

INTERMEDIATES

Technical information



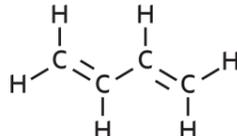
Olefins

OLEFINS

product	Ethylene	
production site	Porto Marghera - Brindisi - Priolo - Dunquerke	
chemical formula	$\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C}=\text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$	
applications	Ethylene is a petrochemically derived monomer used primarily as a feedstock in the manufacture of polymer plastics, fibers and other organic chemicals that are ultimately consumed in the packaging, transportation and construction industries and in a multitude of industrial and consumer markets. Nondurable or consumable end uses — in particular, packaging — make up more than half of ethylene derivative consumption worldwide. One plastic resin, polyethylene, accounts for 55–60% of the total use of ethylene.	
CAS number	74-85-1	
EC number	200-815-3	
physical & chemical properties	appearance	form: refrigerated liquefied gas colour: colourless
	odour	sweetish odour threshold: 299 mg/m ³
	pH-value	not determined
	change in condition	melting point/melting range: -169°C boiling point/boiling range: -103.8°C
	flash point	-136°C (closed cup)
	flammability (solid, gaseous)	extremely flammable gas
	ignition temperature	450°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits:	lower: 2.7 vol % upper: 36 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at -90°C	2124 hPa
	density	relative density at -104°C: 0.5678 g/cm ³ vapour density: 0.98 (air=1)
	evaporation rate	study technically not feasible
solubility in/miscibility with water at 25°C	0.131 g/l	
partition coefficient (n-octanol/water) at 20°C	1.13 log POW	
viscosity	dynamic: based on physical-chemical property this test is not required	
other information	gas at room temperature	

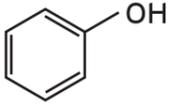
product	Propylene	
production site	Porto Marghera - Brindisi - Priolo - Dunquerke	
chemical formula	$\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C}=\text{C} & \\ & / & \diagdown \\ \text{H} & & \text{CH}_3 \end{array}$	
applications	Propylene is used to produce polypropylene (PP): it has numerous applications: plastic films, containers for industrial batteries, automotive components, electronics, etc. Other derivatives of propylene include propylene oxide, cumene, acrylonitrile, oxo-alcohols and acrylic acid for superabsorbent polymers.	
CAS number	115-07-1	
EC number	204-062-1	
physical & chemical properties	appearance	form: compressed or refrigerated liquefied gas colour: colourless
	odour	nearly odourless
	pH-value	not determined
	change in condition	melting point/melting range: -185.2°C boiling point/boiling range: -47.7°C
	flash point:	-108°C
	flammability (solid, gaseous)	extremely flammable gas
	ignition temperature	455°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 2 vol % upper: 11.1 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 20 °C	10.5 hPa
	density	relative density at 20°C: 0.0018 g/cm ³ vapour density at 20°C: 1.4 (air=1)
	evaporation rate	not applicable
solubility in/miscibility with water at 20°C	0.2 g/l	
partition coefficient (n-octanol/water) at 20°C	1.77 log POW	
viscosity	dynamic: based on physical-chemical property this test is not required	
other information	gas at room temperature	

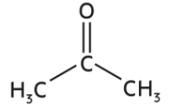
OLEFINS

product	Butadiene	
production site	Ravenna - Brindisi	
chemical formula		
applications	Production of elastomers (SBR, polybutadiene, nitrile and polychloroprene) accounts for 70% of the global demand for butadiene. Adiponitrile, ABS resins, styrene-butadiene copolymer, latexes, styrene block copolymers and other smaller polymer applications account for the remainder.	
CAS number	106-99-0	
EC number	203-450-8	
physical & chemical properties	appearance	form: gaseous colour: colourless
	odour	aromatic odour threshold: 1.0-1.6 ppm
	pH-value	based on physical-chemical property this test is not required
	change in condition	melting point/melting range: -109°C boiling point/boiling range: -4.4°C
	flash point	-76°C
	flammability (solid, gaseous)	extremely flammable gas
	ignition temperature	420°C
	decomposition temperature	based on physical-chemical property this test is not required
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 2 vol % upper: 12.5 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 17°C	2170 hPa
	density	relative density at 20°C: 0.62 g/cm ³ vapour density: 1.87 (air=1)
	evaporation rate	study technically not feasible
	solubility in/miscibility with water at 20°C	0.735 g/l
partition coefficient (n-octanol/water) at 20°C	1.99 log KOW	
viscosity	dynamic: study technically not feasible kinematic: study technically not feasible	
other information	gas at room temperature	

