THERMAL INSULATION OF TEMPERATURE ADAPTABLE FABRICS ON THE DRY AND SWEATING THERMAL MANIKIN. Kim* E.A., Tamura T.
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Polyethylene Glycol(PEG) which is known to have temperature adaptability by solid-solid phase change at various temperature range was treated on the polypropylene undershirts to improve the thermal insulation at the cold environment. Even though the heat release property of the PEG has been proven by the physical tests, it has not been tested how much insulation could be obtained in the clothing system. In this study, by dry thermal manikin, clo values of PEG treated and untreated undershirts were compared and the changes of the skin temperature of the manikin at the lowered environmental temperature were determined. In order to understand the effect of the sweating, changes of thermal insulation were tested with the same method by sweating thermal manikin. Molecular weight of the PEG was 1450 . To test the transient heat resistance at dry and wet state, the environmental temperature was lowered from 20 to 5°C and from 33 to 5°C respectively. Thermograms were taken to confirm the heat release properties of PEG treated fabrics. To take thermograms undershirts were divided into left and right and combined to have one side treated and the other untreated. In this way, difference in the reaction of the treated and untreated shirts at the temperature change was observed simultaneously. Results showed that the clo value of the PEG treated undershirt was slightly lower than the untreated one which is attributed partly to the hygroscopicity of the PEG and partly to the replacement of the air with the chemical. As the environmental temperature was lowered, the surface temperature of manikin wearing the treated undershirts was higher than the untreated ones. Thermogram showed that the surface temperature of the shirts of treated side was higher than the untreated side which confirms the heat release at this temperature range. Evaporative heat resistance at steady state and the insulation at the lowered environmental temperature of the treated sample was higher than the untreated ones even though the values were much lower than dry state. These results confirms the temperature adaptability of PEG under cold environment for dry and sweating situation.