

Hydrocarbon Refrigerants: Alternatives to HFC's

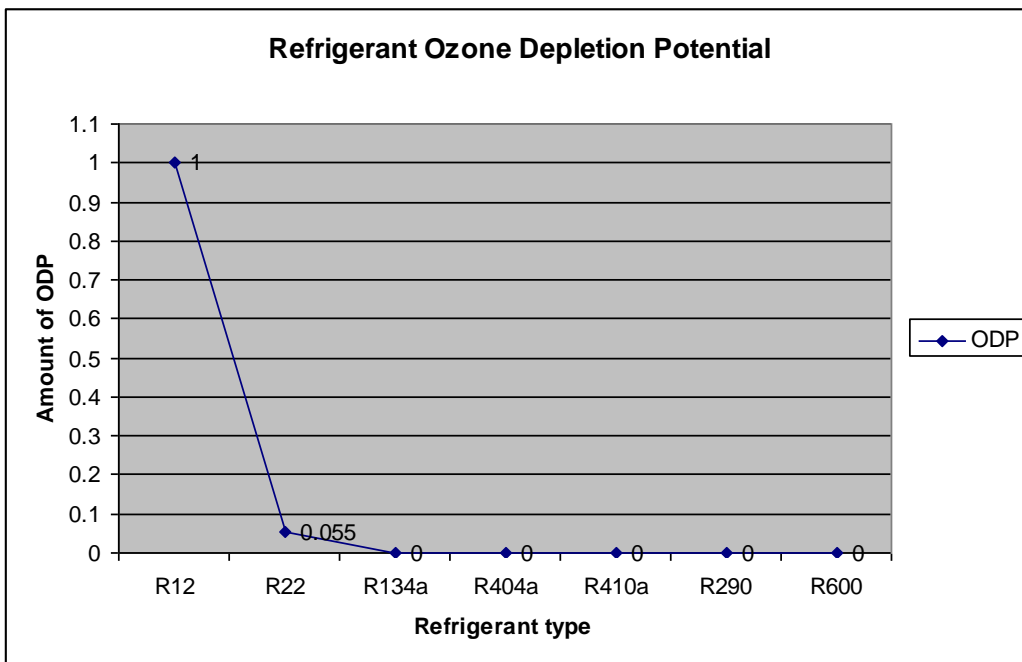
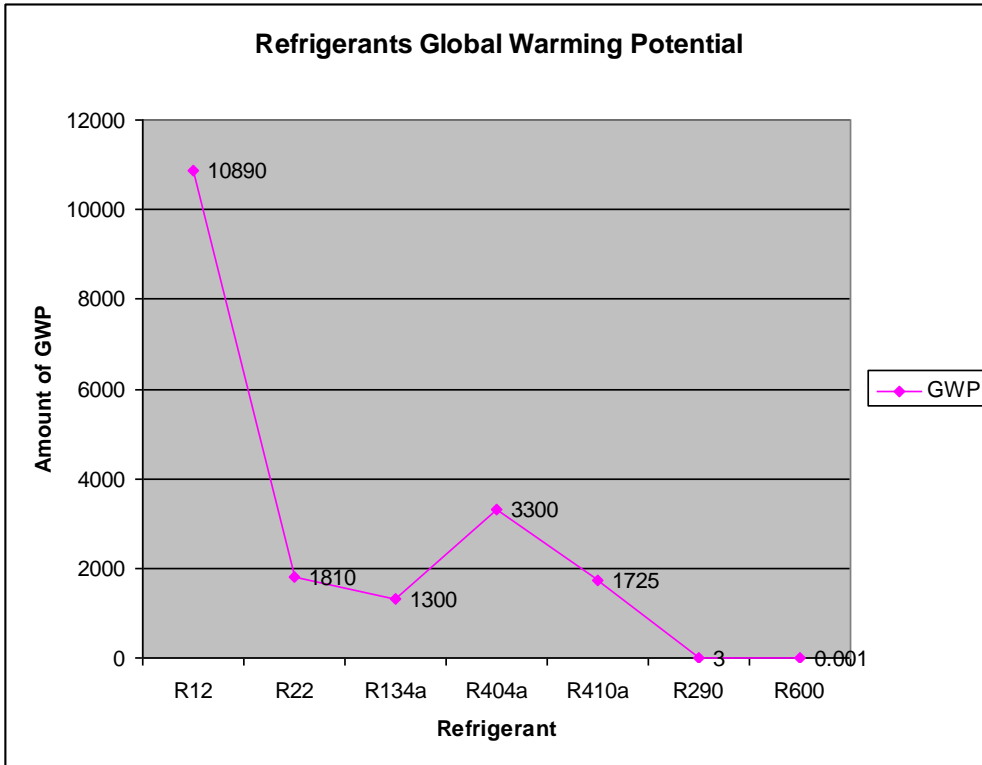
The Montreal Protocol Project eliminated the use of CFC refrigerants, namely R12, in the mid-nineties and will begin the phase out of R22 on January 1, 2010 with a ban on new manufacturing with R22. As a result, Air Conditioning and Refrigeration manufacturers had to redesign their products around different refrigerants, R134a, R404a, R410a just to name a few.

