Abstract

Over the years, industrialized nations have progressively taken different approaches to deal with environmental degradation and pollution problems, by: Ignoring the problems; Diluting or dispersing the pollution so that its effects are less harmful or apparent; Controlling pollution using 'end-of-pipe' treatment.

In May 1989, United Nations Environment Program (UNEP) Governing Council asked UNEP to promote the establishment of a network to "allow the transfer of an environmental protection strategy". The strategy of Cleaner Production formulated by UNEP was launched in a conference in Canterbury in 1990; which is defined as the continuous application of an integrated preventive environmental strategy applied to processes, products and services to increase overall efficiency and reduce risks to humans and the environment.

The key difference between pollution control and Cleaner Production is one of timing. Pollution control is an after-the-event, 'react and treat' approach, whereas Cleaner Production reflects a proactive, 'anticipate and prevent' philosophy. Prevention is always better than cure. Cleaner Production can be and has already been applied to raw material extraction, manufacturing, agriculture, fisheries, transportation, tourism, hospitals, energy generation and information systems.

Various types of Cleaner Production Options include: Raw material substitution, Process Optimization, New Technology, New Product Design and Housekeeping. There are basically six steps involved in Cleaner Production Methodology: 1) Getting Started; 2) Analyzing the process steps; 3) Generating Cleaner Production opportunities; 4) Selecting Cleaner Production solutions; 5) Implementing Cleaner Production solutions and 6) Maintaining the strategy.

There are some important reasons to invest in Cleaner Production: a) Improvements in product and processes; 2) Savings on raw material and energy, thus reducing production cost; 3) Increased competitiveness through the use of new and improved technologies; 4) Reduced concerns over environmental legislation; 5) Reduced liability associated with the treatment, storage and disposal of hazardous wastes; 6) Improved health, safety and morale of employees; 7) Improved company image; and 8) Reduced cost of end-of-pipe solutions.

In order to explore the possibilities of reducing wastes and increasing productivity especially in small and

medium scale chemical industries, the project work is carried out by selecting some case studies for cleaner production exercise in various industries such as

Chlor-alkali industry, Phenol Manufacturing, Copper Phthalocyanine (CPC) manufacturing, Fertilizer industry, Petroleum Refining Industry, Pulp and Paper Industry, Textile Industry and Steel Industry with major focus on three selected products viz. copper phthalocyanine, chlor-alkali and phenol.

The major focus of the project is on exploring cleaner technological options for manufacturing of copper phthalocyanine. With this objective, material balance is carried out followed by experimental work to assess the proposed cleaner technology (CT) options. Cost Benefit Analysis has also been carried out for checking its technical and economic feasibility.

Copper Phtalocyanine (CPC) is most widely used as blue organic pigment in the paints, coatings, and printing inks industry. The project involves analyzing cleaner technological options for a CPC manufacturing unit located at Ankleshwar GIDC, as there are a number of small-scale units manufacturing CPC blue pigment. The major environmental concern is a large concentration of heavy metals, chiefly copper, in the effluent. The case study includes description of existing process, material balance; CPT (Cleaner Production / Technology) options generation and cost benefit analysis of options generated. Two Cleaner Technology options have been analyzed based on

material balance for the existing process: (i) Reduction at Source; i.e. the reduction in the amount of CuCl charged in the reactor. (ii) End-of-pipe treatment; i.e. recovery of copper from effluent.

Many Cleaner Production Technology options have been explored for chlor alkali plant with major emphasis on mercury and diaphragm processes. Mercury recovery and recycle and integration of alkali network of the plant give more economical and environmental benefits.

For phenol production, a new technology of direct oxidation of benzene that creates very less wastes and consumes very less energy was focused. The recovery of phenol from effluent is also an important CP option for existing phenol processes.

Key Words : Environment Protection, Cleaner Production, Cleaner Technological Options.