Reactivity: 4
- n-Pentane
  - Health: 0
  - Flammability: 1
  - Reactivity: 4
- iso-Pentane
  - Health: 0
  - Flammability: 1
  - Reactivity: 4

3. composition / information in ingredients

Chemical name	Other name	CAS 번호	Content (mol%)
Propane	Propane	74-98-6	18 <= x%< 28
Butanes	Butane	68513-65-5	-
- n-Butane	n-Butane	106-97-8	7 <= x%< 15
- iso-Butane	iso-Butane	75-28-5	65 <= x%< 70
1,3-Butadiene	1,3-Butadiene	106-99-0	< 0.1%
Total			100 %

4. First aid measure

a) Eye contact

Seek medical attention immediately.

b) Skin contact

If frostbite has occurred, seek medical attention immediately; Do NOT rub the affected areas

In order to prevent further tissue damage, do NOT attempt to remove frozen clothing and cool the frostbite part as long as possible with cold water.

Before to remove frozen clothing, thaw it

If frostbite has NOT occurred, immediately wash contaminated skin with soap and water

If skin troble occurred, get medical attention and advice.

c) Inhalation

Seek medical attention immediately.

Keep the affected person warm and at rest.

If a person breathes large amounts of this chemical, move the exposed person to If breathing is difficult, give oxygen.

If breathing has stopped, perform mouth-to-mouth resuscitation.

d) Ingestion	Seek medical attention immediately.
e) Notes for physician	Keep a doctor to recognize chemical substance and take care of patients.

5. Fire-fighting measures

a) Suitable (and unsuitable) extinguishing	CO_2, dry chemical, water spray or fog for surrounding area. Use dry sand or earth for the smothering extinguishment
b) Specific hazards arising from the chemical	Extreme flammable gas A leakage of material may present a fire / explosion risk. There is a risk of steam explosion in indoor, outdoor and sewer. It will ignite easily by heat, spark and flame. Vapors may ignite and explode. Shut off source of propane, if possible, dilute leakage of water. Easily ignited by heat, sparks and flames. Steam can move back to the ignition source and flash back Vapor may cause diziness or asphyxiant without awareness Some constituents may be irritating when inhaled at high concentrations. Cylinders exposed to fire may release flammable gas.
c) Special protective equipment and precautions for fire–fighters	Note that some part can leave flammable residue after evaporation Keep away from contact with clothing and other combustible materials to avoid Avoid friction or rough handling because of fire hazard. Allow gas to burn if flow cannot be shut off. Eliminate sources of ignition. Evacuate area and fight fire from a safe distance Leaking gas fire : do not stop extinguish unless leak can be stopped safely. Move container from fire area if it is not dangerous. Be careful that broken cylinders may fly over. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Do not touch the exposure source or safety device directly, as it may freeze in the In case of a tank fire, use fire extinguisher at enough distance or use unmanned After fire has extinguished, flush with plenty of water for a long time to cool In case of a tank fire, immediately leave the fire area if there is treble sound or discoloration of the tank. In case of a tank fire, get out of the area If the tank is in flames Evacuate in accordance of accident situation. (Evacuation radius : 0.8 km, The spread range varies depending on the location of the accident and the fire fighting way to be taken.) Rapidly excess heating or fire will be caused burst or rupture of a container. (In case at elevated temperatures(over 54℃/130℉) CRV of containers will be operated. Extremely Flammable. Do not use near fire of flame.

6. Accidental release measures

a) Personal precautions, protective equipment and emergency procedures	Use non-sparking equipment when cleaning up flammable spill. In closed spaces, wear a self-contained breathing apparatus and ventilate. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Avoid inhalation and skin contact, contaminated clothing should be changed. Contain spilled liquid with sand or earth. do NOT use combustible materials. Dust can be a fire or explosion hazard. Immediately wipe the spill, follow precautions for protective equipment.
Personal precautions, protective equipment and emergency procedures (Continued)	If possible, turn the leak valve of container to be released as gas rather than Ventilate the contaminated area. Do not touch the leak source directly. Using water spray to reduce the vapor or vapor clouds of gas and do not allow Always ground all equipment when handling material

a) Environmental precautions and protective procedures	Keep out of drains, sewers, ditches and waterways. Use appropriate container to avoid environmental contamination. Cover with absorbent or contain, Collect and dispose.
b) Methods and materials for containment	If possible, release in vapor by turning over leaking container. Clean the contaminated zone using cleanser and water. Use water spray/fog for prevent spread.