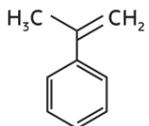
Phenol and derivatives

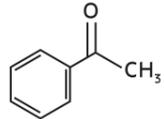
PHENOL AND DERIVATES

product	Phenol	
production site	Mantova	
chemical formula		
applications	Raw material for thermosetting phenolic resins used for laminated plastics, insulation, moulding (in the automotive, household electrical appliance and electronic industry) and adhesives in the plywood and wood industry. Intermediate for cyclohexanol and cyclohexanone, polyamide resins, bisphenol (epoxy resins and polycarbonates). Intermediate for alkylphenols, for drugs, perfumes, dyes, plasticizers.	
CAS number	108-95-2	
EC number	203-632-7	
physical & chemical properties	appearance	form: fluid colour: colourless
	odour	sweetish odour threshold: 0.18 mg/m ³
	pH-value	not determined
	change in condition	melting point/melting range: 40.8°C boiling point/boiling range: 181.8°C
	flash point	81°C
	flammability (solid, gaseous)	not applicable
	ignition temperature	715°C
	decomposition temperature	not determined
	danger of explosion	not applicable. Product does not present an explosion hazard
	explosion limits	lower: 1.3 vol % upper: 9.5 vol %
	oxidizing properties:	not applicable
	vapour pressure at 20°C	0.2 hPa
	density	relative density at 20°C: 1.07 g/cm ³ vapour density: 3.24
	evaporation rate	not determined
solubility in/miscibility with water at 15°C	82 g/l	
partition coefficient (n-octanol/water) at 30°C	1.47 log POW	
viscosity	dynamic at 50°C: 3.49 mPas	

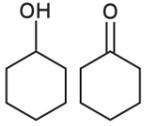
product	Acetone	
production site	Mantova	
chemical formula		
applications	Intermediate for methacrylates and bisphenol. Solvent for paints, varnishes and lacquers, vinylic and acrylic resins, cellulose resins, adhesives, inks. Extraction solvent for essential oils. Intermediate for the synthesis of many other solvents, intermediate for pharmaceuticals (vitamins) and cosmetics.	
CAS number	67-64-1	
EC number	200-662-2	
physical & chemical properties	appearance	form: fluid colour: colourless
	odour	characteristic odour threshold: 47.5 mg/m ³
	pH-value	not determined
	change in condition	melting point/melting range: -94.7°C boiling point/boiling range: 56.5°C
	flash point	-17°C
	flammability (solid, gaseous)	not applicable
	ignition temperature	465°C
	decomposition temperature	not determined
	danger of explosion	not applicable. Product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 2.6 vol % upper: 13 vol %
	oxidizing properties	none
	vapour pressure at 20°C	240 hPa
	density	relative density at 20°C: 0.79 g/cm ³ vapour density at 20°C: 2.01
	evaporation rate	not determined
	solubility in/miscibility with	water: fully miscible polar solvents: fully miscible non-polar solvents: slightly miscible
	partition coefficient (n-octanol/water)	-0.24 log POW
	viscosity	dynamic at 20°C: 0.32 mPas

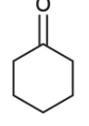
PHENOL AND DERIVATES

product	α Methylstyrene	
production site	Mantova	
chemical formula		
applications	As monomer it is used in the production of homopolymers and copolymers for applications in many industrial fields. Homopolymers are used to manufacture paints, adhesives and textile coatings. ALFAMET. As copolymer with acrylonitrile and acrylonitrile-butadiene is used to manufacture a modified ABS with improved heat resistance, or linked to other comonomers finds application in paints, enamels and inks, adhesives, and ion exchange resins.	
CAS number	98-83-9	
EC number	202-705-0	
physical & chemical properties	appearance	form: fluid colour: colourless
	odour	aromatic odour threshold: 0.25 mg/m ³
	pH-value	not determined
	change in condition	melting point/melting range: -23.2°C boiling point/boiling range: 165°C
	flash point	40-54°C
	flammability (solid, gaseous)	based on physical-chemical property this test is not required
	ignition temperature	574°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 0.7 vol % upper: 6.1 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 20°C	2.53 hPa
	density	relative density at 20°C: 0.91 g/cm ³ vapour density at 20°C: 4.1
	evaporation rate	not determined
solubility in/miscibility with water at 25°C	0.1 g/l	
organic solvents	soluble in many organic solvents	
partition coefficient (n-octanol/water) at 25°C	3.48 log POW	
viscosity	dynamic at 20°C: 0.94 mPas	

