Opteon™ SION® by Chemours™

Get the optimal balance of performance, environmental sustainability, safety and cost with Opteon™ SION®

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- What is Opteon™ SION®?

SION® is a brand new Patented non-flammable, fast drying cleaning solvent from Chemours™ designed to clean a wide range a soils form mechanical components, Electronics, Optics, Military hardware etc both in existing solvent cleaning systems and for hand cleaning applications. SION® has been designed to be safe for the operators and for the Environment and will successfully replace many of the High cost HFE materials as well as nPB, HFC-365 blends and other hazardous Chlorinated solvents such as Trik, Methylene Chloride and Perk. SION® can also be used as a safe, viable alternative to fast evaporating flammable materials such as IPA, Acetone, Thinners, MEK, typically used in hand cleaning applications.

- **Has SION® and all of its substances been registered under REACH?**

SION® is a blend of two key chemicals and both have been registered under REACH. SION® has no chemicals registered as SVHC.

- **What is SION® typically used for?**

SION® is typically used as a replacement for either Hazardous or high cost cleaning solvents for the removal of oils, flux, liquors, paint, machining or sanding particulate. SION® has a very high wetting index (low surface tension, viscosity and density) and can remove particulate down to submicron levels and will leave no residues.

- **What solvents can SION® replace?**

SION® has a high solvency (KB value of100) comparable to Methylene chloride, Trik, Perk, nPB, it solvency is twice that of similar HFE materials providing significant improvements in cleaning and in service life.

- **What is the exposure limit of SION®?**

SION® has an 8 hr WEL of 200 ppm (EH40). Typical exposure levels around standard equipment would be around 5 – 10 ppm providing a significant margin of safety. The figure of 200 ppm is comparable to IPA (Isopropyl Alcohol) widely used as a hand cleaning chemical.

- **How much will it cost to use SION®?**

SION® is the lowest cost HFO based Fluorinated solvent on the market today however material costs are only one element to consider and the overall cost of the process should be considered when looking at the cost of a solvent cleaning process as each application is different. Due to the unique characteristics of SION® emissive losses in typical equipment will be around half that of Chlorinated solvents and around a 25% reduction over older generation high value HFC or HFE materials.

- **How effective is SION® as a cleaning solvent?**

SION® is very effective on a wide range of soils however cleaning trials should be carried out to ensure that the required results are achievable. Fraser Technologies can run trials to ascertain the effectiveness and compatibility of SION ™ with your components.

- **What is the Global Warming Potential of SION ™?**

SION® has a GWP of less than 15 meaning it is the lowest GWP of any fluorinated solvent on the market today by a significant margin.

- **What does Global Warming Potential mean?**

Global-warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide. A GWP is calculated over a specific time interval, commonly 20, 100 or 500 years. GWP is expressed as a factor of carbon dioxide (whose GWP is standardized to 1). For example, the 20 year GWP of methane is 72, which means that if the same mass of methane and carbon dioxide were introduced into the atmosphere, that methane will trap 72 times more heat than the carbon dioxide over the next 20 years

- **Is SION® affected by F-gas regulations?**

SION® contains no materials regulated under the F-Gas regulations.

- **Is SION® affected by the Solvent Emissions Directive?**

SION® is an R20 based solvent and as such the SED does apply however the SED threshold limit for SION® is 2 metric tons.

- **How does SION® compare to nPB?**

nPb is an R60 chemistry which is Mutagenic and, therefore, strictly regulated in its use. With the US now recommending 0.1 ppm exposure limit nPb is becoming very difficult to use safely. SION® has a similar solvency to nPB and in most cases will work equally as well as nPB however it does have a slightly lower boiling point so applications that rely on the high temperature of nPB to assist the cleaning may struggle. Fraser Technologies can run cleaning trials with SION® to ascertain if the process is suitable for your application.

- **How does SION® compare to Trichloroethylene?**

Trik is an R45 chemistry which is Carcinogenic and, therefore, strictly regulated in use with specific permits required. SION® has a similar solvency to Trik and in most cases will work equally as well as Trik however it does have a lower boiling point so applications that rely on the high temperature of Trik to assist the cleaning may struggle. Fraser Technologies can run cleaning trials with SION® to ascertain if the process is suitable for your application.

