ARTECO
A Joint Venture Company

Cool Flash

SEPTEMBER 30TH, 2008, EDITION NR. 14

Editorial

I want to take this opportunity to invite you to come and visit us at Chillventa. We've put our stand in a brand-new outfit. Come and meet some of our distributors, technical experts and sales people; and learn more about our products and projects.

We'll be there!

Stand 5-112

Enjoy reading this new edition of the Cool Flash and hope to see you all at Chillventa!
Katelijne Boens

In this edition :

PIETRO CARINI SpA IS 140 YEARS OLD

By Pietro Carini SpA

Mr. Pietro Carini established in 1868 in Milan the company which 140 years later still carries his name. Since the beginning the activity of the company was to act as agent and distributor on the Italian market of Chemicals and related products, on behalf of foreign principals- in the initial years mainly from Germany and other European countries.

Towards the end of the 19th century Mr. Antonio Bozzi joined the Company - of which he became first a partner in 1905, and then the sole owner. Still to day - 103 years later – the company is fully owned and run by the Bozzi family, now at the third and fourth generation at Carini's.

In the period between WW-I and WW-II, and in the first decades after it, the main activity of the company was to act on a commission agency basis; the main principal at that time was the large American concern Monsanto Co.

As of the late 60's and early 70's, the activity switched somewhat and the principal role of Pietro Carini became the one to act as distributor, on the Italian market on behalf of several foreign principals such as Exxon, Ferro, PPG and Ineos. The markets served from PVC modification (and in this field Carini is certainly offering the widest range of plasticizers then anyone else in Italy), to the coating sector, to detergency and to the general chemical market.

One sector that in the last decade became of paramount importance has been the one of the synthetic heat transfer fluids – mainly the line of ZITREC offered by ARTECO which is sold to a large variety of end uses, but also the Therminols offered by Solutia Inc.. A "*special task team*" in this sector had been created under the leadership of the M.D. Enrico Bozzi, and composed by Matteo Valoti, Anna Sebastiani and Massimo Manzoni, who contribute in different roles to the success story of this special product line.

From Arteco to Zitrec

NSF (National Sanitation Foundation) is an organisation which helps to protect you and your customers by certifying products worldwide and writing internationally recognized standards for food, water and consumer goods. Our Zitrec FC is registered by this organisation as a heat transfer fluid which can be used where there is possibility of incidential food contact (HT1).

Zitrec Heat transfer fluids

Agenda

- 8 — 10 Oct '08 IKK 2008
  Stuttgart — Germany
  CANCELLED
- 15 — 17 Oct '08 Chillventa
  Nürnberg — Germany
  Visit us in Hall 5
  Stand no: 5-112

- 21 — 23 Oct '08 Veronafiere
  Verona — Italy

- 24 — 27 Feb '09 Climatización
  Madrid — Spain

READ IN THE PRESS

Dordrecht gets Sportboulevard with new ice hall

The biggest covered sportcomplex of the Netherlands will be build in 2010 in Dordrecht. Part of it is a 60x30m ice hall, which will be cooled my means of ammonia as primary refrigerant, and a glycol-based heat transfer fluid as secondary fluid.

Source: RCC Koude & Luchtbehandeling, September 2008

IKK2008 not taking place

It was already announced in March 2008, IKK, the International Trade Fair for Refrigeration, Air Conditioning and Ventilation, will not take place in 2008 in Stuttgart.This was the result of a discussion between the VDKF (German Association of Refrigeration and Air Conditioning) and Messe Stuttgart.

Natural cooling of meat

In the meat-industry, quality, freshness and hygiene are 3 important criteria. Exemple is given of a slaughterhouse in Denmark, where a 2-stage coolingsystem was installed, and on which office aircondition, based on indirect cooling system using glycol was connected.

Source: Cool & Comfort, Jul-Aug-Sept 2008

Use of glycerol in heat transfer fluids?

By Pascal Lemberge

Glycerol or glycerin(e) is a colourless and odourless, sweet tasting liquid of low toxicity. This chemical compound is similar to the well known monoethylene glycol (MEG) and monopropylene glycol (MPG) but has three hydroxyl groups instead of two. Compared to MEG and MPG, glycerol has a higher density and higher viscosity.

Glycerol is widely used in medical, pharmaceutical and personal care formulations but also as an ingredient in food and beverages. Other applications of glycerol include polymers and explosives (nitroglycerine). Until recently, glycerol was never considered as an alternative base fluid for engine coolants or heat transfer fluids as prices were much higher than MEG or even MPG.

Production process

Alkaline hydrolysis of epichlorohydrin used to be the main manufacturing method of synthetic glycerol. Since glycerol forms the backbone of triglycerides it can also be produced by transesterification of vegetable oil, which in turn is the basis of biodiesel production. Hence, glycerol is also available as a 10% by-product of biodiesel production.

In an attempt to reduce CO2 emissions, the use and production of biodiesel production has boomed which in turn led to a huge increase of glycerol availability and a significant decrease in price making the epichlorohydrin process no longer economical.

(Cont'd page 3)

Use of glycerol in heat transfer fluids (cont'd)

By Pascal Lemberge

With prices dropping, glycerol becomes an interesting and cost saving alternative for MEG and MPG. As glycerol is less toxic and made of renewable resources, it also has a greener image than MEG. Heat transfer fluids in which MEG is replaced by glycerol are therefore perceived as more environmentally friendly. And not only coolant manufacturers but also some automotive OEMs are starting to show interest in glycerol.