7. Handling and storage

a) Precautions for safe handling	To avoid sudden release of pressure, loosen closure cautiously before opening. Avoid inhalation, skin and eyes. Use only clean, dry utensils in handling. Minimize dust generation and accumulation. Do not smoke or use matches or lighters during use and until vapors are gone. To dissipate static electricity during transfer, ground drum and connect to receiving container with bonding strap. Avoid prolonged or repeated skin contact. Wash thoroughly after handling. Avoid breathing gas or vapor.
b) Conditions for safe storage (including any incompatibilities)	Keep away from heat, spark and flame – No Smoking. Avoid direct sunlight and store in a well-ventilated place. The empty cylinder should be completely drained, properly blocked and immediately returned to the cylinder regulator. Place it properly. Stored containers should be periodically checked for general conditions and leakage. Keep container tightly closed. Store in a cool, well-ventilated area.

8. Exposure controls and personal protection

a) Control parameter and Biological Exposure Indices

Domestic regulation

Propane	TWA - 1,000ppm 1,800mg/m3
n-Butane	TWA - 800ppm 1,900mg/m3
iso-Butane	TWA - 800ppm 1,900mg/m3 No
n-Pentane	Data Available
iso-Pentane	No Data Available

ACGIH TLV-TWA (Threshold Limit Value - Time Weighted Average)

Propane	TWA 1,000 ppm 8hours (3/2012)
n-Butane	TWA 1,000 ppm 8hours (3/2012)
iso-Butane	TWA 1,000 ppm 8hours (3/2012)
n-Pentane	TWA 600 ppm 8hours (3/2012)
iso-Pentane	TWA 600 ppm 8hours (3/2012)

Biological Exposure Indices (BEI)

Propane	No Data Available
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	No Data Available

Appropriate engineering controls	Adequate ventilation should be provided so that exposure limits are not exceeded. In case of risk explosion, use explosion-proof ventilation equipment.
Personal protective equipment Respiratory protection	Use NIOSH approved positive-pressure, supplied air respirator with escape bottle.
Eye protection	Where there is a possibility of liquid contact, wear splash-proof safety goggles and faceshield.
Hands protection Body protection	Use cold-impervious, insulating gloves where contact with liquid may occur. Where contact with liquid may occur, wear apron and faceshield.

9. Physical and chemical properties

a)Appearance	
- Color	Colorless
- Physical state	Gas, liquid at low temperature, high pressure
b) Odor	Odorless (before injecting an odorizer), Characterisitic ordor (after injecting an odorizer)
c) Odor threshold	The odor of gas shall be detected when the gas/air compound ratio reaches 1/1000. (after injecting an odorizer)
d) pH	Not applicable about
e) Melting /freezing point	-155 ~ -138℃
- Propane	-187.68℃
- n-Butane	-138.29℃
- iso-Butane	-159.61℃
- n-Pentane	-129.8℃
- iso-Pentane	-159.9℃
f) Initial boiling point and boiling range	about -10 ~ 0℃
- Propane	-42.11℃
- n-Butane	-0.49℃
- iso-Butane	-11.75℃ 36.1℃
- n-Pentane	27.85℃
- iso-Pentane	about -75 ~ -60℃
g) Flash point	-104℃
- Propane	-60℃
- n-Butane	-83℃
- iso-Butane	-49℃
- n-Pentane	-51℃
- iso-Pentane	No Data Available
h) Evaporation rate	Flammable gas
i) Flammability (liquid, gas)	about 8.4 % / 1.6 %
j) Upper / lower flammability	9.5% / 2.1%
- Propane	8.4% / 1.6%
- n-Butane	9.6% / 1.8%
- iso-Butane	7.8 % / 1.4 %
- n-Pentane	9.2 % / 1.3 %
- iso-Pentane	

