

Proceedings of the International Conference
on Science and Science Education



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Appendix A. (Co-)Presenters Attendance List (Parallel Session)

Appendix B. Question and Answer

Welcoming Address

Welcome to the 2015 IConSSE – The International Conference on Science and Science Education!

This conference, which is organized by the Faculty of Science and Mathematics, Satya Wacana Christian University Salatiga, is held at Laras Asri Resort and Spa Salatiga.

Arts, science and technology are crucial components in the advancement of human civilization. There is art in the creation of technology, and science provides strong bases for the technological development. We are proud to inherit the temple of Borobudur which is a proof that Indonesian's ancient arts and technology are so advanced that not only is the masterpiece beautiful, but also technologically rich.

This International Conference on Science and Science Education is attended by more than 160 participants. There are more than 67 papers is presented orally covering wide-variety subjects of science and science education. We thank you all for your participation.

We thank the Organizing Committee, Reviewers, and Steering Committee for having been working hard. Finally, we would also like to thank the Rector of Satya Wacana Christian University, and Dean of Faculty of Science and Mathematics for their support for this conference.

We hope you will enjoy our togetherness. Thank you.

Salatiga, November 30th, 2015

Dr. Adi Setiawan
Chairman

Direct synthesis of mordenite from kaolin and rice husk ash

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Abstract

Mordenite with a Si/Al molar ratio of approximately 20 was synthesized from natural material such as kaolin and rice husk ash. The synthesis of mordenite was conducted under the following reaction condition $6\text{Na}_2\text{O}:0.75\text{Al}_2\text{O}_3:30\text{SiO}_2:x\text{H}_2\text{O}$ ($x=710, 780$ and 850) at $175\text{ }^\circ\text{C}$ for 24-72 hours. The products were then identified by X-ray diffraction, FTIR, and SEM. The results showed that batch composition of the starting gel $6\text{Na}_2\text{O}:0.75\text{Al}_2\text{O}_3:30\text{SiO}_2:710\text{H}_2\text{O}$ with 36 hours synthesis time formed a high crystalline mordenite.

Keywords mordenite; kaolin; rice hush ash; H₂O amount; synthesis time

1. Introduction

Mordenite is a high silica zeolite with orthorhombic structure. With a Si/Al molar ratio equal to 5, the completely hydrated sodium form has the ideal composition of $\text{Na}_8\text{Al}_8\text{Si}_{40}\text{O}_{96}\cdot 24\text{H}_2\text{O}$. Mordenite consists of parallel 12-membered ring (MR) channels (0.67-0.70 nm) with 8 MR side pockets (0.34-0.48 nm). Mordenite has been used as catalyst for various industrially important reactions due to its high thermal and acid stability (Mignoni et al., 2008). Mordenite is one of the most important industrial catalysts for the conversion of hydrocarbons, for instance in hydroisomerization, alkylation, dewaxing, reforming and cracking (Zhang et al., 2009). The concentration of active sites and the catalytic activity are related to the zeolite structure formation and the increasing degree of crystallinity (Pirutko et al., 1996).

Mordenite are commonly prepared by hydrothermal method of the gel containing precursors of silica, alumina, metal cations and H₂O. Most of works on the synthesis of mordenite, the starting materials for silica and alumina were from chemical sources. It was reported that for the synthesis of mordenite using reactive and amorphous silica from natural material rice husk ash, relatively lesser Na₂O or greater SiO₂ content in the starting mixture was required compared to that of using silica from chemical source (Bajpai & Rao, 1981). In addition, natural material Kaolin showed to be a promising source of Si and Al for mordenite synthesis (Mignoni et al., 2008). In a country such as Indonesia, rice husk ash and kaolin are available in very large quantities and at low cost. It will have advantages as a low cost and environmental friendly process.

Some studies show that compounds with high-crystallinity have higher activity. For example an amorphous PtRu/C catalyst with high-crystallinity was found to have a higher electrocatalytic activity for methanol oxidation reaction. These results show that control of

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