

Effect of Hydrothermal Temperature Variation for Synthesis of Lithium Manganese Oxides Spinel on Adsorption and Desorption Efficiency of Lithium Ion From Lumpur Sidoarjo

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ABSTRACT

Technological developments in the field of materials show a very rapid development in recent years. One of the materials that are needed in a variety of applications is lithium. Lithium is the main ingredient in the manufacture of batteries which are the power source for various electronic equipment. Lithium itself can be obtained from sea water brines and geothermal fluid. One of them is located in Sidoarjo Indonesia, which has a content of about 6 ppm. For the extraction of lithium from Lumpur Sidoarjo can be done by adsorption method. Lithium Manganese Oxide Spinel is used as an absorbent material because it is inexpensive, non-toxic and readily available.

In this study, the hydrothermal method is used as a method for the synthesis of the LiMn_2O_4 which can be done at relatively low temperature and produces more homogeneous particles. Hydrothermal method performed at a temperature of 160°C, 180°C and 200°C for 24 hours. XRD testing was conducted to determine the crystal structure. SEM testing was conducted to determine the morphology of the material after hydrothermal process. BET testing conducted to determine surface area. After that, the acid treatment method carried out for the adsorption and desorption processes. Adsorption is done by dipping Lithium Manganese Oxide Spinel that has been

synthesized into Lumpur Sidoarjo. ICP testing performed to determine lithium ion contained in Lumpur Sidoarjo before and after adsorption to determine the amount of lithium that is absorbed. Desorption testing performed by dipping LiMn_2O_4 into a solution of HCL. In the XRD test showed that LiMn_2O_4 has cubic crystal structure. From the SEM test results show that not much difference in the morphology of the three variations. The particles tend to form agglomerations. In the ICP test results indicate that the hydrothermal temperature 160°C of the LiMn_2O_4 has the highest adsorption efficiency with 6.775 ppm. While for most high desorption is 200°C at 0.081 ppm.

Keyword : Hydrothermal, Lithium manganese oxides spinel, lumpur sidoarjo, adsorption, desorption

