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Safety Risks of Gaseous Toxic Compounds Released from Li Batteries

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Abstract : The evolving electromobility and all the electronics also bring an increase of danger with used Li-batteries. Li-batteries have been used in many industries, and currently many types of the batteries are available. Batteries have different compositions that affect their behavior. In the field of Li-battery safety, there are some areas of little discussion, such as extinguishing of fires caused by Li-batteries as well as toxicity of gaseous compounds released from Li batteries, transport or storage. Technical Institute of Fire Protection, which is a part of Fire Brigades of the Czech Republic, is dealing with the safety of Li batteries. That is the reason why we are dealing with toxicity of gaseous compounds released under conditions of fire, mechanical damage, overcharging and other emergencies that may occur. This is necessary for protection of intervening of fire brigade units, people in the vicinity and other envirnomental consequences. In this work, different types of batteries (Li-ion, Li-Po, LTO, LFP) with different kind of damage were tested, and the toxicity and total amount of released gases were studied. These values were evaluated according to their environmental hazard. FTIR spectroscopy was used for the evaluation of toxicity. We used a FTIR gas cell for continuous measurement. The total amount of released gases was determined by collecting the total gas phase through the absorbers and then determining the toxicants absorbed into the solutions. Based on the obtained results, it is possible to determine the protective equipment necessary for the event of an emergency with a Li-battery, to define the environmental load and the immediate danger in an emergency.

Keywords : Li-battery, toxicity, gaseous toxic compounds, FTIR spectroscopy
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