METHYL ALCOHOL

Methyl alcohol (methanol, wood alcohol) is a widely used solvent in paints, varnishes, shellacs ("heads") and paint removers. It is used alone as an antifreeze fluid and with ethanol and soap as a solid canned fuel. Small amounts of methanol are found in expired breath of normal subjects (Ericksen and Kulkarni, 1963), and a possible metabolic source for endogenous methanol is recognized (Axelrod and Daly, 1965). The purpose or significance of endogenous methanol and its accumulation in alcoholic subjects during prolonged periods of drinking (Majchrowicz and Mendelson, 1971) are not yet understood.

Toxicology: Methyl alcohol is readily absorbed from the gastrointestinal and respiratory tracts. As little as 2 teaspoonsful is considered toxic if ingested. The fatal dose in man lies between 2 and 8 oz.; this range implies a high variation in individual susceptibility (Soll-

Gosselin, Robert e et al.: Clinical Toxicology of Commercial Products, 4th Ed., Williams & Wilkins, Baltimore, Maryland, 1981.
which involves chiefly the ganglion cells of the retina, is a destructive inflammation followed by atrophy. In the acute phase the retina is congested and edematous, and the edges of the optic disk may be blurred. The result is bilateral blindness, which is usually permanent unless treatment is prompt and energetic. Even if complete blindness is avoided, residual scotomata are common (Benton and Calhoun, 1955; Röe, 1948). The electroretinogram is said to have diagnostic and prognostic significance in methyl alcohol poisoning (Ruedemann, 1962).

Except for optic atrophy, permanent neurologic sequelae are exceedingly rare. Motor dysfunction with rigidity, spasticity and hypokinesia of unknown etiology, however, has been reported. Levodopa provided some functional relief (Guggenheim et al., 1971).

It is generally agreed that metabolically formed formaldehyde is responsible for the ocular lesions (Potts and Johnson, 1952; Prager et al., 1955). Since ocular damage has yet to be reported in cases of formaldehyde poisoning, it would appear that formaldehyde must be generated at the site of the lesion to produce damage (Kini et al., 1962). The contrast between primates and nonprimates is probably due not to a difference in retinal sensitivity but rather to a difference in the rates of formaldehyde production and perhaps of its elimination (Kini and Cooper, 1960). Actual measurements of formaldehyde in body tissues and fluids during human methanol intoxication are rarely encountered in the literature, but Closs and Solberg (1970) claim to have detected high levels in urine in one case.

Ethyl alcohol, when consumed at the same time as methyl alcohol, prolongs the latent period before toxic symptoms appear. It has also been observed that even severe symptoms of methanol poisoning are alleviated by the ingestion of ethanol, and for this reason the recommended treatment includes ethanol in small quantities (e.g., whiskey, 1 oz. every 3 to 4 hours by mouth or stomach tube). A blood alcohol level of about 0.1% is regarded as optimal. In extreme cases the ethanol may be given intravenously as a dilute solution in bicarbonate or saline (Agner et al., 1949).

The mechanism of this protection lies in the ability of ethyl alcohol to inhibit the metabolism of formaldehyde in the liver (Crusius, 1946), thus delaying its liberation into the circulation.

Visual disturbances, which are the most distinctive aspect of methanol poisoning in man, may become evident soon after severe acidosis begins. Dilated, unreactive pupils and dimness of vision are characteristic. The ocular lesion...
effects in poisoned dogs and deserve a clinical trial.

Laboratory: Check blood alcohol level and arterial blood pH or plasma CO₂ combining power (or urine acidity) at repeated intervals (preferably every hour, since relapses are common). Measure serum amylase (see text). Hypokalemia of severe proportions has been reported (Tonning et al., 1956). Blood methanol concentrations in 6 fatal cases ranged from 1.1 to 2.4 mg./ml. (Harger et al., 1938).

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METHYL BROMIDE

Methyl bromide and methyl chloride are gases at ordinary temperatures whereas methyl iodide is a volatile liquid. The iodide is encountered infrequently, but it is an intermediate in