

Hydrocarbon Immobilization with Polymers

Polymers in this area of *Polymer Chemistry* are very solidly based and the groups all carry Federal Drug Administration Certification, which basically means, that the chemistry can be used in food handling, packaging, medical field, and virtually anything that would be for human use. These polymers are safe and they are typically produced by very large companies for specific uses in mind.

The polymers are made from natural gas, and are found to be virtually clean, and contain no heavy metals. Polymers are abundant...they are found in synthetics, and occur naturally, i.e., in trees and plants. Polymers are a large part of our everyday life and we could not possibly live our quality of life without the exact chemistry that most companies choose for hydrocarbon solidification.

CI Agent is made from this group of Polymers...it is a non-toxic, non-hazardous, non-corrosive, and environmentally friendly petroleum bonding agent, primarily used as a chemical countermeasure against water-borne spills. Petroleum-based products includes oils, transportation fuels, solvents, oil-based paints, etc.

CI Agent is a dry *Granular* material specifically designed to immobilize petroleum-based, (on land and/or water) liquid spills by coagulating and bonding the liquid.

Unlike absorbents that soak up the liquid through expansion, **CI Agent** bonds the liquid into a removable mass with minimal volumetric increase and retains the liquid for easier removal. This eliminates the *dripping out* effect by not allowing the liquid to be squeezed or pushed out and minimizes any residue or contamination.

CI Agent polymers are composed of lightly cross linked polymer chains. Because of the cross linking, CI Agent displays a markedly unusual behavior with organic materials. Most plastics, for example, dissolve readily in an appropriate solvent, CI Agent, however, does not dissolve but instead; solidify the organic liquid through “micro-encapsulation”, which basically, converts the original liquid into a non-leach able solid waste. When **CI Agent** is contacted by an active organic liquid, it begins to solidify through the cross linking of the **7 different polymers** used in its unique blend. No other chemical or external mechanical action is necessary. Additionally, organic liquids “captured” by **CI Agent** are actually absorbed and entrapped in the molecular network and cannot be *released* from the solidified polymers. The characteristics of the formulated polymers *fuse* with the hydrocarbon materials, resulting in the formulation of a cohesive *rubber-like* mass, which may be easily removed in most clean up situations? In addition, while solidifying the petroleum-based spill, it does not pick up any water in the process. This allows **CI Agent Pillows** and *Booms* to be used on land as a preventative measures prior to a possible release of a hydrocarbon.

After **CI Agent** has reached its capacity for organic uptake, it will *cure* in some cases instantly, or in a relatively short period of time (usually one to two minutes depending on the viscosity of the material), and will form an interlocking network with a rubber-like consistency. **CI Agent** is extremely stable and the toxicity of the material *encapsulated* is reduced considerably.

There is any number of industrial applicability for *spent CI Agent*, eliminating the formulation of a *waste product* and allowing the material, *if acceptable* via TCLP and other **Environmental Protection Agency** and/or state testing procedures, to become an intermediate for introduction into another *downstream* process. The following are types of end-use applications:

1. Asphalt modification to improve flexibility and stability characteristics.
2. Plastics and rubber additions to extend raw material and provide various characteristics enhancements.
3. Additives for adhesives, sealants, and coating to extend and improve flexibility.
4. Oil viscosity modification to change the characteristics of various petrochemicals products.
5. Additives for general rubber compounding to modify prosperities and extend rubber makeup.

Alternatively, the encapsulated material can be used as fuel, creating 7000btu/pd with an extremely small (.02%) ash residue.