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Phase Analysis of Different Liquid Ratio on Metakaolin/Dolomite Geopolymer

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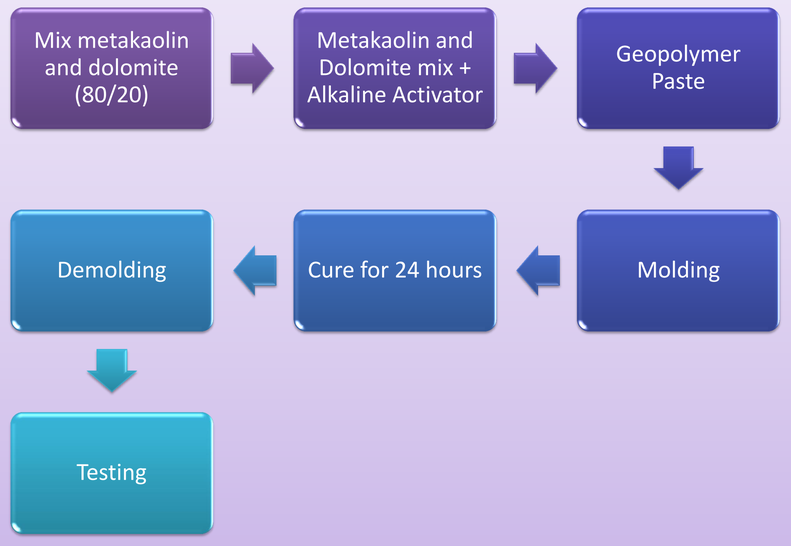
ABSTRACT

Geopolymer is widely studied nowadays in various scope of studies. Some of the studies that are ongoing are study of the various materials towards the geopolymer strength produced. Meanwhile some of the studies focuses on the mixing of the geopolymer itself. This paper discussed the phase analysis of metakaolin/dolomite geopolymer for different solid to liquid ratio which were, 0.4, 0.6, 0.8 and 1.0 and the properties that affected the geopolymer based on the phases. The constant parameters in this study were the percentage of metakaolin and dolomite used. The metakaolin used was 80% meanwhile dolomite usage was 20%. Besides that, the molarity of NaOH used which is 10M and the alkaline activator ratio used is 2.0. All the samples were tested at 28 days of curing. The results show that the 0.8 solid to liquid ratio used gave better properties compare to other solid to liquid ratio. The phases analyzed were quartz, sillimanite, mullite and faujasite. The 0.8 S/L ratio shows the better properties compared to others by the test of phase analysis, compressive strength morphology analysis and functional group analysis.

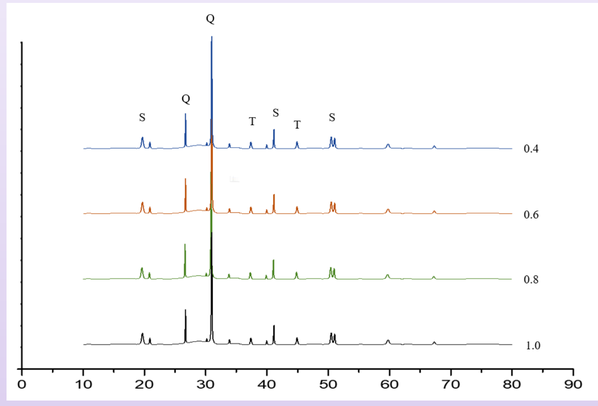
INTRODUCTION

Many studies show that the methods of XRD help to understand the behavior of geopolymers and for this reason, they were of great significance to scientists in latest studies. XRD is also used, considering the considerable amorphous nature of geopolymers, to classify new developed phases, to describe the degree to which the starting materials have reacted and to determine the amorphic level of the final products. However, limited studies were done towards the dolomite in terms of stand-alone geopolymer material or as a blended geopolymer material. Dolomite was used as a source for the manufacture of magnesium oxide in concrete materials, which is a well-recognized and already commercialized shrinkage-compensating additive. Thus, the dolomite was used as an addition into the metakaolin to produce metakaolin/dolomite blended geopolymer.

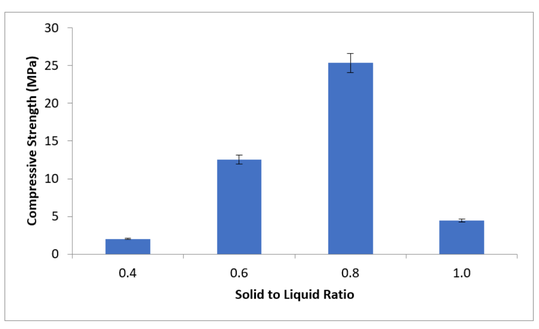
METHODOLOGY



RESEARCH AND DEVELOPMENT



Quartz – 26.85º and 31.47º
Mullite - 48.20º and 44.47º
Sillimanite - 19.15º, 42.20º and 53.66º



CONCLUSION

In a conclusion, the solid to liquid ratio 0.8 have the significant properties compared to others solid to liquid ratios. The phase analysis shows that the results is parallel to the compressive strength, morphology analysis and functional group analysis. Phase analysis can help to elaborate the properties of geopolymer by detecting the major crystalline components which can existed in geopolymer systems. Besides that, solid to liquid ratio 0.8 also shown to give better properties in compressive strength by achieving the highest strength. Lastly, in the morphology analysis solid to liquid 0.8 gave better surface observation.

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