k) Vapor pressure	about 2.5 Bar (at 21℃)
- Propane	8.587 Bar (at 21℃)
- n-Butane	2.148 Bar (at 21℃)
- iso-Butane	3.126 Bar (at 21℃)
- n-Pentane	0.5790 Bar (at 20℃)
- iso-Pentane	0.795 Bar (at 21℃)
l) Solubility	about 60mg/L (at 25℃)
- Propane	62.5mg/L (at 25℃)
- n-Butane	61mg/100mL (at 20℃)
- iso-Butane	48.9mg/L (at 25℃)
- n-Pentane	40.2mg/L (at 20℃)
- iso-Pentane	48 mg/L (at 25℃)
m) Vapor density	about 2 (air=1)
- Propane	1.55
- n-Butane	2.07
- iso-Butane	2.01
- n-Pentane	2.48
- iso-Pentane	2.5
n) Specific gravity	about 0.58 (at 15℃)
- Propane	0.58088 kg/L (at boiling point, 1.013bar)
- n-Butane	0.60126 kg/L (at boiling point, 1.013bar)
- iso-Butane	0.59382 kg/L (at boiling point, 1.013bar)
- n-Pentane	0.626 kg/L
- iso-Pentane	0.616 kg/L (at boiling point, 1.013bar)
o) Partition coefficient (n-octanol / water)	about 2.85 (log Kow)
- Propane	2.36
- n-Butane	2.89
- iso-Butane	2.76
- n-Pentane	3.39
- iso-Pentane	2.3
p) Autoignition temperature	About 260℃ (The Lowest temperature of all substance)
- Propane	470℃
- n-Butane	430℃
- iso-Butane	460℃
- n-Pentane	260℃
- iso-Pentane	420℃
q) Decomposition temperature	No Data Available
r) Viscosity	No Data Available
s) Molecular weight	About 58.4
- Propane	44.0965
- n-Butane	58.1234
- iso-Butane	58.1234
- n-Pentane	72.1503
- iso-Pentane	72.1503

10. Stability and reactivity

a) Chemical stability and possibility of hazardous reactions	Extreme Flammable gas. A leakage of material may present a fire / explosion risk. There is a risk of steam explosion in indoor, outdoor and sewer. It will ignite easily by heat, spark and flame. Vapors may ignite and explode. Vapor can move to the ignition source and flash back. Vapors may cause dizziness or asphyxiant without awareness Cylinders exposed to fire may release flammable gas.
b) Conditions to avoid	Keep away from strong oxidizers, ignition sources and heat – no smoking. No Data Available
c) Incompatible materials	
d) Hazardous decomposition products	Carbon monoxide, carbon dioxide and non-combusted hydrocarbons(smoke).

11. Toxicological information

a) Information on the likely routes on	
- Propane	nausea, vomiting, irregular heart rate, headaches, drowsiness, dizziness, disorientation, emotional lability, inebriation, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy, shortness of breath, central nervous system (CNS) depression. Ingestion of a hazardous amount is unlikely to occur. may cause freeze burns and frostbite.
- n-Butane	It can cause stimulus, nausea, vomiting, shortness of breath, irregular heart rate, headaches, drowsiness, fatigue, dizziness, disorientation, emotional lability, inebriation, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy.
- iso-Butane	It can cause stimulus, nausea, vomiting, headaches, drowsiness, fatigue, dizziness, emotional lability, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy. may cause freeze burns and frostbite
- n-Pentane	It can cause stimulus, nausea, vomiting, stomach ache, shortness of breath, headaches, drowsiness, dizziness, adjustment (feature) loss, asphyxiant. Ingestion of a hazardous amount is unlikely to occur.
- iso-Pentane	It can cause stimulus, nausea, vomiting, stomach ache, shortness of breath, headaches, drowsiness, dizziness, adjustment (feature) loss, asphyxiant. Ingestion of a hazardous amount is unlikely to occur.
b) Health hazards information	
- Acute toxic	No Data Available
Oral	
Dermal	
Propane	No Data Available
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	LC50 > 2,000 mg/kg Rat
Inhalation	
Propane	LD50 570,000 ppm 15 min Rat
n-Butane	LC50 277,374 ppm 4 hr Rat
iso-Butane	LC50 658,000mg/ ㎥ 4 hr Rat
n-Pentane	LC50 364,000mg/ ㎥ 4 hr Rat
iso-Pentane	LC50 280,000mg/ ㎥ 4 hr Rat

