

A study on exposure assessment to lead in workplace

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This study was conducted to investigate distribution of lead particles by operation of industry, to evaluate the effect of particle size on the absorption to workers, and to recommend the Occupational Health Standard for lead. Results of this study are summarized as follows. Aerodynamic Mass Median Diameters(MMD) of airborne lead particles in the battery and litharge manufacturing industry were $14.1 \mu\text{m}$ and $15.1 \mu\text{m}$. The diameters in radiator manufacturing and secondary smelting industry were $1.3 \mu\text{m}$, $4.9 \mu\text{m}$, respectively. Those were significantly smaller than the particle sizes in other industries($p<0.05$). Total lead concentrations in the secondary smelting industry were higher than those in the battery and litharge manufacturing industry. Total lead concentrations in other industries except radiator manufacturing industry exceeded the standard of $50 \mu\text{g}/\text{m}^3$. Only radiator manufacturing industry indicated lead concentrations significantly lower than those in other industries($p<0.05$). Average blood lead level of workers was $85.1 \mu\text{g}/\text{dl}$ in secondary smelting manufacturing, $51.3 \mu\text{g}/\text{dl}$ in the battery manufacturing, and below $40 \mu\text{g}/\text{dl}$ in the litharge and radiator manufacturing industry. Blood lead levels of workers by industry were significantly different($p<0.05$). From relationship between airborne lead concentrations by size and lead in blood, confidence limits of airborne lead concentration equivalent to $40 \mu\text{g}/\text{dl}$ of permissible limit in blood, was $147.9 - 489.8 \mu\text{g}/\text{m}^3$ as total lead and $28.8 - 79.4 \mu\text{g}/\text{m}^3$ as

ACGIH-RPM. It is recommended that two separate occupational health standards for lead should be established by particle size. Airborne concentration of $150 \mu\text{g}/\text{m}^3$ as total lead dust and $30 \mu\text{g}/\text{m}^3$ as respirable lead dust are recommended.

Key words : Mass Median Diameter(MMD) of lead particles

Respirable Particulate Mass of ACGIH

Lead concentration by particle size

Occupational Health Standards for total and

respirable lead