product	Acetophenone	
production site	Mantova	
chemical formula		
applications	Solvent and intermediate for the synthesis of a wide range of pharmaceuticals (antibiotics, vasoconstrictors) and chemicals (dyes, etc.). Plasticizer and solvent used in the resins industry. Basis for the synthesis of ketone resins for printing paints. Basis for the synthesis of perfumes.	
CAS number	98-86-2	
EC number	202-708-7	
physical & chemical properties	appearance	form: fluid colour: colourless
	odour	aromatic
	pH-value	not determined
	change in condition	melting point/melting range: 20.04°C boiling point/boiling range: 202.11°C
	flash point	105°C (closed cup)
	flammability (solid, gaseous)	based on physical- chemical property this test is not required
	ignition temperature	535°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product does not present an explosion hazard.
	explosion limits	lower: 1.1 vol % upper: not determined
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 25°C	0.45 hPa
	density	relative density at 20°C: 1.03 g/cm ³ vapour density: 4.15
	Evaporation rate	not determined
	solubility in/miscibility with water at 25°C	6.1 g/l
	partition coefficient (n-octanol/water) at 20°C	1.65 log POW
viscosity	dynamic at 25°C: 1.681 mPas	

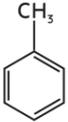
PHENOL AND DERIVATES

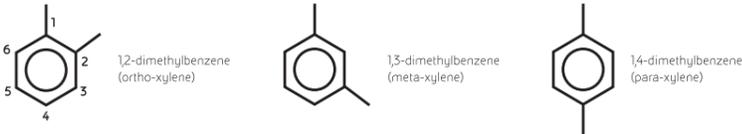
product	KA oil	
production site	Mantova	
chemical formula		
applications	Intermediate for the production of adipic acid for nylon 6.6 and cyclohexanone and caprolactam for nylon 6. Intermediate for the manufacture of esters used as plasticizers. Softening solvent for varnishes and lacquers. Solvent for rubber, dyes, resins, oils, greases, waxes and asphalts. Stabilizer and homogenizer for emulsions, soap solutions and detergents used in the fibre industry. Intermediate for the synthesis of pharmaceuticals and cosmetics. Solvent and stabilizer for the preparation of disinfectants.	
CAS number	NA	
EC number	906-627-4	
physical & chemical properties	appearance	form: fluid colour: not determined
	odour	characteristic odour threshold: not determined
	pH-value	not determined
	change in condition	melting point/melting range: undetermined boiling point/boiling range: 156°C
	flash point	48°C
	flammability (solid, gaseous)	-
	ignition temperature	285°C
	decomposition temperature	not determined
	self-igniting	product is not selfigniting
	danger of explosion	product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 1.3 vol % upper: 11.2 vol %
	vapour pressure at 20 °C	1.2 hPa
	density	density at 20°C: 0.94 g/cm ³ relative density: not determined vapour density: not determined
	evaporation rate	not determined
solubility in/miscibility with water	not miscible or difficult to mix	
partition coefficient (n-octanol/water)	not determined	
viscosity	dynamic: not determined kinematic: not determined	
organic solvents	33.0%	

