Engineered Geopolymer Composites (EGCs) for Sustainable Transportation Infrastructure Dataset

Dataset available at: https://digitalcommons.lsu.edu/transet_data/89/

(This dataset supports report **Engineered Geopolymer Composites (EGCs) for Sustainable Transportation Infrastructure**)

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The related final report **Engineered Geopolymer Composites (EGCs) for Sustainable Transportation Infrastructure**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/56599

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Abstract: The objective of this study was to develop novel Engineered Geopolymer Composite (EGC) materials implementing locally available ingredients to produce practical and cost-effective EGCs for repair and new construction of transportation infrastructure in the region. To this end, geopolymers (GPs) were synthesized by alkali activation of metakaolin (MK) or a combination of metakaolin and fly ash (MKFA) as GP precursors. MK-GPs were activated using sodium silicate and potassium silicate solutions prepared by dissolving silica fume (SiO2) and KOH or NaOH in deionized water. MKFA-GPs replaced silica fume using fly ash and were activated using only KOH solution. GP binders, GP mortars and fiber-reinforced GP composites were manufactured and thoroughly evaluated. Based on the experimental findings, it was concluded that MK based GP matrices are promising for the development of EGCs as these GPs produce high mechanical strength at ambient curing conditions and allow for pseudo strain hardening (PSH) behavior to occur when reinforced with low contents of PVA fiber (i.e., 1.6% volume fraction). However, attaining proper fiber dispersion in MK-GP matrices was challenging. MKFA GP matrices developed in this study exhibited low mechanical strength and did not produce PSH behavior when reinforced with PVA fibers. Low strengths were associated to the low reactivity of fly ash in contrast to silica fume. A feasibility study was conducted in Ecuador to evaluate use of natural zeolite, volcanic ash, and metakaolin for the development of GP matrices, the maximum compressive strength attained was ~20 MPa.

Comments: Tran-SET Project: 19CLSU04

Recommended citation:

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Dataset description:
This dataset contains 1 file collection described below.

19CLSU04_Data.zip:

- 19CLSU04_GP_Mortar_Data (TAMU).xlsx
- 19CLSU04 Data (LSU) Revised.xlsx

The .xlsx file type is a Microsoft Excel file, which can be opened with Excel, and other free available software, such as OpenRefine.

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed ***NO*** additional curation actions on this dataset. NTL staff last accessed this dataset at https://digitalcommons.lsu.edu/transet_data/89/ on 2021-07-22. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.