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실험 화재시 유독가스 방출과 Rats를 이용한 독성평가

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Toxicity Evaluation of Fire Effluent Gases from Experimental Fires by a Rats

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INTRODUCTION

It has long been recognized that exposure to the fire induced toxic gases is one of the hazards confronting people in fires. In this study, the toxicity of fire effluent gases released from experimental fires is evaluated by exposing lab rats to the fire-induced gases in a burn room.

METHODOLOGY

The plane view of exposing lab rats to the fire-induced gases in a burn room is shown in Figure 1.

The fuels used in the experiments are mainly interior upholsteries such as sofa, clothes, chair, curtain, floor cover, etc. Sprague Dawley (age 7 weeks, 215±15g), the lab rat used in the experiments, is placed at the specific height where the respiration of human takes place, and in turn is exposed to the fire-induced toxic gases.

Then, several types of blood tests are given to the rats, which includes glucose (enzyme method, reagent ; sinyang, Korea, Hitachi 7600 110), AST(GOT, UV method, reagent; sinyang, Korea, Hitachi 7600 110), ALT (GPT, UV method, reagent ; sinyang, Korea, Hitachi 7600 110), CBC Count (complete blood cell count method, reagent ; RBC/Plt, HGB, Baso, EZ Kleen, Defoamer, Sheath Rinse, Perox 1,2,3 Ret., ADVIA TM 120 Hematology System, Bayer, USA) and CO (carboxy)-Hb (method : alkali hematin, UV spectrometer, Hewlett Packard).

Toxicity of effluent gases induced by the burning of interior upholsteries is evaluated according to the amounts of CO, SO₂, NO_x, released from the fires in terms of various fuels,

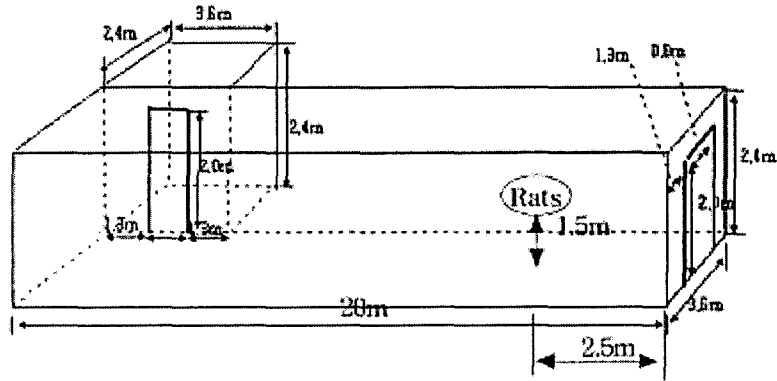


Fig 1. A sketch of experimental set-up

CO-Hb curve and CBC curve obtained from the blood of rats in term of various fuels, and glucose, AST, ALT curve obtained from the serum of rats in terms of various fuels(classified wood products, chemical products, mixing).

RESULTS AND DISCUSSIONS

The gases induced by the burning of interior upholsteries were measured during 10min. The results are shown in in Figure 2, 3 and 4.

We see from Figure 5, 6 that the glucose, Carboxyhemoglobin(CO-Hb) concentration in the serum and blood of rats by mixing and chemical products were higher then wood products.

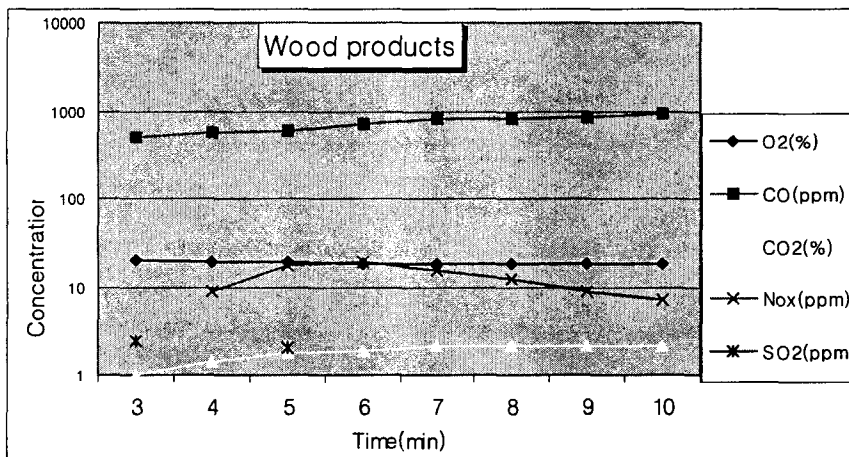


Fig. 2. The concentrations of gases by the burning of wood products with time in exposure room

