

# Toxicology



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Methylation is the addition of a methyl group to a substrate or the substitution of an atom or a group of atoms by a methyl group. A methyl group, CH<sub>3</sub>, is an alkyl group derived from methane, CH<sub>4</sub>, by loss of one hydrogen. The methylation process converts inorganic (metal) mercury, Hg, to methyl mercury, CH<sub>3</sub>Hg<sup>+</sup>. As a positively charged ion, methyl mercury combines with anions, such as chloride (Cl<sup>-</sup>), nitrate (NO<sub>3</sub><sup>-</sup>), hydroxide (OH<sup>-</sup>), and sulphur containing anions, such as thio groups (SH). Indeed, the thio group on the amino acid cysteine and hence in proteins containing cysteine has high affinity for methyl mercury forming a strong covalent bond. Methyl mercury can coordinate (bond) to more than one cysteine amino acid. Unlike ingested inorganic mercury, ingested methyl mercury is easily absorbed by the gastrointestinal tract and found its way into the blood, where it forms bonds with the thio groups in cysteine of amino acids, peptides, and proteins. The methyl mercuric-cysteinyll compound or complex mimics another essential amino acid, known as methionine, and it is, unfortunately, recognized by amino acid transporting proteins in the body as methionine (Kerper, Ballatori, & Clarkson, 1992). Thus it is freely transported throughout the body to various parts including the brain and across the placenta, where it is absorbed by the developing fetus. It causes several health disorders in the body. Hence, methylation turns metal mercury into a toxic compound.

Bibliography Kerper, L. E., Ballatori, N., & Clarkson, T. W. (1992).

Methylmercury transport across the blood-brain barrier by an amino acid carrier. *Am. J. Physiol.* , 262 .