- Skin corrosive / irritant

Propane	No Data Available (EU Directive 67/548) rabbit /irritating (IUCLID) No
n-Butane	Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	Non-stimulated (rabbit)

- Serious eye damage / eye irritation

Propane	No Data Available (EU Directive 67/548/EEC) Rabbit/ not irritating (IUCLID)
n-Butane	Non-stimulated (rabbit)
iso-Butane	Non-stimulated (rabbit) No
n-Pentane	Data Available
iso-Pentane	High-concentrated vapor can stimulate eye.

- Respiratory sensitization — No Data Available
- Skin sensitization

Propane	No Data Available
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	Negative (from the result of Maximization test using a guinea pig) Not applicable

- Carcinogenicity — No Data Available

The occupational safety and health act (domestic)	
Labor Ministry Notice Propane	Not Listed
propane	Not Listed
n-Butane	Not Listed
iso-Butane	Not Listed
n-Pentane	Not Listed
iso-Pentane	Not Listed
IARC	Not Listed
OSHA	Not Listed
ACGIH	No Data Available
NTP	Not Listed

- EU CLP

Propane	No Data Available
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	No Data Available

- Germ cell mutagenicity

Propane	No Data Available
n-Butane	Back mutation test using microorganism – negative
iso-Butane	Back mutation test using microorganism – negative
n-Pentane	No Data Available
iso-Pentane	Mammal bone marrow micronucleus test – negative

- Reproductive toxicity	0
Propane	No Data Available
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	First generation reproductive toxicity test result : No reproductive toxicity was Not applicable(EU Directive 67/548/EEC)
- Specific target organ toxicity (single	
Propane	No Data Available
n-Butane	In high concentration, causing narcosism and depressing-central nervous system. No
iso-Butane	Data Available
n-Pentane	No Data Available
iso-Pentane	Narcotizatiion was reported for inhalation exposure : Rat
- Specific target organ toxicity (repeated	
Propane	No Data Available
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	No Data Available
- Aspiration hazard	No Data Available

12. Ecological information

a) Aquatic and terrestrial ecotoxicity

- fish	
Propane	LC50 > 100 ㎎/L 96 hr ((Species : Fish TLm))
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	No Data Available
- Crustacean	
Propane	LC50 52.157 ㎎ /L 48 hr
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	EC50 2.3 mg/L 48 hr
- Algae	
Propane	LC50 32.252 ㎎ /ℓ 96 hr
n-Butane	No Data Available
iso-Butane	No Data Available
n-Pentane	No Data Available
iso-Pentane	No Data Available

b) Persistence and degradability

- Persistence	
Propane	log Kow 2.36
n-Butane	log Kow 2.89
iso-Butane	log Kow 2.76
n-Pentane	No Data Available
iso-Pentane	log Kow 2.30
- Degradability	No Data Available

c) Bioaccumulative potential

- Accumulative

Propane	BCF 13
n-Butane	No Data Available
iso-Butane	BCF 1.57~1.97
n-Pentane	No Data Available
iso-Pentane	No Data Available

- Biodegradability

Propane	65.7% 35day
n-Butane	65.7% 35day (aerobic, microbes, well-decomposed)
iso-Butane	65.7% 36day (aerobic, microbes, well-decomposed)
n-Pentane	No Data Available
iso-Pentane	No Data Available

d) Mobility in soil	No Data Available
e) Other adverse effects	No Data Available (the components ratio of pentanes is less than 2.5 %)

13. Disposal considerations

a) Disposal method	All disposal practices must be in compliance with all laws and regulations with elimination of the risk of explosion.
b) Disposal precaution	Beware of fire and explosion hazards due to residual gas in the container like cylinder or tank Disposal should be in accordance with applicable regional, national and local laws and regulations.

