Deutsche Umwelthilfe

Press release

Mobile Air Conditioning in cars: a highly toxic chemical cocktail against climate change?

Deutsche Umwelthilfe fears the replacement of climate-impacting refrigerants will once again bring hazardous fluorine chemistry products into use – Independent investigations concerning the chemical refrigerant 1234yf reveal enormous risks for vehicle occupants and helpers in case of fire – Chemical industry operates without regard to potential victims

Geneva, 4th of March 2009: The decision of the European Union to ban refrigerants with a severely negative climate impact in car air conditioning systems, may have unintended life-threatening consequences for future accident victims as the automobile industry continues to focus on hazardous refrigerants as substitutes in new Mobile Air Conditioning Systems. Thus, the highly flammable and toxic chemical 1234yf is now being used by many manufacturers as a cheap alternative.

"The strong desire of many car managers to continue cooperating with the chemical industry in this highly sensitive area is a dead-end and will very likely lead to additional traffic victims," warned the CEO of Deutsche Umwelthilfe e.V. (DUH) Jürgen Resch today in Geneva. On the occasion of the 79th International Motor Show the Deutsche Umwelthilfe e.V. presented their own test results concerning the behaviour of 1234yf if the chemical cocktail catches fire in the event of a car accident. The product of the U.S. Chemical companies Honeywell and DuPont is due to replace the refrigerant R134a in 2011. The global group Arkema also advertises the new product in the car industry under the name of Forane® 1234yf. But this is only a solution at first glance. The refrigerant 1234yf is flammable and in conjunction with water sets free highly toxic hydrofluoric acid (chemical: HF) in life-threatening concentrations

Even in very low concentrations, hydrofluoric acid is highly toxic. Moreover, this is not immediately noticeable by victims. HF penetrates the skin, destroys deeper tissue layers and leads to severe internal burns. Inhalation may cause an acute pulmonary edema. It can also cause chronic damages even resulting in death. *"One kilogram of refrigerant 1234yf can generate 700 grams of hydrofluoric acid in the event of fire. An average car air-conditioning system contains about 600 grams of refrigerants. It is almost unimaginable what could happen if several vehicles collided,"* said the traffic adviser and former Head of Department at the Federal Environmental Agency (UBA), Dr. Axel Friedrich. Survivors of a car accident could end up dying because they have been exposed to hydrofluoric acid. It is *"shameful how parts of the automobile and chemical industries unabashedly play with the safety and ultimately even with the lives of people, only so as not to miss out on this lucrative global market."*

The test results of DUH's accident simulations are unambiguous. The scenario: at about 600 degrees Celsius (or 1112 °F) at the motor bend and in the event of an accident in

which the refrigerant hose is ripped off, 1234yf ignites and burns steadily with a large flame. The extent of the formation of hydrofluoric acid turned out to be the main surprise for the testers. The chemical companies which have been strongly pressured by the car manufacturers must have been aware of this problem. Nevertheless, these companies continue to focus on quick profits in this multi-billion worldwide business. As a so-called drop-in refrigerant 1234yf can be filled into existing air conditioning systems without any major modifications. Consequently, the automakers save considerable sums of money in the short-term as they do not have to modify their air-conditioning systems. *"The submitted costings of the chemical companies and auto manufacturers are on shaky ground because there are no reliable long-term statements about the application or the production of this instable chemical,"* said project leader for climate-friendly cooling of DUH, Eva Lauer.

Honeywell even threatened to sue DUH for damages, should they publish the test results. But after the first public presentation nothing happened. *"There is silence in the forest because Honeywell apparently realized one cannot hold the bearer of the bad news responsible for the terrifying results,"* said Resch.

The current international discussion on next generation Mobile Air Conditioning Systems and the dangerous refrigerant 1234yf has been set into motion by the EU Directive 2006/40/EC and EU Regulation 842/2006. From 2011 onwards, the currently used and extremely climate damaging refrigerant R134a will be forbidden in new cars Europe-wide. But the auto industry seems determined to exchange the climate risk with a new one: to replace R134a with the highly inflammatory and in case of fire even toxic chemical 1234yf.

The DUH believes that the natural refrigerant carbon dioxide (CO_2) – in this context also referred to as R744 – is currently the only tested environmentally friendly alternative that is also ready for serial production. CO_2 has a global warming potential of only 1 (the currently used R134a has a global warming potential of 1,400) and is cheaply available worldwide. The DUH therefore calls on the automotive industry to only use CO_2 as a refrigerant in new cars. The introduction of this technique would avoid unnecessary emissions and contribute to achieving the climate protection goals. *"The Motor Show in Geneva would have been the ideal platform, to present new generation Mobile Air Conditioners on CO2 basis, in conjunction with the new production vehicles. This opportunity has, once again, been missed"* said Dr. Friedrich.

A video documentary showing the performed tests with 1234yf is available in English, French and German at: www.duh.de/klimaanlage_film.html

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Hydrofluoric acid (taken from Wikipedia):

Hydrofluoric acid is extremely corrosive and a contact poison. It should be handled with extreme care, beyond that accorded to other mineral acids, in part because of its low dissociation constant, which allows HF to penetrate tissue more quickly. Symptoms of exposure to hydrofluoric acid may not be immediately evident. HF interferes with nerve function and burns may not initially be painful. Accidental exposures can go unnoticed, delaying treatment and increasing the extent and seriousness of the injury. HF is known to etch bone, and since it penetrates the skin it can weaken bones without destroying the skin. More seriously, it can absorb into blood through skin and react with blood calcium, causing cardiac arrest.

In the body, hydrofluoric acid reacts with the ubiquitous biologically important ions Ca^{2+} and Mg^{2+}. In some cases, exposures can lead to hypocalcemia. Amputation may be required as a result from HF chemical burns.