

Innovation in Utilizing Carbon Dioxide (CO₂) Based Eco-Chem Gas as Portable Fire Extinguisher

Andi Muhammad Ilham Ramadhan^{1,*}, Gusnawati¹, Fitra Jaya¹, Syamsul Bakhri¹, Iwan Anzari Rusli²

¹*Department of Chemical Engineering, Faculty of Industrial Technology, Universitas Muslim Indonesia, Makassar 90231, Indonesia*

²*Department of Industrial Engineering, Faculty of Industrial Technology, Universitas Muslim Indonesia, Makassar 90231, Indonesia*

**Presenter's email: ilhamramadhan3879@gmail.com*

Abstract. Forest, mountain, and residential fires in Indonesia accounted for 51.2% from 2022 to July 2023. This issue requires serious attention and demands innovative solutions to mitigate its impact. This research aims to develop an effective and innovative solution to minimize fire incidents by creating environmentally friendly gases. These gases are designed to extinguish fires and reduce their destructive effects quickly and safely. The method involves using acetic acid and sodium bicarbonate in predetermined proportions to trigger a chemical reaction that produces carbon dioxide as a fire extinguishing agent. From the research results, a total weight of 134.352 grams of carbon dioxide gas was collected in the balloon. Subsequently, within approximately three hours, the gas obtained was tested on a small-scale or laboratory scale. The testing involved burning stacks of A4-sized paper and pieces of cardboard in an open test area at an air temperature of 28 °C. The area of the burning fire was 60.2 × 53.8 cm. During the experiment, when the gas released from the balloon reacted and touched the fire, it immediately spread and emitted foam around the burning fire. Therefore, it was observed that the gas and foam spreading and expanding on the fire surface hindered the combustion process and extinguished the fire. The experiments demonstrated that the produced gas effectively extinguishes fires, with advantages in reaction speed and environmental friendliness. Thus, Eco-Chem gas products have the potential to be used as portable fire extinguishers.

Keywords: Environmentally friendly, Fire, Portable fire extinguisher