Also emerging in the North American market is the demand for products that use other alternative refrigerants, "natural" substitutes such as R290 (Propane) and R600 (Isobutane). These refrigerants have been used in Europe and in Asia since the early nineties, but are just now catching the interest of North American markets.

This demand, unlike that of the Montreal Protocol, is created almost totally by end-users. Powerful companies such as Coca-Cola, McDonald's and GE perceive the "going green" movement as an opportunity to establish an "Environmentally Conscious" image with consumers. Alternative refrigerants are, in their eyes, a long-lasting solution to ozone depleting gases, which also have a low Global Warming Potential.

The proposal of moving toward an HFC-Free Domestic Refrigerator is being considered under the Significant New Alternatives Policy (SNAP) (link <http://www.epa.gov/Ozone/snap/refrigerants/ga.html>), an EPA program that assesses substitutes to substances being phased out under the Clean Air Act for the protection of the Earth's ozone layer (source *Appliance Design* article October 31, 2008). Link: http://www.appliancedesign.com/CDA/Articles/Breaking_News/BNP_GUID_9-5-2006_A_1000000000000458025

When compared to even the most environmentally friendly HFCs these natural refrigerants are a valid alternative. The tables below show a comparison of the impact of hydrocarbon refrigerants vs. HCFC's and HFC's on Ozone Depletion Potential (ODP) and Global Warming.



Data source EPA Website: Link <http://www.epa.gov/Ozone/science/ods/index.html>

HCFC's such as the phased-out R22 have an ODP of 0.01 to 0.1 and are categorized as "Class II" Substances by the EPA. All HFCs have 0 ODP while they have higher GWP.

Definitions

What do these numbers mean? Obviously, in both cases, a lower number is better. Ozone Depletion Potential is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. HFC's do not contain chlorine and therefore have 0 ODP. The Global Warming Potential is the ratio of the warming caused by a substance to the warming caused by a similar mass of carbon dioxide (CO₂). Thus, the GWP of CO₂ is defined to be 1.0. Data source EPA website: Link <http://www.epa.gov/Ozone/defns.html#ods>

Safety Concerns

Of primary concern to manufacturers interested in producing refrigeration systems that use Hydrocarbons (R290 and R600) is the danger involved with working with flammable gases. The lack of practical experience in the North American market raises some questions as to how regulations of various governing bodies will apply to the use of HC's.

The good news is, manufacturers in Europe and elsewhere have been using HC's since the early 1990's, so there is an abundance of practical experience with making the use of HC refrigerants a safe and environmentally-friendly alternative to HFC and HCFC gases. ATEX regulations, which govern component selection and equipment manufacturing process, apply within Europe and act as a standard throughout the EU, eliminating the need for each member state to have its own regulations in place. Their primary purpose is to ensure the personal safety of those employed in potentially explosive environments. IECex, on the other hand, is more concerned with making these safety requirements and practices standard worldwide, in order to better facilitate the installation of safely manufactured process equipment on an International scale. Finally, installations of equipment are certified by outside, independent bodies, TÜV in Europe for instance. Source: <http://www.pixavi.com/company-technology9-certifications-pixavi.html>