# Progress Report on Fire and Toxicity Chemistry in Japan

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Studies on fire and toxicity chemistry have not made significant progress in number in these 16 months since the last UJNR meeting. One of reports of this field related to fire chemistry is the work of O. Sugawa and H. Yamamoto's which is dealing the change of smoke particles from wood and fire retarded wooden materials at various temperatures.[1] They have obtained that combination of molybdenum, bromine and phosphate compounds are effective for reduction of smoke particles from wooden materials. This phenomena seem to be based on the synergestic effect of the molybdenum compound.

Related to toxicity chemistry, some were reported by T. Morikawa, E. Yanai, T. Watanabe, T. Okada, and Y. Sato who have dealt with toxic gases from natural and synthetic polymers under different opening conditions using a full scale two-storey house of concrete construction.[2),3),4)] A room on the first floor was used as the fire room. Various kinds and amounts of natural and synthetic materials were supplied for fire loads under some opening conditions. CO and HCN were estimated to be major toxicants. More amount of HCN were detected from synthetic polymers than natural ones in the same amount of nitrogen-containing materials. Smaller area of the opening tended to produce more toxic gases.

For analysis of CO-Hb in blood, rabbits were applied. Synthetic polymers showed higher toxicity than natural ones from the point of CO concentration in the combustion products, as well. HCN from synthetic materials may cause rabbits incapacious or dead.

T. Morikawa has also conducted a studay on evolution of toxic gases at smouldering conditions and its estimation.[5] Cotton, acrylic wool, sawdust and mosquito coil, tatami mat (made of straw covered with rush) were smolder using red hot charcoal as a heat source and CO, $CO_2$, $O_2$, HCN, Acrolein were analized by gas chromatography. He showed relationship between total toxicity index ($\Sigma(C_i/C_{fi})$) and toxicity of each gas. He confirmed the toxicity index of CO is higher than that of the sum of toxicity indexes of other toxicants.

T. Hirata, Y. Fukui, S. Kawamoto and M. Inoue have dealt with combustion toxicity of gases from plywood treated with retardants and with CCA presevatives. They have explained these in terms of chemical reaction mechanisms, and concerned with generation of CO and other toxicants. Details are mensioned in their paper entitled " COMBUSTION TOXICITY OF WOODS TREATED WITH RETARDANTS AND CCA PRESERVATIVES " of the 11th Joint Meeting of UJNR Panel on Fire Research and Safety.

References

1) O. Sugawa and H. Yamamoto; Fire Science & Technology Vol.9 No.1, P1, 1989

2) T. Morikawa and E. Yanai; J. of Fire Science, Vol.7, No.2, P131, 1989

3) E. Yanai and T. Morikawa; Annual conference on Fire Research, P79, Japan Association for Fire Science and Engineering, May 1989.

4) T. Morikawa, E Yanai, T. Watanabe, T. Okada, and Y. Sato; ditto, P83.

5) T. Morikawa; ditto, P75.