

Pollutant Solidification/Fixation

There appears to be a great deal of confusion concerning the terms “solidification” and “fixation”. Solidification is often used to describe the thickening of the type used to meet D.O.T. requirements for hazardous waste transportation. This is essentially meeting the “No Free Liquid” standard using the Paint Filter Test. This is also a requirement for land burial of non hazardous wastes.

For liquids to be incinerated, this requirement is best met with OMNI's STOP-IT! particulate, a recycled cellulose fiber having high absorbency, low ash, and a high BTU value.

Liquids that are nonhazardous or that will become nonhazardous after neutralization can be prepared for land burial by solidifying and neutralizing using OMNI-KAP™, SorbaSet S™ or SorbaSet B™. The SorbaSet™ series are particularly suitable for spills as absorption, solidification and neutralization all occur simultaneously. The free water in these systems is chemically tied up rather than simply absorbed. It will not release under pressure. These systems are also non biodegradable, meeting the RVRA land burial requirements.

For the purposes of this review, the latter definition of solidification is the one used. Another term used to describe this process is that of Chemisorption. Fixation is a rather complex chemical reaction that results in a pollutant (usually heavy metals) being rendered most insoluble. The requirements for fixation are to meet the E.P.A. TCLP extraction test.

In some cases, SorbaSet S™ and OMNI-KAP™ will meet these requirements, they are not the most efficient and economical product to use for large quantity fixation. The preferred product is OMNI-FIX™. The object meeting of the TCLP is to delist (render nonhazardous the waste or site).

The two largest types of hazardous pollutants are on site liquid or semi-liquid wastes to be land buried and sites having contaminants in soil. In both cases, bench tests must be made to determine the amount of OMNI-FIX™ needed to meet the specifications.

With heavy metals, ratios of 1 to 2 OMNI-FIX™:pollutant usually suffices. The heavy metals (where possible) should be soluble and ionically available. While OMNI-FIX™ will fixate some monovalent ions, it is most effective on multivalent cations. If polyvalent ions such as mercury are present, it is best to oxidize the ion to a higher valence state.

Chelated metals are not readily reactive and if possible the chelate should be broken. This can be done by passing thinner liquids through a bed of iron fillings or steel wool, or by adding iron fillings to the material being treated. Metal solubilization and chelate breaking are best done at a slightly acid pH (5). Common indicator paper or colorimetric analysis will show ion solubility.

In all situations water contents of at least 15% must be maintained to aid reaction. Excessive water may be drained off and treated separately with OMNI-FIX™ flocculation or OMNI-TRAP™ filtration. In cases where excess water cannot be decanted, after adding and reacting OMNI-FIX™ the addition of small quantities (up to 20%) of the OMNI-KAP™ will tie up excess water.

Depending on the viscosity, pH, solids and other conditions, mixing may be best accomplished using a propeller type or “mortar” type cement mixer. A rather thick gelatinous viscosity is the most desirable to keep the OMNI-FIX™ in suspension until it has reacted. Where needed, inert fillers such as vermiculite, clays, or fly ash are recommended to increase viscosities. We do not recommend the use of lime. It has been noted that some heavy metals resolubilize at higher pH's and many organics weeped out under these conditions.

Site soil treatment may be done depending on conditions such as depth of contamination, soil type, water table, etc. in a number of ways. For contamination depths of 2 feet or less, the use of tilling type machines (four passes N.E.W.S.) using lawn spreaders to apply the OMNI-FIX™ does a very satisfactory job. Wetting between passes can keep the moisture level to the desired point without flooding. For greater depths, excavation and “mortar” mixing will suffice. There are available a number of on site mixers (GeoCon, etc.) that will mix to greater depths without excavation.

In all events of site reclamation, the site should be isolated using a slurry wall cut off (trenching with a backfill of Betonite/water mix) to prevent migration of contaminants.