

SINABUNG VOLCANIC ASH AS CO₂ ABSORBER

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1. Introduction

The condition of carbon emission becomes the environment world issue. The smoke from vehicles, burning forest and combustion of factory are reported as the sources of carbon emission. One gas that contributes to this problem is carbon dioxide. The present report is focusing on the solid materials as CO₂ capture tool such as activated carbon, zeolite and silica particle. It has been reported that silica is one of the major components of volcanic ash. Meanwhile, since one of the volcanic mountain in North Sumatera was erupted recently, we try to investigate the produced ash from the eruption. Gravimetric analysis shows that the major component of *Sinabung* volcanic ash are 55.43% of SiO₂, 18.37% of Al₂O₃, 8.33% of Fe₂O₃, 8.05% of CaO, 2.95% of Na₂O and 2.95% of MgO

2. Experimental Setup

In this research, we approach the application of silica based materials of *Sinabung* volcanic ash to capture the CO₂. The ash was first treated as composite board to make concrete wall and affixed to a acrylic board and shaped into box then equipped with MQ-135 sensor to measure the CO₂ absorption from dry ice. In addition, the role of pure SiO₂ to capture CO₂ was also investigated using extracted SiO₂ from *Sinabung* and tested by acid base-titration.

3. Result

The CO₂ absorption via sensor analysis shows *t value* of 22.18321 < 4.39 (*t table* with significance level 5%), indicates the increasing mass of volcanic ash in each sample performs better absorption of CO₂. Whereas CO₂ absorption via acid-base titration shows *t value* of 0.2471 < 4.39 (*t table* with significance level 5%), indicates there is no significant difference between volcanic ash and extracted SiO₂ in various masses.

NO	Type Of Sample	Mass Of Cement/g	Mass Of Volcanic Ash/g	Percentage of CO ₂ absorbtion/%
1	Sample E	180	-	-
2	Sample A	150	30	-29.75%
3	Sample B	30	150	-44.73%
4	Sample C	60	120	-31.72%
5	Sample D	120	60	-18,53%

4. Conclusion

Both sensor and titration data supports that the ability of volcanic ash to capture CO₂ is a physical absorption on particle surfaces due to the porosity of major components of the volcanic ash. In conclusion, *Sinabung* volcanic ash can be used as an alternative CO₂ absorber.

Key words:

Sinabung volcanic ash, CO₂ absorber, CO₂ absorption, Silica based material