Recent scares involving health damage from exposure to chemicals in living environments, exemplified by the humidifier disinfectant accident, have increased people’s mistrust of biocidal products and household chemical products. Accordingly, the demand for tighter regulation, as well as better management of such products has also increased. The purpose of this study was to develop a methodology that utilizes cumulative risk assessment to comprehensively evaluate the risk of chemicals contained in household products, thereby enhancing the safety management of them.

First, we recognized that cumulative exposure and risk assessment is used interchangeably with mixture exposure and risk assessment in Korea. Therefore, we came up with the terms cumulative exposure of a single substance and cumulative exposure of multiple substances to represent aggregate exposure and cumulative exposure respectively. Similarly, we defined cumulative risk assessment of a single substance and cumulative risk assessment of multiple substances to represent aggregate risk assessment and cumulative risk assessment respectively. Next, we reviewed the status of research related to cumulative risk assessment in Korea. Although studies on cumulative risk assessments have been active, most studies were limited to studies on single substance cumulative risk assessments. In addition, the results of the research did
not lead to any implementation of laws or policies. Our analysis of the implementation of cumulative risk assessment in regulation showed that only the Ministry of Environment mentions cumulative risk assessment in its regulations; cumulative risk assessment should be taken into account in the management of products containing chemicals of concern. However, no clear guidance existed for cumulative risk assessment. On the other hand, the analyses of the cumulative risk assessment status in other countries show that cumulative risk assessment was often used as the scientific basis for enhanced regulations to protect susceptible populations.

In addition, we concluded that the pre-assessment step of planning and scoping and the post-assessment step of interpretation and risk characterization are as important as the actual assessment step in conducting cumulative risk assessment. Finally, we analyzed the process in which cumulative risk assessment of phthalates and parabens led to changes in the regulation of chemicals. Our case study showed that the cumulative risk assessment’s endpoint can be extended from common mechanism of toxicity to common adverse outcome, which would allow for wider application of cumulative risk assessment. Moreover, our case study confirmed that cumulative risk assessment based on careful planning can be used as the scientific basis for the management of chemicals and products. In addition, the cases analyzed in this study indicated that cumulative risk assessment can be a powerful tool for the protection of susceptible populations from environmental hazards.

Based on our results, the need to utilize cumulative risk assessment in safety management of household chemical products was derived. This study confirmed that cumulative risk assessment is an extremely useful tool in implementing policies to reduce the exposure of chemicals to children. However, at present, this powerful methodology is not utilized in the policy making process in Korea. Therefore, we propose a cumulative risk assessment guideline consisting of three stages: planning, evaluation, and risk characterization, so that cumulative risk assessment can be utilized in the decision-making process for the management of household chemical products. For the results of the cumulative risk assessment conducted according to the proposed guidelines to be incorporated into the policies, inter-ministry cooperation is essential. In addition, institutional measures should
be established to utilize the results of the cumulative risk assessment for the protection of susceptible populations. Therefore, in this study, we propose additional provisions for the cumulative risk assessment in the ‘Chemical Product Safety Act,’ and related notices. Finally, as a short-term research project to increase utilization of cumulative risk assessment, we propose database construction and integration of existing data to establish a framework for cumulative risk assessment. Also, we propose a pilot project for the cumulative risk assessment of household chemical products with high potentials of exposure to children. As a long-term research project, we propose groundwork research to discover common adverse outcome chemical groups, and exploratory research to expand cumulative risk assessment of household chemical products to multiple substances.

Cumulative risk assessment is an extremely powerful methodology for assessing the risk of household chemical products and for achieving risk reduction. In order for this methodology to be used particularly for the protection of susceptible populations such as children, a thorough review of the implementation and use of cumulative risk assessment, as well as consensus building on stakeholders’ priorities for cumulative risk assessment should be undertaken. The establishment and successful utilization of the cumulative risk assessment through this process will contribute immensely to enhancing the safety of the people in the living environment.

Keywords
- Cumulative Exposure
- Cumulative Risk Assessment
- Household Chemical Products
- Susceptible Population
- Children’s Products
International Sources


- ECETOC(2016), *Guidance for Effective Use of Human Exposure Data in Risk Assessment of Chemical*.


Online Sources
