Carbon tetrachloride essay

During 1839 a highly toxic substance was discovered by the name of carbon tetrachloride. Created by the reaction of chlorine with chloroform, carbon tetrachloride is manufactured when chlorine and methane or chlorine and carbon disulfide react.

The process including methane became the prominent way of production in the United States during the 1950’s, but the process dealing with carbon disulfide remained important to countries in which natural gases were not abundant. Because of its excellent solvent properties and non-flammability, carbon tetrachloride has been in use for many decades in certain products such as grease solvents, dry cleaning solvents, and fire extinguishing agents. Also it has been used to catalyze ozone depleting CFC’s, chlorofluorocarbons, such as dichlorodifluoromethane (F-12) and trichlorofluoromethane (F-l l), primarily used as refrigerants (freon). Carbon tetrachloride contributes both to ozone depletion and to global warming.

Recently it has been utilized by industries as a fumigant and feedstock, but because of its toxicity, these uses have been discontinued, and only the industrial use as feedstock remains. Decomposition of carbon tetrachloride may result in the production of carbon dioxide, hydrochloric acid, and phosgene, a highly poisonous gas. Carbon tetrachloride has been classified as a substance too hazardous to be put on the market, and that no warning label could be considered adequate to protect consumers, or any who purchase it, from its toxicity. Although it may contain many good properties and attribute good uses to society and the economy, the bad outweigh the good.

Therefore it should not be marketed due to the danger that it would provoke. This is why a phase-out was scheduled under the Montreal Protocol, with the exception of feedstock and other essential uses. There have been many arguments that have coincided with the creation of carbon tetrachloride. First of all, it is not natural and is a man made substance.

Secondly, the toxicity of carbon tetrachloride targets some of your most vital organs including the kidneys, liver, and the central nervous system. Contaminated drinking water, and air and food supplies all became issues when carbon tetrachloride's true colors were revealed to the world. Build-ups of this substance would cause severe kidney and liver damage, mild and severe nerve damage, and in even some cases of continued and elevated exposure, death. Though short exposures to carbon tetrachloride would sometimes prove not to be fatal, in many cases it was. Many groups and agencies picked up on these happenings and investigated the causes.

They found that a leading cause of these medical conditions was the substance carbon tetrachloride found in the soil, the air, or even the water. Most of the concentration would be found in the air because it moves very quickly into the air upon release. It also evaporates from the soil and surface water leaving only a small amount in the soil and letting the rest move to contaminate the groundwater. It is very stable within the air having a lifespan of 30-100 years at most. It can break down and transform in water and soil within days of exposure and when it breaks down it causes chemical reactions that destroy the ozone. Global warming and ozone depletion are also very big issues that were explored when carbon tetrachloride was found to be toxic and unsafe to the environment.

It was found that carbon tetrachloride had ozone depleting potential (ODP) and global warming potential (GWP). After the realization of the danger that carbon tetrachloride proved many groups and organizations began to label restrictions, and petition for reductions in the production of this substance. Due to the abundant quantity of this hazardous substance the Environmental Protection Agency (EPA) labeled a limit of 0. 005 parts of carbon tetrachloride per million parts of drinking water (0. 005 ppm).

Also the EPA set limits on the amount of carbon tetrachloride that can be released from the industries into wastewater and they are preparing to set a limit on the amount that can be released into outside air. The Occupational Safety and Health Administration (OSHA) has set a max concentration limitation in the air of a workplace to 10 ppm for an 8-hour workday over a 40-hour workweek. Many other agencies have taken up political arms in this matter including: Agency for Toxic Substances and Disease Registry (ATSDR), United Nations Environment Programme (UNEP), European Chlorinated Solvent Association (ECSA), World Health Organization (WHO), International Agency for Research on Cancer (IARC), and many more. Based on available toxicological evidence it is an impossibility to calculate an accepted daily value for intake of carbon tetrachloride, but these restrictions that have been mandated will stay in place and stand strong until there a way is found to destroy or in the off chance degrade the toxic properties of carbon tetrachloride. There has been much effort to replace carbon tetrachloride. In its former use as a dry-cleaning solvent, carbon tetrachloride has been ultimately replaced by tetrachloroethylene, which is much less toxic and more stable than it’s predecessor.

Research efforts made possible findings of physical and chemical characteristics of new substances indicating they could contribute to radiative heating of the atmosphere and influence the level of ozone in the stratosphere. Two classes of compounds that define this decription are hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs). These chemical compounds are currently being used by industries in situations formerly requiring the use of CFCs including carbon tetrachloride. These alternatives are considered by industries to be a much more suitable replacement, at least temporarily, than anything they know of because of their potential to degrade the depletion of stratospheric ozone. The availability of these compounds as well as additional alternatives has allowed for the elimination of CFCs like carbon tetrachloride.

Although stratospheric ozone depletion is digressed when using HCFCs scientists are not sure whether these compounds will be deemed as a long-term solution for this problem. On the other hand, HFCs have been designated to be used on a more long-term basis because they are non-ozone-depleting compounds. These compounds will take over the responsibilities that CFCs once held to the environment providing a cleaner and safer atmosphere. The biggest issues with carbon tetrachloride are global warming, ozone depletion, and bio-hazardous conditions.

Global warming is caused by the introduction of the carbon tetrachloride into the stratosphere in turn depleting the ozone layer which protects us from hazardous UV rays. Ozone layer depletion causes unnecessary concentrations of UV rays to reach Earth’s surface causing global warming. These two conditions come paired with one other and are very dangerous.

Bio-hazardous conditions can be caused when carbon tetrachloride contaminate the air, water, and soil.

When this occurs kidney infection, liver infection, and nerve damage may inflict those who have prolonged exposure to this substance in the circumstances provided. For the most part, mankind is affected by carbon tetrachloride in an adverse manner. Many tests have also been administered to mice, rats, and hamsters. These tests have proved to be very brutal and vicious because the rats, mice, and hamsters would develop similar conditions that humans would with exposure to carbon tetrachloride.

In conclusion mankind and rodents are the species most affected by this compound.