

Karakterisasi dan proses pemisahan fraksi non-magnetik partikel halus wte bottom ash = Characterization of non magnetic fraction of fine particle wte bottom ash and its separation processes / Almira Larasati

Almira Larasati, author

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Abstrak

ABSTRAK

Waste to Energy Plant (WtE) merupakan cara yang efektif untuk meminimalisir jumlah sampah sampai dengan 80% dalam hitungan massa dan volume. Namun, WtE memproduksi by-products yaitu Bottom ash yang mengakibatkan pencemaran lingkungan. Beberapa cara dilakukan untuk mengatasi pencemaran lingkungan oleh Bottom ash tersebut yang salah satunya adalah metode recycling. Bottom Ash mengandung banyak komposisi kimia termasuk garam, oksida, sulfida, dan elemen-elemen berharga seperti Cu, Ni, Zn, Pb. Research ini dilakukan untuk mendaur ulang Bottom Ash dengan metode yang ramah lingkungan dan terfokus kepada partikel halus yang bersifat non-magnetik. Beberapa metode separasi dilakukan yaitu Pengeringan, Penggerusan, pengayakan, separasi magnetik, dan separasi densitas. Beberapa metode karakterisasi yang dilakukan adalah dengan XRF, EDAX, dan Mikroskop Optik. Hasil yang didapatkan adalah element non magnetik yang berharga Cu, Ti, Zn berhasil terkumpulkan hingga mencapai 30,000ppm Cu, 11,000ppm Ti, dan 15,000ppm Zn setelah proses eksperimen GoldPan. Dari hasil research ini juga didapatkan bahwa Bottom Ash berpotensi untuk menjadi bahan campuran dari semen. Major elemen pada campuran semen pada bottom ash seperti Al, dan Si memenuhi standar kriteria campuran semen sementara Ca masih dibawah kriteria. Selain itu, pada bottom ash terkandung S dan Cl yang tinggi, namun pada eksperimen ini kadar S dan Cl berhasil direduksi sampai dengan 0,4-0,5%.

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ABSTRACT

Waste to Energy Plant (WtE) is an effective way to minimize the amount of waste up to 80% in mass and volume. However the bottom ash produced by WtE as by-products causes an enviromental problem as it is usually landfilled. Several ways to overcome this problem has been implemented by many research using a recycling method of the bottom ash. Bottom ash contain several valuable elements such as Cu, Ni, Zn, Pb and many compounds such as silicates, sulfides, salts, and oxides. This research offers an enviromentally-friendly and inexpensive process to recover bottom ash without producing another waste from the overall process and focuses in non magnetic fine particles of bottom ash. Some separation methods used in this research from drying, milling, sieving, magnetic separation, and density separation process have been conducted. Several materials characterization methods are implemented to investigate chemical composition by using XRF and EDAX method and to study the image representation of recovered bottom ash by using Optical Microscope (OM) and Scanning Electron Microscope (SEM). The results show that several valuable non magnetic elements such as Cu, Ti, and Zn are successfully collected more than 30,000 ppm Cu; 11,000 ppm Ti; and 15,000 ppm Zn after gold pan experiment and there is also a possibility to recover bottom ash into an additional compounds of cement raw material products if the metallic fraction contained in it can be separated and the composition of the additional compounds of cement raw material can be adjusted to fulfill the standard requirement of cement industry. In contrast, Si, Al, and Fe contents are already met the

requirement of common cement raw material while Ca content is slightly under the requirement, S and Cl content has also been decreased up to 0,4 ? 0,5 % which is important for raw or mixture cement material requirement.