THE OXYGENATED AND

Most solvents are manufactured from crude oil.

THE SOLVENTS **FAMILY**

Welcome to the world of solvents



WHY SO MANY SOLVENTS?

HYDROCARBON SOLVENTS For many products to perform effectively, solvents are simply essential. Every day, we benefit from the diverse range of available The chemical classification of solvents is based on solvents and their unique properties. their chemical structure. Hydrocarbon solvents are

molecules containing only hydrogen and carbon Furthermore, the solvents industry is highly atoms. Oxygenated solvents contain hydrogen, committed to the principles of product carbon and oxygen atoms.¹ stewardship and the health and safety of downstream users.

The manufacturing process is highly integrated into Solvents dissolve other substances. Sugar the operation of an oil refinery or petrochemical dissolves in coffee because water is a solvent. manufacturing site. A limited number of solvents Water is easily available and is simple and safe are manufactured using other raw materials to handle, so why are there so many industrially (natural gas, coal or biomass). important solvents?

Most hydrocarbon solvents are separated in the The easy answer is that not everything refinery by distillation and then further treated dissolves in water. However, the choice and purified. Some are synthesised from olefins. of a solvent is based not only on whether Hydrocarbon solvents are classified into three subsomething dissolves or not (solvency), but also groups based on the type of "carbon skeleton" of on evaporation rate, boiling point, viscosity, their molecules, giving us the aliphatic, aromatic surface tension and many other factors that and paraffinic solvents families. affect the thousands of industrial processes

Oxygenated solvents are produced through chemical reactions from olefins (derived from oil With so many properties to consider and or natural gas), giving us the following sub-groups different materials to be dissolved, access to a based on what is called "chemical functionality" wide range of solvents is crucial. alcohols, ketones, esters, ethers, glycol ethers and

are complex because the properties required This brochure gives only a few examples of how may change as the process is carried out. solvents can be used to benefit consumers; in For example, to achieve a surface with a good reality, there are thousands of other applications. gloss finish, it may be necessary initially for the solvent to evaporate quickly but at a later stage evaporate much more slowly. This and many

I. The group of chlorinated solvents manufactured by reaching ydrocarbons with chlorine are not discussed in this document. Chlorinated Solvents Association at www.eurochlor.org or the alogenated Solvents industry Alliance (HSIA) at www.hsia.org

1. FAMILY: ALCOHOLS

Ethanol is used by perfume manufacturers as the solvent of choice because of its low odour. The low boiling point of ethanol means that the solvent evaporates quickly and



2. FAMILY: ALCOHOLS

Isopropyl alcohol is used as a windscreen de-icing and cleaning solvent because it stays in liquid form well below freezing point and therefore helps to remove the ice. It removes stains that appear on the windscreen and



3. FAMILY: KETONES

composites to make skis.

The carbon fibres are layered with epoxy resins and the ketone's high solvency power softens the resin to apply it easily and evenly between the layers. The solvent's low boiling point allows it to evaporate quickly to enable the layers to bind easily and form a strong, durable product.

Ketones such as acetone, MEK (Methyl ethyl ketone) and MIBK (Methyl isobutyl ketone) are used in carbon fibre

4. FAMILY: ESTERS

polish can be removed easily from the nail.

Ethyl acetate is used in nail polish and is especially valued for its fruity odour and fast-drying properties. It is also used in nail polish removal fluids and its high solvency power means that the



6. FAMILY: GLYCOL ETHERS

Glycol ethers are highly effective as an active component of heavy-duty glass, floor and other hard surface cleaning formulations. These solvents have good water compatibility high solvency for greases and oils and good biodegradability.



8. FAMILY: ALIPHATIC HYDROCARBONS

Aliphatic hydrocarbons (typically dearomatised hydrocarbons) are used in the preservation of timber. The high water resistance and low surface tension of the solvent enables it to penetrate the wood.



10. FAMILY: ALIPHATIC HYDROCARBONS

High boiling point hydrocarbon aluminium rolling process t make aluminium foil. Acting as a lubricant, the solvent protects the metal from oxidation, helps eliminate metal dusts/

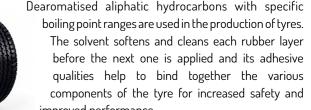
from the process.



Pentanes are used to make plastic foams for insulation purposes in household goods such as refrigerators and freezers. The low boiling point of pentanes is the important property. Pentane is mixed into liquid plastic, which is then heated with steam; the pentane vapourises inside the plastic and expands to form a honeycomb-like plastic foam The low thermal conductivity of the foam helps it to act as a highly effective insulator.

12. FAMILY: PARAFFINS

14. FAMILY: ALIPHATIC HYDROCARBONS





Low volatility dearomatised aliphatic hydrocarbons are used in the oilfield as base fluids in drilling mud formulations for lubricating the drilling process in oil wells. The solvents have excellent and high biodegradability.

lubricating properties, are inert towards most type of rock formations, and have low toxicity

11. FAMILY: AROMATIC HYDROCARBONS

Toluene is used as the ink solvent in a specialised type of magazine printing, "publication rotogravure", because it evaporates quickly enough to prevent smudging and is easily recycled. The process of rotogravure is capable of producing printed material of the highest quality.

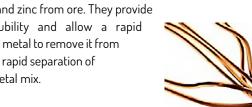


odour, favourable health and handling characteristics and excellent cleaning efficiency.

nickel, cobalt and zinc from ore. They provide reaction of the metal to remove it from the ore, then a rapid separation of the solvent-metal mix

16. FAMILY: ALIPHATIC HYDROCARBONS

Aliphatic hydrocarbons are used to extract metals such as copper,







does not remain on the skin.

is also used in the home in window cleaning products.



5. FAMILY: ESTERS

Butyl acetate is used to purify penicillin by keeping impurities in solution whilst the penicillin is selectively removed from the reaction mixture by extraction. Further purification of the penicillin is achieved through the method of crystallisation.



7. FAMILY: GLYCOL ETHER ESTERS

Glycol ether esters are added to spray paints to prevent them from re-painted effectively.



9. FAMILY: ALIPHATIC HYDROCARBONS

drying before they hit their target. The slow evaporation of this powerful group of solvents means that cars, for example, can be



Commercial hexanes are used to extract natural oil from seeds due

to its optimum solvency power (like dissolves like). Hexane is a light solvent that is easily removed from the edible oil and is also recycled during the process.



THE SOLVENTS FAMILY





"The Solvents Family" is a result of cooperation between the European Solvents Industry Group (FSIG) and the Solvents Industry Association (SIA)

For further information on solvents in Europe,

olease visit www.esig.org

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