

## Hydrocarbons

A child is found choking on lamp oil, a teenager inhales paint thinner to get high, a man siphons gasoline from his car, and a mechanic inhales a large amount of refrigerant. These are typical of the approximately 36,000 calls involving hydrocarbons reported to U.S. poison centers annually.

Hydrocarbons are organic compounds made of carbon and hydrogen in different conformations. Hydrocarbons can originate from plant oils, animal fats, natural gas, or crude oil. Aromatic hydrocarbons (e.g. benzene, toluene, xylene) have ring structures, while aliphatic hydrocarbons (e.g. furniture polish and fuels such as gasoline and kerosene) are straight chains.

Low Aspiration Risk <i>Low volatility, high viscosity</i>	High Aspiration Risk <i>High volatility, low viscosity</i>
petroleum jelly, motor oil, mineral oil	gasoline, kerosene, lighter fluid, naphtha, furniture polish (mineral seal oil), turpentine, pine oil



Clinically, hydrocarbons may be classified based upon their risk of aspiration vs risk for systemic toxicity. Most hydrocarbons are not well absorbed through the GI tract but pose an aspiration risk. Vomiting following ingestion may occur, which increases this risk. Aspiration results in inflammation, edema, and necrosis of lung parenchyma. Hydrocarbons with high aspiration risk tend to be volatile, have low surface tension, and low viscosity which increases the extent of exposure to lung tissue. Signs and symptoms of aspiration include persistent hacking cough, cyanosis, abnormal lung sounds, tachypnea, and chest muscle retractions.

Not all of these findings may be present, and evidence of aspiration pneumonitis can be delayed. Most findings occur by 4-6 hours post aspiration, and chest radiographs should be timed accordingly. Patients who remain asymptomatic and have no radiologic findings following 6 hours of observation may be discharged and observed at home with instructions to return if fever or breathing difficulty develops. Symptomatic patients should be admitted. Treatment includes supportive care and the use of bronchodilators. Activated charcoal should not be administered as it binds hydrocarbons poorly and worsens aspiration risk. Antibiotics are only indicated if there is clear evidence of secondary infection. Corticosteroids are not recommended.

Hydrocarbons with systemic toxicity are summarized by the acronym "CHAMP": camphorated, halogenated, aromatic, and hydrocarbons containing metals or pesticides. These chemicals produce systemic toxicity as well as a risk of aspiration. Camphor (in liniments and rubs) is well known to cause seizures. Aromatic hydrocarbons (in adhesives, paint thinners and solvents) produce CNS depression. They can also sensitize the myocardium and increase the risk of dysrhythmias and "sudden sniffing death" when intentionally inhaled. Halogenated hydrocarbons, found in insecticides (e.g. lindane), fabric cleaners (e.g. trichloroethane), paint strippers (e.g. methylene chloride) and industrial solvents have been associated with CNS, cardiovascular, liver and kidney toxicity. Metal and pesticide-containing hydrocarbons should be treated for the specific toxins that the hydrocarbons carry.

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### Did you know?

#### Liquid synthetic cannabinoids are being sold for use in electronic cigarettes.

Synthetic cannabinoids (i.e. synthetic marijuana) are psychoactive chemicals that have been sold for several years as dry herbal products to be smoked. The latest formulation is a liquid for use in e-cigarettes. These e-liquids are easy to conceal and have no detectable odor. An outbreak of at least 25 cases treated in hospitals was recently reported to the Michigan Regional Poison Center, some involving "Cloud 9" e-liquid used in e-cigarettes or ingested with sports drinks. Clinical effects have included sedation, confusion, tachycardia, hallucinations and prolonged psychotic behavior. AB-PINACA, a federally unscheduled synthetic cannabinoid, has been isolated in "Cloud 9".