Acetone Dangers

In one study, volunteers exposed to concentrations up to 500 ppm reported no harmful effects. In other studies, concentrations of approximately 300-500 were reported to cause slight irritation of the nose and throat. Exposure to 250 ppm for 4 hours has caused mild effects on performance in some behavioural tests (auditory tone discrimination and a mood test). As concentrations approach 1000 ppm, noticeable irritation has occurred and some people have reported headaches, light-headedness and tiredness. Inhalation of concentrations higher than 2000 ppm can cause dizziness, a feeling of drunkenness, drowsiness, nausea and vomiting. Unconsciousness may result if exposure is extremely high (greater than 10000 ppm). Intolerable nose and throat irritation would also occur at these concentrations. Even higher concentrations can cause collapse, coma and death. Tolerance to the effects of acetone can develop. Tolerance means that, with repeated exposures, higher concentrations are required to produce symptoms which had previously been observed at lower concentrations.

One case report describes two men who were working in a confined space with extremely high acetone concentrations (measured at 12000 ppm, 3 hours after the accident). Low concentrations (up to 50 ppm) of trichloroethane were also detected. After working in the area 4 hours, the men noticed irritation of the throat, headache, weakness in the legs and a feeling of drunkenness. The men then left the area for 1 hour. Upon returning, one man collapsed and the other felt faint. Rescuers, who were exposed for 2 to 3 minutes, experienced symptoms similar to the workers. The man who lost consciousness regained consciousness a short time later but was confused, drowsy, unsteady on his feet, felt nauseated and was vomiting. The other man had, at this point, also lost consciousness and was vomiting. Both men fully recovered.

A single case report suggests slight kidney and liver damage may have occurred following a severe exposure to acetone. There are insufficient details available to draw conclusions from this report.

What happens when acetone comes into contact with my skin?

Acetone is either slightly irritating or not irritating, based on animal and limited human information. Application of 1 mL of acetone in a small glass tube to six male volunteers for 30 or 90 minutes resulted in only mild redness and swelling at 90 minutes.

The risk of developing health effects following the absorption of acetone through unbroken skin is very slight. There are several reports of people, usually young children, becoming ill following skin exposure to acetone while lightweight casts were being put on broken limbs. The symptoms experienced were similar to those described following high inhalation exposures. In all cases, a large amount of acetone came into contact with the skin for several hours and inhalation exposure may also have occurred. These reports are not considered relevant to people exposed to acetone at work.

Can acetone hurt my eyes?

Acetone vapour causes mild irritation at concentrations of around 500 ppm. Irritation is very noticeable at 1000 ppm. Liquid acetone is severely irritating, based on animal and limited human information. In 3 human cases, acetone caused corneal injury which completely healed within 48 hours. In one unusual case, liquid acetone was held directly on the eye for a long time. In this particular case, there was permanent damage to the eye, with clouding of the cornea.

What happens if acetone is accidentally swallowed (enters the digestive system)?

Ingestion is not a typical route of occupational exposure. Several studies report no effects or minor effects (slight drowsiness) in people who ingested up to 20 grams/day for several days. Animal toxicity information also suggests that acetone is not very toxic following ingestion. If acetone is aspirated (breathed into the lungs during ingestion or vomiting) it can cause severe, life-threatening lung injury. Animal information suggests that acetone would be difficult to aspirate because it evaporates so quickly. Based on its physical properties, acetone can be aspirated into the lungs during ingestion or vomiting.

One case report describes a man who intentionally drank 200 mL (about 7 ounces) of acetone. Within one hour, he had flushed cheeks and appeared drunk. His breathing was shallow and his throat red and swollen. He soon lapsed into coma and did not regain consciousness for 12 hours. Four weeks later, he developed symptoms similar to diabetes (increased urination, thirst and blood sugar levels). The patient...
fully recovered within 5 months after the incident.

**What are the long term health effects of exposure to acetone?**

**SKIN:** Prolonged or repeated contact may cause defatting of the skin and produce dermatitis (dryness, irritation, redness and cracking).

**INHALATION:** Most human population studies indicate that acetone would not produce significant health effects following long-term exposure. In a series of studies, no statistically significant differences in causes of death or clinical laboratory results were observed in 948 employees exposed to up to 1070 ppm acetone over 23 years. Another study which reviewed 18 years of industrial experience with employees in a cellulose acetate production facility did not show an increased incidence of illness. One other study did not find significant changes in clinical chemistry tests conducted on 60 employees who had worked at least 5 years in the acetate fibre manufacturing industry (exposures of 550-1050 ppm).

No conclusions can be drawn from other reports which have described effects following long-term acetone exposure. These reports are limited by factors such as the small number of workers studied, the fact that other exposures may have contributed to or caused the observed effects and/or possible self-reporting biases. In one study, 110 men were exposed to a mean concentration of 361 ppm acetone for an average of 14.9 years. These men reported more heavy headedness, nausea, faintness, weight loss, eye irritation than a comparison group with no acetone exposure. They also did not perform as well on some neurobehavioural tests (reaction time and digit span tests). A few historical reports have also described long-term exposure effects such as irritation of the airways, throat, stomach and occasionally, dizziness, attacks of giddiness and a loss of strength.

**Will acetone cause cancer?**

There is no human information. Animal information suggests that acetone is not carcinogenic.

**Will acetone cause any problems with my reproductive system?**

No firm conclusions can be drawn from the available studies. A study of 25 men exposed to acetone and styrene during the manufacture of reinforced plastics showed an increased percentage of abnormal sperm head shapes in exposed workers compared to controls. A study of 891 women who worked or were working in the semiconductor industry showed an increased risk of miscarriages among fabrication workers. Seven chemicals were strongly associated with the increased risk of miscarriage, one of which was acetone. No conclusions can be drawn from these two studies because of factors such as the small number of workers studied and the concurrent exposure to other potentially harmful chemicals. There is insufficient information for evaluation provided in a Russian study which reports increased complications of pregnancy and reduced birth weight in children of mothers exposed to acetone. One animal study showed sperm effects, in the presence of kidney damage.

**Will acetone cause effects on the fetus/unborn baby?**

There is no human information. Animal information suggests that acetone would only cause effects in the presence of maternal toxicity.

**Will acetone act in a synergistic manner with other materials (will its effects be more than the sum of the effects from the exposure to each chemical alone)?**

Acetone has increased the liver toxicity of chemicals, such as carbon tetrachloride, chloroform, trichloroethylene, bromodichloromethane, dibromochloromethane, N-nitrosodimethylamine and 1,1,2-trichloroethane, the lung toxicity of styrene and the toxicity of acetonitrile and 2,5-hexanediol in laboratory animals. It appears to inhibit the metabolism and elimination of ethyl alcohol, thereby
potentially increasing its toxicity. Acetone can either increase or decrease the toxicity of 1,2-dichlorobenzene, depending on the concentration of acetone used.

Is there potential for acetone to build-up or accumulate in my body?

Acetone is a normal by-product of mammalian metabolism and is found in virtually every organ and tissue, and in the blood. Acetone can enter the body by inhalation, ingestion or skin contact. Acetone is metabolized by a number of routes to compounds, which are used by the body to make glucose and other products of intermediary metabolism, with the generation of carbon dioxide. Acetone is excreted both unchanged, and following metabolism, mainly as carbon dioxide. The main route of excretion is in the expired air, with very little excreted in the urine. Respiratory excretion is complete within 20 hours after inhalation. The amount of unchanged acetone excreted in the urine increases with increasing exposure concentration and duration, and with exercise during exposure.