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CHEMTEC

PLAFORIZATION™

and Environmental Protection

CHEMTEC srl

PlafORIZATION™ and the Environment

PlafORIZATION™ technology was developed with the objective of providing an economical and safe method of cleaning and phosphating, from the point of view of both environmental and operator safety.

PlafORIZATION™ includes a wide range of formulations, and R&D is extensively concentrated on creating products and processes capable of satisfactorily preserving the indoor and outdoor environment. Researchers' awareness of ecological issues is evident in their constant efforts aimed at prevention of water, air and soil pollution. Similar care is taken to improve the working environment and work safety.

Today, PlafORIZATION™ is marketed throughout the world following the company's "3P" guidelines, its Pollution Prevention Program – a program put in place to define a clear environmental policy aimed at protecting the environment by modifying technologies and developing new ones designed as less polluting and less resource-intensive processes.

The Pollution Prevention Program

The Pollution Prevention Program is based on the following fundamental concepts:

1. Global Potential Pollution
2. Environmental efficiency
3. Resource Recovery
4. Good Housekeeping
5. Material Substitution
6. Airdegradability

1. Global Potential Pollution

When considering the effects of a product or process on the environment, governments and users alike should take into account the effects on all major systems – water, soil and air.

2. Environmental efficiency

What separates a waste from a raw material is economic usefulness, and research must be oriented toward turning wastes into resources.

3. Resource recovery, creation of industrial ecosystems

Pollution emissions can also be reduced by keeping the polluting agents within the production system, and by reusing them in the same or other processes.

4. Good housekeeping

Operating a plant in the most efficient manner not only saves money and does not require large capital expenditures. It also reduces pollution, often by as much as a third.

5. Material substitution

Substituting one material for another offers the prospect of completely eliminating a given pollution problem. Of course, substituting one material for another does not mean shifting the problem from atmosphere to water or soil and vice-versa.

6. “Airdegradability”

An important new concept in regulation of Volatile Organic Compounds (VOCs) is the theory of photochemical transformation of VOCs in air under tropospheric conditions – AIRDEGRADABILITY.

Airdegradability & Volatile Organic Compounds VOCs Pollution Prevention and Airdegradability

Common sense would dictate that all VOCs are not equal.

Scientific studies of the rate of photochemical transformation of VOCs in air demonstrate that among volatile organic compounds there are substances that cannot be easily degraded in air (i.e., CFCs and HHCs), while other compounds are subject to photochemical transformation. The degradation depends to a very large extent on the chemical structure of these substances.

It is known that CFCs cause ozone depletion. The half-life of these chemicals in the atmosphere is believed to have a direct correlation with ozone depletion.

Thus, atmospheric half-life is very important in evaluating the potential atmospheric pollution rate for new compounds introduced as substitutes for ozone-depleting materials.

Results of the measurement of constant reaction rates of photolysis, ozone and hydroxyl radical reactions for non-depleting compounds demonstrate that their degradation in air does not give rise to hazardous air pollutants (i.e., zero or extremely low contribution to the creation of smog, no contribution to the creation of acid rain, insignificant contribution to global warming).

Hence, the theory of “airdegradability” and the new half-life concept demonstrates that there are compounds that are extremely unstable. Those compounds can be transformed photochemically so that they cannot migrate to the stratosphere where they would decompose when exposed to UV radiation, releasing chlorine and bromine, which destroy ozone molecules. Furthermore, studies prove that photochemical degradation of certain VOCs produces new substances that can be absorbed by the natural ecosystems without giving rise to local environmental and health and safety problems.

Pollution Prevention and Plaforization™

water: no water pollution

Plaforization™ works in an anhydrous medium, so no water is involved in the process, no rinsing stages are necessary, and no water effluent is generated by the process.

soil: no waste

Unlike conventional aqueous phosphating processes, which require the metal parts to pass through a number of tanks and chemicals to complete their treatment, Plaforization™ not only takes place in a single tank at room temperature, but also it does not generate undesirable by-products such as metal sludge and muds, which have to be disposed of in landfills. Ever more stringent government regulations regarding land disposal of hazardous wastes have served to further add to the rapidly spiraling costs to metal finishers of all types of sludge disposal. This greatly impacted the economic payback equations previously used to determine whether a company is better off treating or recovering a waste stream. It is worth noting that, today, many industries are required to install costly equipment for treating effluent. Even established plants are spending up to 10% of their revenue on effluent: conserving water, treating waste and dumping. In many countries, firms often end up paying even more to dump their effluent far away because of limited availability of sites

atmosphere: no HAPs

Chemicals are free of ozone-depleting substances and they are formulated to give rise to airdegradable non-hazardous air pollutants (no HAPs).

The Plaforization family of products are stable blends of new organic fluids which contain no CFCs or other potentially hazardous halogenated compounds. Plaforization™ is a simple Cold Technology which uses low-cost equipment designed, on the one hand, to minimize consumption of raw materials and, on the other hand, to maximize conservation of raw materials on-site (i.e., Ecophor System™: an industrial ecosystem).

workplace: safe for operators

The various Plaforization™ formulations have a wide range of physical properties, making them useful in many applications. Their elevated boiling points, combined with their low freezing points and their non-toxicity, make them easy to store and handle in most climates.

Plaforization™ is always used in specially designed industrial plants where no human contact with chemicals is expected and where conventional ventilation equipment assure a safety environment.

Plaforization™ - summary of ecological advantages

- no water pollution
- no effluent to dispose of
- no sludge/muds to dispose of
- high airdegradability rate
- no emissions of HAPs into the atmosphere
- free of ozone depleting substances
- free of CFCs
- free of carcinogenic compounds
- safe for the workplace

Conclusion

The aim of this paper was to clarify the concept of Global Pollution Potential and highlight the advantages of introducing a Plaforization™ process into a metal finishing operation.

Plaforization™ has an extremely low overall pollution potential when introduced into specific market niches - niches in which the adoption of alternative processes would mean spending money on waste treatment, money which is – simply – wasted.