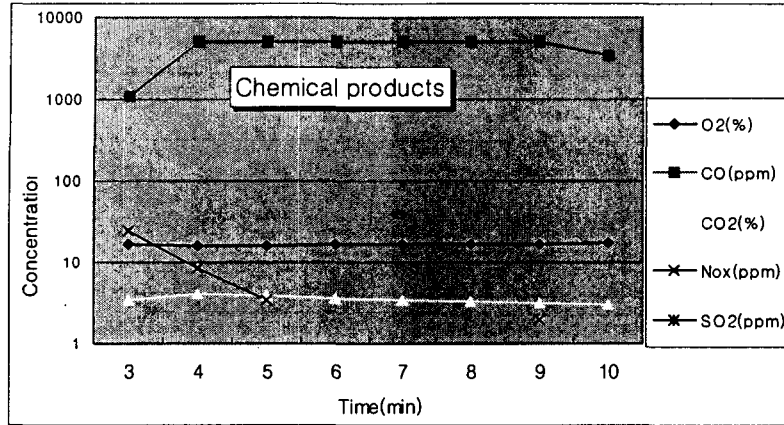


Fig. 3. The concentrations of gases by the burning of chemical products with time in exposure room

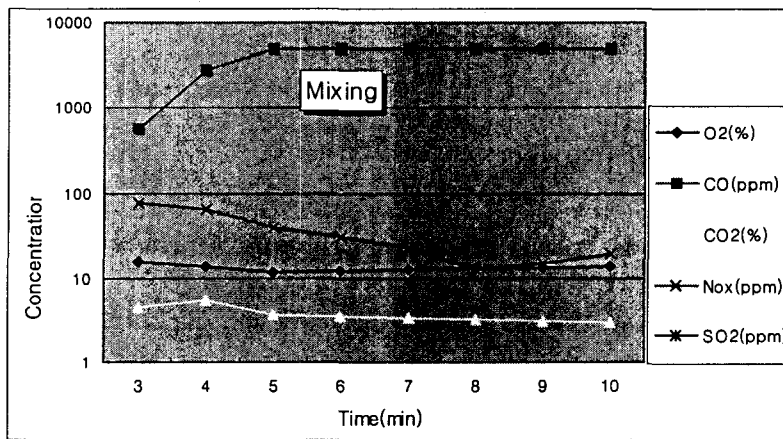


Fig. 4. The concentrations of gases by the burning of mixing interior upholsteries with time in exposure room

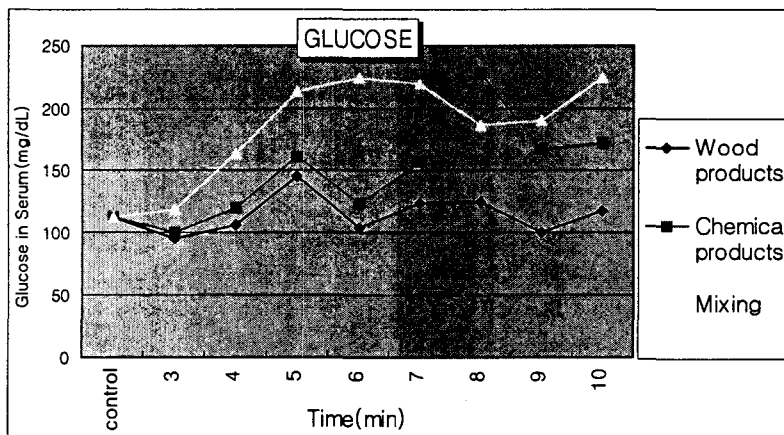


Fig. 5. The glucose concentrations in serum by the exposure of interior upholsteries with time

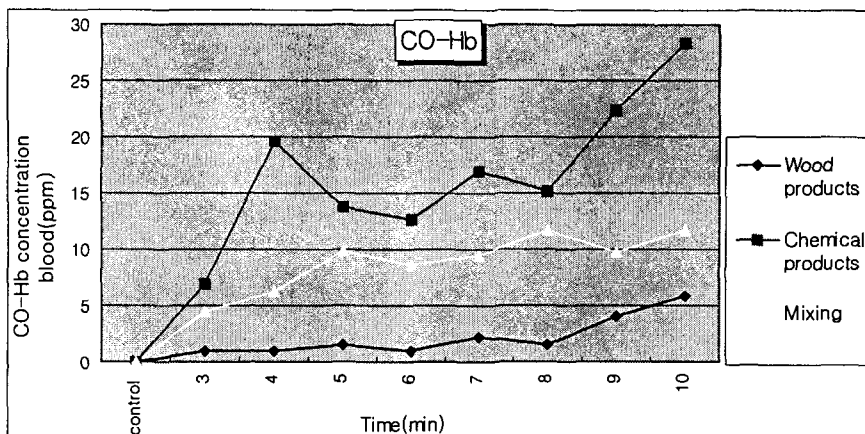


Fig. 6. The CO-Hb concentrations in blood by the exposure of interior upholsteries with time

However, The GOT, GPT concentration and CBC Count by interior upholsteries was not difference.

CONCLUSION

It was found from the result that CO concentration induced by the burning of mixing and chemical products has risen then wood products. And the glucose, carboxyhemoglobin concentration in the serum and blood of rats by mixing and chemical products has risen then wood products. However, The GOT, GPT concentration and CBC Count by interior upholsteries was not difference.

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