

## CFC Alternatives (9356)

Chlorofluorocarbons (CFCs) and other ozone-depleting compounds are subject to a mandated phase-out of production and use under regulations promulgated by governments that are signatories of the Montreal Protocol. The original phase-out layer has been depleting faster than originally estimated. In addition to the phase-out schedules, a number of related regulations have been promulgated or proposed on the acceptable types of substitutes for ozone-depleting compounds and on labeling of products that use ozone-depleting compounds in their production.

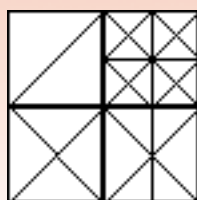
CFCs and HCFCs (hydrochlorofluorocarbons) were developed in the 1920s and have become the most widely used refrigerants in residential, commercial, and institutional sectors (including office area air conditioning associated with industrial plants). They are also used extensively for industrial refrigeration and chilling, including refrigerated transport and storage facilities.

Foam blowing is used to reduce the density of a plastic material by creating a structure filled with cellular voids. This is achieved by the expansion of a gas that is dispersed within a molten polymer phase. CFCs have been used extensively as physical blowing agents in the production of rigid and flexible foams.

Current and proposed regulations related to the phase-out of CFCs are reviewed in CFC Alternatives. This serves to provide a concise outline of the problems and dislocations that will be caused by the phase-out of these ozone-depleting compounds in refrigeration and plastic foam blowing applications. Potential strategies which might be used by industries currently using such products, to cope with the phase-out, are also suggested in this report.

CFC production is to be phased out by 1996; the phase-out of production and consumption of HCFCs is to be accomplished over a longer period. The use of HCFCs as replacements for CFCs is considered to be an interim solution in refrigeration systems. HCFCs represent excellent retrofit candidates for CFCs and will be available, under the current phase-out schedule, for more than 30 years. (The average refrigeration system life tends to be 25 years or less.) HFCs (hydrofluorocarbons) have much lower ozone-depleting potential. As discussed, some are currently available for use in refrigeration application; others are under development.

Another replacement for CFC in refrigeration examined in this report is alternative refrigeration technology. There are a number of alternative refrigeration processes currently under development, but the single commercial alternative at this time is the absorption refrigeration process.



The manufacture of foamed plastics relies on the use of blowing or foaming agents that create bubbles or cells in the plastic foam structure. The three types of foams covered in this report are polyurethanes, polystyrenes, and polyethylenes, all of which rely on physical blowing agents for their production. CFC Alternatives critically examines potential alternatives, both fluorocarbon based and nonfluorocarbon containing materials for plastic foam blowing.