Physico-chemical properties

But glycerol has some disadvantages as well.

- Compared to MEG, glycerol is not as effective in lowering the freezing point. The freezing point of a 50% v/v MEG water solution is -37°C while that of a 50% v/v glycerol water solution is only -28°C.
- Due to the higher density and viscosity of glycerol, a 50% v/v dilution is also heavier and more viscous. The higher viscosity requires more pumping energy, especially at lower temperatures.
- The glycerol molecule is also more susceptible to chemical oxidation than MEG or MPG and makes it less resistant against higher temperatures.

Handling & Storage

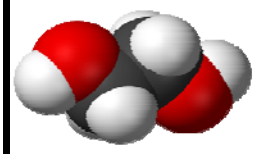
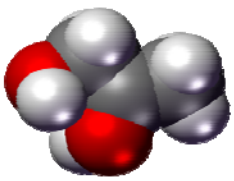
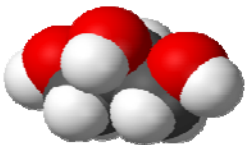
While pure MEG has a freezing point of -13°C, pure glycerol freezes at +18°C which requires glycerol to be stored at 20°C. Due to its high viscosity at ambient temperatures glycerol is heated to 50°C when handled during the production of heat transfer fluids.

So although glycerol is regarded as a cheap alternative for MEG, its manipulation in production is laborious and costly.

Use in heat transfer fluids?

Clearly, a pure glycerol based heat transfer fluid is not advantageous. Limiting the amount of glycerol could ensure that freezing protection is hardly affected, and keep the impact on density and viscosity of the coolant acceptable.

Nevertheless, while our inhibitor packages guarantee an efficient corrosion protection, heat transfer fluids containing glycerol do not offer the same performance as entirely MEG (or MPG) based products. Pure MEG (or MPG) based heat transfer fluids containing performance optimized inhibitor packages are still the products of choice.

Property	MEG	MPG	Glycerol
Formula	$C_2H_6O_2$	$C_3H_8O_2$	$C_3H_8O_3$
3D model			
Flash point, °C	118	103	160
Boiling point, °C	198	187	290
Freezing point, °C	-13	-60	18
Surface tension, dyne/cm (20°C)	48.4	40.1	64
Specific heat, cal/g/°C (20°C)	0.56	0.59	0.65

More about corrosion inhibitors — Part 2 : Thin barrier inhibitors

By Jurgen De Kimpe

Mixtures of corrosion inhibitors are widely used in heat transfer fluid and cooling water treatment. A corrosion inhibitor is a chemical substance added to the heat transfer fluid to reduce the corrosion rate of one or more metals in the secondary cooling system.
Inhibitors function by interacting with specific metal surfaces in a variety of modes. The most common molecular mechanisms include:

- Passivation of the metal or reinforcement of the passive metal oxide layer.
- Formation of a thin barrier of the inhibitor on part of, or the full metal or metal oxide surface by varying extent of physi- and/or chemisorption.
- The formation of thick barriers of inhibitor or inhibitor metal reaction product.

In This edition of Coolflash:

B. Thin Barrier Inhibitors

A thin barrier inhibitor forms a layer on a metal/metal oxide surface, be it on the *total surface* or *selectively on the anodic or cathodic regions* of the metal surface. Often these barriers are as thin as one or two layers of inhibitor molecules. The mechanism of adsorption can vary widely, from a pure physical addition in the case of oil like substances, to strong metal – salt like chemical bond formation in the case of some medium and long chain carboxylates.

By adsorption to the total surface, by so-called *general barrier inhibitors*, the surface is cleared of water molecules making solvatation of metal ions impossible. Furthermore, the absorption of protons or oxygen can be prevented. Examples of general barrier inhibitors are :

- Triazole compounds. They form a relatively weak chemical bond between the triazole nitrogen atom and the copper(I)oxide layer that covers yellow metals in water.
- Silicate (inorganic substance), for the inhibition of aluminium.

Effective general barrier inhibitors are often characterized by an additional packing or orientation on the surface. This can be either by electrostatic attraction or by polymerization of the inhibitor molecules absorbed on the surface, making the inhibitor more effective than would be predicted by the individual inhibitor-metal bond. Due to the reaction with the total metal surface, many general barrier inhibitors have relatively high consumption rates.
Anodic barrier inhibitors are selectively absorbed to the anodic spots on the metal surface. Cathodic barrier inhibitors are selectively absorbed to the cathodic spots. *Cathodic barrier inhibitors* mainly find application in strong acidic environments due to their competition with absorbed protons or because they prevent the actual H_2 formation.

The anodic barrier inhibition is the molecular basis of the **organic acid technology.** Hereby, not organic acids, but the associated carboxylate anions formed after neutralization, selectively target the anodic spots on the metal surface, forming a strong chemical metal – carboxylate salt bond with the metal surface. This shielding of the anodic spots makes the release of metal ions by corrosion thus virtually impossible.
Not all carboxylate anions seem as effective however. It is thought that following play a mayor role in determining the effectiveness of the organic acid technology inhibitor package :

- the structure of the long carboxylate hydrophobic tail
- the packing of the carboxylate inhibitor molecules on the metal surface
- possible synergic structural benefits obtained by combining various carboxylate inhibitors

Furthermore, the required activation energy to form the metal-carboxylate chemical bond and a possibly required initial physical absorption to the metal may influence the kinetics of the corrosion inhibition process.

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Zitrec Heat transfer fluids