14. Transport information

a) UN number	2037
Propane	1978
n-Butane	1011
iso-Butane	1969
n-Pentane	1265
iso-Pentane	1265
b) UN proper shipping name	BUTAN
c) Transport harzad class(es)	E 2.1
d) Packing group, if applicable	No Data Available
e) Environmental harzards	No Data Available
f) Special precaution for user	
- emergency procedures in a fire	F-D
- emergency procedures with the gas	S-U

15. Regulatory information

a) Regulations by the occupational safety and

Propane	Not applicable
n-Butane	Substance with exposure limits Not
iso-Butane	applicable
n-Pentane	Not applicable
iso-Pentane	Not applicable

b) Act on registration, evaluation, etc of chemicals (domestic)

Propane	Not Listed
n-Butane	Not Listed
iso-Butane	Not Listed
n-Pentane	Not Listed
iso-Pentane	Not Listed

c) Chemicals control act (domestic)

Propane	Not Listed
n-Butane	Not Listed
iso-Butane	Not Listed
n-Pentane	Not Listed
iso-Pentane	Not Listed

d) Regulation by the act on the safety control of hazardous substances (domestic)

Not applicable

e) Regulation by wastes control act (domestic)

Propane	Designated waste material
n-Butane	Designated waste material
iso-Butane	Designated waste material
n-Pentane	No Data Available
iso-Pentane	No Data Available

f) The other regulation by domestic and foreign act

- Domestic regulation

Persistent organic pollutans control act	Not applicable
High-pressure gas safety control act	Flamable, Liquefied gas
Safety control and business of liquefied petroleum gas act	Liquefied petroleum gas

- Foreign regulation

OSHA regulation	Not regulated
CERCLA103 (40CFR302.4)	Not regulated
SARA302 (40CFR355.30)	Not regulated
SARA304 (40CFR355.40)	Not regulated
SARA311/312 (40CFR370.21)	Not regulated
SARA313 (40CFR372.65)	Not regulated
EPCRA (section 302)	Not regulated
EPCRA (section 304)	Not regulated
EPCRA (section 313)	Not regulated
Rotterdam Convention	Not regulated
Stockholm Convention	Not regulated
Montreal protocol	Not regulated
EU REACH (classification result)	F+; R12
iso-Pentane	F+; R12 | Xn; R65, R66, R67 | N; R51/53
EU REACH (risk statement)	R12
Propane	R12
n-Butane	R12,
iso-Butane	R67 R12
n-Pentane	R12, R51/53, R65, R66, R67

EU REACH(safety statement)	S2, S9, S16
Propane	S2, S9, S16
n-Butane	S2, S9, S16
iso-Butane	S2, S9, S16
n-Pentane	S2, S9, S16, S33, S61, S62
iso-Pentane	S2, S9, S16, S33, S61, S62

16. Other information

a) Information source and references

ECB-ESIS(European chemical Substances Information System)(http://ecb.jrc.it/esis)

ECOTOX Database, EPA(http://cfpub.epa.gov/ecotox)

IUCLID Chemical Data Sheet, EC-ECB

International Chemical Safety Cards(ICSC)(http://www.nihs.go.jp/ICSC) TOXNET,

U.S. National Library of Medicine(http://toxnet.nlm.nih.gov)

The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)

Transport of Dangerous Goods - UN

Chemical Information System, National Environmental Science Institute(http://ncis.nier.go.kr) Korea

Occupational Safety and Health Agency MSDS Database

Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)

Industrial poisoning handbook, Shin Kwang Publishing Co.

Dangerous Material Information Management System, National Emergency Management Agency (http://hazmat.nema.go.kr)

UN RTDG

ICSC

PATTY(4th, 1994)

ACGIH (7th, 2001)

Airliquide (http://encyclopedia.airliquide.com)

Airgas (http://www.airgas.com)

Wikipedia (http://en.wikipedia.org) GHS (Rev.7) (2017) 7th Ed

b) First Date Create **2019-4-16**

c) Number of revisions and date of last revision

Number of revisions **Rev 00**

Date of last revision **2019-4-16**

d) The other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

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