PERP

Polyvinyl Chloride (93-4)

The majority of new technology developments in both PVC's plant operation and market sectors are in direct response to the severe pressure from the worldwide environmental lobbies concerned with polyvinyl chloride's ecological impact. In spite of this pressure, polyvinyl chloride remains a highly successful commodity polymer and overall demand remains strong, although specific sectors have been subjected to substitution by materials apparently presented as having a reduced environmental impact.

The emphasis differs from one region to another. In the United States there has been more concern about the carcinogenic effects of free vinyl chloride. Strict limits on permissible plant emissions have been instigated in some states (including Texas) and this has led to engineering modifications to process lines to collect any escaping vinyl chloride for incineration. Some polymer technologists believe that there is little that can be done with polyvinyl chloride reactor technology to improve yields. However, there are possibilities, on the engineering side, of improving reactor charging and discharging rates by "doubling up" on process line conveying capacity, which carries with it the increased risk of escaping vinyl chloride.

In Europe there has been a greater focus on the toxicology of polyvinyl chloride itself once it is in the environment in its end-use form. Bans on cadmium stabilizers have forced the industry to reformulate compound grades around more environmentally benign lead, tin, zinc, and calcium salts. Lead will be next to be phased out. Although the replacement stabilizers are adequate in terms of thermal stability, the melt rheology can be changed and lower throughput to reduce shear may be required. This will ultimately affect the profitability of the product. The environmentalists have enforced several local bans on polyvinyl chloride in applications as diverse as food packaging and flooring. Very few have proved enforceable on a long term basis due to lack of suitable replacement materials, but because of this ban other polymer producers have been offered the opportunity to replace polyvinyl chloride.

Environmentalists are now turning their attention to the upstream ethylene dichloride/vinyl chloride monomer sector. (Greenpeace describes these installations as "dioxin factories.") While direct pressure is removed from polyvinyl chloride for the moment, restrictions on ethylene dichloride/vinyl chloride monomer production could have farreaching consequences on the profitability and structure of the polyvinyl chloride industry.



This report examines the industry's response to these various environmental pressures. Included in this analysis is a schematic of





PVC's life cycle and a discussion of the key issues associated with each stage of the life cycle.

Environmental pressures not withstanding, polyvinyl chloride is experiencing a recovery in demand from the difficult years of 1991 and 1992, reflecting polyvinyl chloride's great strength and suitability as a construction material in long term applications. Sixty percent of polyvinyl chloride produced is used in construction related end uses. The mature markets are recovering from the recession, and a revitalization of house building is taking place. Emerging nations in the Far East and Central/ Eastern Europe have an urgent need to renew, expand, and modernize their housing stocks and improve water distribution and drainage systems. This demand is already happening in the Far East but will be slower to start in the Central/Eastern European states, which are still trying to attract Western investors to sponsor many of the necessary improvements.

For this reason Chem Systems believes that demand will continue to grow in the three main regions, and until 2000 the United States is expected to maintain an average annual growth of 3.6 percent, Japan 5.7 percent, and Western Europe 2.1 percent. Polyvinyl Chloride segments capacity information, trade balance data, and end-use application breakdowns on a regional basis.



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