product	Cyclohexanone	
production site	Mantova	
chemical formula		
applications	Intermediate for the production of caprolactam for nylon 6 and adipic acid for nylon 6.6. Intermediate for the manufacture of: cyclohexanone peroxide used as catalyst for vinyl polymerization and other reactions; derivatives used as herbicides and insecticides; pharmaceutical derivatives (sedatives, vitamin derivatives); e-caprolactone (PVC plasticizer and used for polyurethane elastomers). Intermediate for cyclohexanone-formaldehyde resins for preparation of lacquers and printing inks. Solvent for many industrial fields: plastics, particularly PVC, polystyrene, methacrylate ester polymers; paints, varnishes, lacquers, particularly nitrocellulose and nitro type; leather degreasing, dye and finish carriers; metals as degreasing agent.	
CAS number	108-94-1	
EC number	203-631-1	
physical & chemical properties	appearance	form: fluid colour: colourless
	odour	acetone-like odour threshold: 0.48 mg/m ³
	pH-value	not determined
	change in condition	melting point/melting range: -31°C boiling point/boiling range: 154.3°C
	flash point	44°C
	flammability (solid, gaseous)	based on physical-chemical property this test is not require
	ignition temperature	420°C
	decomposition temperature	not determined
	danger of explosio	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 1.3 vol % upper: 9.4 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 30°C	7 hPa
	density	relative density at 20°C: 0.9465 g/cm ³ vapour density: 3.4
	evaporation rate	not determined
solubility in/miscibility with water at 20°C	86 g/l	
partition coefficient (n-octanol/water) at 25°C	0.86 log POW	
viscosity	dynamic at 25°C: 2.2 mPas	

Aromatics

AROMATICS

product	Toluene	
production site	Porto Marghera - Priolo	
chemical formula		
applications	<p>It is an aromatic hydrocarbon with many industrial applications. It is used as an octane component in the formulation of gasolines and in the production of paints and thinners.</p> <p>Toluene is the raw material used to produce toluene-diisocyanate (TDI) a key material in the production of polyurethane foams that have vast application in furnishings, automotive components, footwear and in refrigerator production.</p>	
CAS number	108-88-3	
EC number	203-625-9	
physical & chemical properties	appearance	form: fluid colour: colourless
	odour	aromatic odour threshold: 8,02 mg/m ³
	pH-value:	not determined
	change in condition	melting point/melting range: -95°C boiling point/boiling range: 110,6°C
	flash point	4°C
	flammability (solid, gaseous)	based on physical-chemical property this test is not required
	ignition temperature	480°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 1.1 vol % upper: 7.1 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 21°C	30.89 hPa
	density	relative density at 20°C: 0.866 g/cm ³ vapour density: 3.18
evaporation rate	not determined	
solubility in/miscibility with water at 25°C	0.5 g/l	
partition coefficient (n-octanol/water) at 20°C	2.73 log POW	
viscosity	dynamic at 25°C: 0.6 mPas	

product	Mixed Xylenes	
production site	Priolo	
chemical formula		
applications	<p>Mixed Xylenes are used primarily as a source for individual isomer isolation; the isomers serve as chemical intermediates in the manufacture of fibers, plastics, plasticizers and surface coatings.</p> <p>Mixed Xylenes are also used as solvents and as a high-octane component of gasoline.</p>	
CAS number	1330-20-7	
EC number	215-535-7	
physical & chemical properties	appearance	form: fluid colour: not determined
	odour	characteristic odour threshold: not determined
	pH-value	not determined
	change in condition	melting point/melting range: undetermined boiling point/boiling range: 136°C
	flash point	27°C
	flammability (solid, gaseous)	based on physical-chemical property this test is not required
	ignition temperature	465°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 1 vol % upper: 7 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 20°C	650-944 Pa (range categoria)
	density	relative density: not determined vapour density: not determined
	evaporation rate	not determined
	solubility in/miscibility with water	not miscible or difficult to mix
partition coefficient (n-octanol/water)	3.16 log POW	
viscosity	kinematic at 20°C: 0.74 mm ² /s	

AROMATICS

Other

product	Benzene	
production site	Porto Marghera - Priolo	
chemical formula		
applications	It is the basic hydrocarbon of the aromatics, so called because of their typical smell. It is the base compound for various industrial applications such as ethylbenzene, an aromatic hydrocarbon used in the production of styrene and polystyrene, cumene, intermediate for the production of phenol, used in detergents (LAB). Through its derivatives, benzene finds applications in a variety of fields, such as automotive, telephony, electronics, and furnishings, home appliances and packaging.	
CAS number	71-43-2	
EC number	200-753-7	
physical & chemical properties	appearance:	form: fluid colour: colourless
	odour:	aromatic odour threshold: 4.5 mg/m ³
	pH-value:	not determined
	change in condition	melting point/melting range: 5.49°C boiling point/boiling range: 80°C
	flash point	-11°C
	flammability (solid, gaseous)	based on physical-chemical property this test is not required
	ignition temperature	498°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 1.2 vol % upper: 7.8 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 20°C	100 hPa
	density	relative density at 20°C: 0.88 g/cm ³ vapour density: 2.7 (air=1)
	evaporation rate	not determined
solubility in/miscibility with water at 23°C	1.88 g/l	
partition coefficient (n-octanol/water)	2.13 log POW	
viscosity	dynamic at 25°C: 0.604 mPas	

