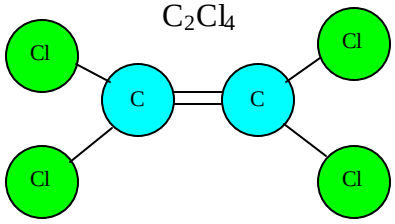
2.0 CHLORINATED VOLATILE ORGANIC COMPOUNDS

2.1 Constituents and History

2.1.1 PCE (Tetrachloroethylene)

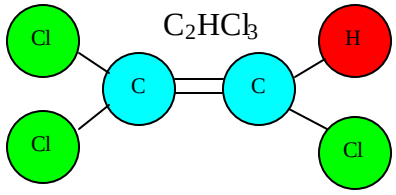


PCE was discovered by Michael Faraday, a physicist and chemist, in 1821. Though PCE is most often thought of in conjunction with the drycleaner industry, only 25% of all PCE production in the United States is used by drycleaners. PCEs other uses include metal cleaning, vapor degreasing, and as an ingredient in automotive aerosols. Commercial consumption of PCE has been on the decline in the U.S. since its peak in the late 1970's when it was determined to be a carcinogen by the United States Consumer Product Safety Commission.

PCE is manufactured through the use of high temperature chlorination of ethylene or 1,2-dichloroethane, which produces Trichloroethene (TCE) as a byproduct. At one time, PCE was produced by the chlorination of acetylene until high prices forced a change in the 1970's.

PCE is the second most commonly found chlorinated solvent at CVOC impacted sites. It has been detected in at least 771 of the 1,430 National Priorities List sites identified by the EPA.

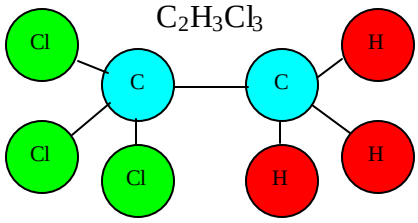
2.1.2 TCE (Trichloroethylene)



TCE was regarded as the dominant cleaning solvent through the 1970's and peaked with its use in the automotive and aerospace industries as a degreaser. Besides being used as a degreaser, TCE has been used as an ingredient in dyes, rubber, glue, insecticide, paint, and water proofing materials. In some instances, TCE was even used to extract caffeine from coffee beans.

In the mid-1970's reports began to surface that, like PCE, TCE was a carcinogen. This caused business and industry to switch from TCE to TCA (1,1,1-Trichloroethane). TCE is the most commonly found chlorinated solvent at CVOC impacted sites. It has been detected in at least 852 of the 1,430 National Priorities List sites identified by the EPA.

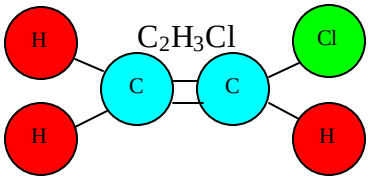
2.1.3 TCA (1,1,1-Trichloroethane)



TCA dates back to 1840 when it was synthesized from 1,1-Dichloroethane and chlorine. TCA was originally used in Europe as a rubber solvent. However, it was first used in the United States in the 1940's as a product in cold cleaning and as a corrosion inhibitor. Upon its replacement of TCE in the mid-1970's, TCA was linked to 21 deaths relating to decongestant aerosol sprays and fluorocarbon propellants.

TCA also has a very high rate of detection at CVOC impacted sites. Of the 1,430 sites listed on the EPA's National Priorities List, TCA has been detected at least 696 instances.

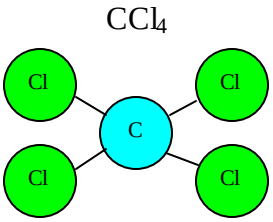
2.1.4 Vinyl Chloride



Vinyl Chloride is most widely known for its use in the production of polyvinyl chloride (PVC) pipes. It is also used as an ingredient in adhesives and refrigerants and acts as a copolymer in plastic wraps. The major characteristic that makes vinyl chloride unique compared to other chlorinated solvents is the fact that it is one of only 2 compounds whose liquid density is less than that of water.

Vinyl Chloride has been detected in at least 496 of the 1,430 National Priorities List sites identified by the EPA.

2.1.5 Carbon Tetrachloride



Carbon Tetrachloride was a popular solvent from the early 1900's through the 1950's. Commercial use and production ended January 1, 2000. Carbon Tetrachloride was used to treat animals for hookworm in the 1920's and replaced gasoline as a dry cleaning agent in the 1930's. By the 1950's, half of all Carbon Tetrachloride produced was used in Freon 11 among other chlorofluorocarbons. In the 1970's, Carbon Tetrachloride was identified as a carcinogen and its use in any emissions was banned in 1996. Carbon Tetrachloride has been identified in at least 326 of the 1,430 National Priorities List sites identified by the EPA.