- **How does SION® compare to HFE solvents?**

SION® has the highest solvency power of any Fluorinated solvent, in general terms this will improve cleaning, allow a higher level of contamination (reducing the frequency of tank clean outs) and has the lowest GWP of any Fluorinated solvent on the market today. SION® also has a low “in use” cost with significant savings to be had over traditional Fluorinated solvents

- **Is SION® flammable?**

Despite containing a flammable chemistry SION® is not a flammable Solvent. This is down to the unique patented “Azeotropic” mix of a special inerting agent used to eliminate the flammable element of the solvent. As this is a true Azeotrope the % mix of the chemistry remains unchanged providing a stable, non-Flammable solvent.

- **What is an Azeotrope?**

An azeotrope is a mixture of two or more liquids in such a way that its components cannot be altered by simple distillation. This happens because, when an azeotrope is boiled, the vapor it produces has proportionate constituents as the original mixture.

Because their composition is unchanged by distillation, azeotropes are also called (especially in older texts) constant boiling mixtures. The word *azeotrope* is derived from the Greek words ζέειν (boil) and τρόπος (state) combined with the prefix α- (no) to give the overall meaning, "no change on boiling".

- **The MSDS sheet states R18: In use, may form flammable/explosive vapour-air mixture?**

SION® is an azeotrope having no Flash Point (FP) either in open cup or in a closed cup. Its fluorinated components give this unique no Flash Point property to solvents containing high levels of Trans.

However, there are statements in the material safety data sheet (MSDS) and Technical data sheet (TDS) that warrant further explanation:

- In section 9 of the MSDS it is detailed that although there is no FP there is an upper explosion ™ limit and lower explosion ™ limit (UEL and LEL) of 7 to 14 % (70,000 – 140,000 ppm). When using any solvent in cleaning equipment there are 2 possibilities:

    1. The vapour is totally saturated (1,000,000 ppm), in which case there is no risk.
    2. The vapour is condensed and the concentration is well below 0.002 % wt (200 ppm).

Both of these potential scenarios are well away from the 7-14% LEL and UEL's. Many solvents have no flash point but have LEL – UEL's.

See table below for similar products and limits

SOLVENT	Lower Explosion ™ Limit	Upper Explosion ™ Limit
SION®	7%	15%
HCFC – 141b	7.6%	16.7%
Methylene Chloride	12%	19%
Trichloroethylene	8%	11%
nPB	3.8%	9.5%
Novec HFE 72DA	5.9%	14.5%

In section 2 of the MSDS there is a sentence " In use, may form flammable/explosive vapour-air mixture ". Although this is not true for SION ™, we have to insert this statement to comply with DIRECTIVE 1999/45/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 31 May 1999 concerning the approximation of the laws, regulations and administrative provision ™s of the

Member States relating to the classification, packaging and labelling of dangerous preparations, on page 43 of this directive it is stated that

10. Liquid preparations containing halogenated hydrocarbons
For liquid preparations which show no flashpoint or a flashpoint higher than 55°C and which contain a halogenated hydrocarbon which is more than 5% flammable or highly flammable, the packaging must bear the following inscription as appropriate:

Can become highly flammable in use

or

Can become flammable in use.

- **What implication does the Lower and Upper explosion limit have as stated in the MSDS?**

As stated above, SION® is safe in use and the labelling is based on legislative compliance.

- **Can SION® be used in my existing equipment?**

SION® can be used in almost any solvent cleaning system however some of the older systems may not be suitable due to their overall condition or the fact that the cooling system is not sufficient to contain the solvent properly meaning the process would not be economic to run. An FCT product specialist will be able to advise you on the suitability of your existing equipment.

Can I use SION® for hand cleaning applications?

Yes, SION® is stable and non-flammable in use. The only recommendation would be to follow the recommendations in the MSDS and insure adequate ventilation. You should always do a risk assessment of any new process and SION® is no exception to this.

- **Is SION® suitable for use with Titanium and Aluminium?**

Detailed testing of SION® has shown that this product is safe for use with these materials. Further material compatibility is available on request.

➢ **Does SION® have any aerospace approvals?**

SION® is currently being used by a number of major Aerospace companies and new approvals are being granted on a regular basis. An FCT representative will be able to advise you of the latest status.