OTHER

product	1-Butene	
production site	Ravenna	
chemical formula	$\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_3$	
applications	Comonomer used in the production of linear polyethylenes.	
CAS number	106-98-9	
EC number	203-449-2	
physical & chemical properties	appearance	form: compressed liquefied gas colour: colourless
	odour	nearly odourless odour threshold: not determined
	pH-value	not determined
	change in condition	melting point/melting range: -185°C boiling point/boiling range: -6°C
	flash point	study technically not feasible
	flammability (solid, gaseous)	extremely flammable gas
	ignition temperature	385°C
	decomposition temperature	not determined
	danger of explosion	based on physical-chemical property this test is not required, product is not explosive. However, formation of explosive air/vapour mixtures are possible
	explosion limits	lower: 1.6 vol % upper: 10 vol %
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 20°C	2500 hPa
	density	relative density at 20°C: 0.555 g/cm ³ vapour density: 1.99 (air = 1)
	evaporation rate	study technically not feasible
solubility in/miscibility with water at 25°C	0.22 g/l	
partition coefficient (n-octanol/water) at 20°C	2.4 log POW	
viscosity	dynamic: based on physical-chemical property this test is not required kinematic: based on physical-chemical property this test is not required	

product	Carbon black feedstock	
production site	Porto Marghera - Brindisi - Priolo - Dunquerke	
chemical formula		
applications	Ethylene cracker fuel oil rich in high boiling aromatic components. It finds application to produce Carbon Black, which is used as coloring agent in tires and road pavings. In addition, Carbon Black is used for tire reinforcements, black pigments (e.g. for road markings) or conductors. Carbon Black Feedstock may be used as a source for: - Naphthalene for phthalic anhydride, insecticides and concrete plasticizers. - Biphenyl for food preservatives, heat transfer fluids or various organic syntheses. - Fluorene or anthracene for light emitting diodes (LED's), dyes or wood preservatives. It is also used as gasoline blending component.	
CAS number	68513-69-9	
EC number	271-013-9	
physical & chemical properties	appearance	form: fluid colour: according to product specification
	odour	characteristic odour threshold: not determined
	pH-value	not determined
	change in condition	melting point/melting range: 43-63°C boiling point/boiling range: 160°C
	flash point	>66°C
	flammability (solid, gaseous)	based on physical-chemical property this test is not required
	ignition temperature	453-480°C
	decomposition temperature	not determined
	danger of explosion	product does not present an explosion hazard
	explosion limits	lower: 0.9 vol % (ref. Naftalene) upper: 5.9 vol % (ref. Naftalene)
	oxidizing properties	based on physical-chemical property this test is not required
	vapour pressure at 20°C	2 hPa
	density	relative density: not determined vapour density: not determined
	evaporation rate	not determined
solubility in/miscibility with water at 20°C	25-41 mg/l	
partition coefficient (n-octanol/water)	3.3-5.4 log POW	
viscosity	kinematic at 40°C: 250 mm ² /s	

Intermediates sites

Dunkerque, France - Plant

San Donato Milanese, Italy - Headquarter

Mantua, Italy - R&D and Plant

Brindisi, Italy - Plant

Abu Dhabi, United Arab Emirates

VPM, a joint venture with Petrochem/Mazrui Energy Services

Additional Safety Information

It is not intended to provide with this data a complete and in-depth analysis of health and safety information. Further and more detailed data are available in the relevant Safety Data Sheet on the web site www.versalis.eni.com

Disclaimer

The information contained herein is intended as advice only and whilst the information is provided in utmost good faith and has been based on the best information available at the moment of writing, it is to be relied upon at the user's own risk. Versalis is available to provide the guaranteed values for each product on demand.



versalis

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