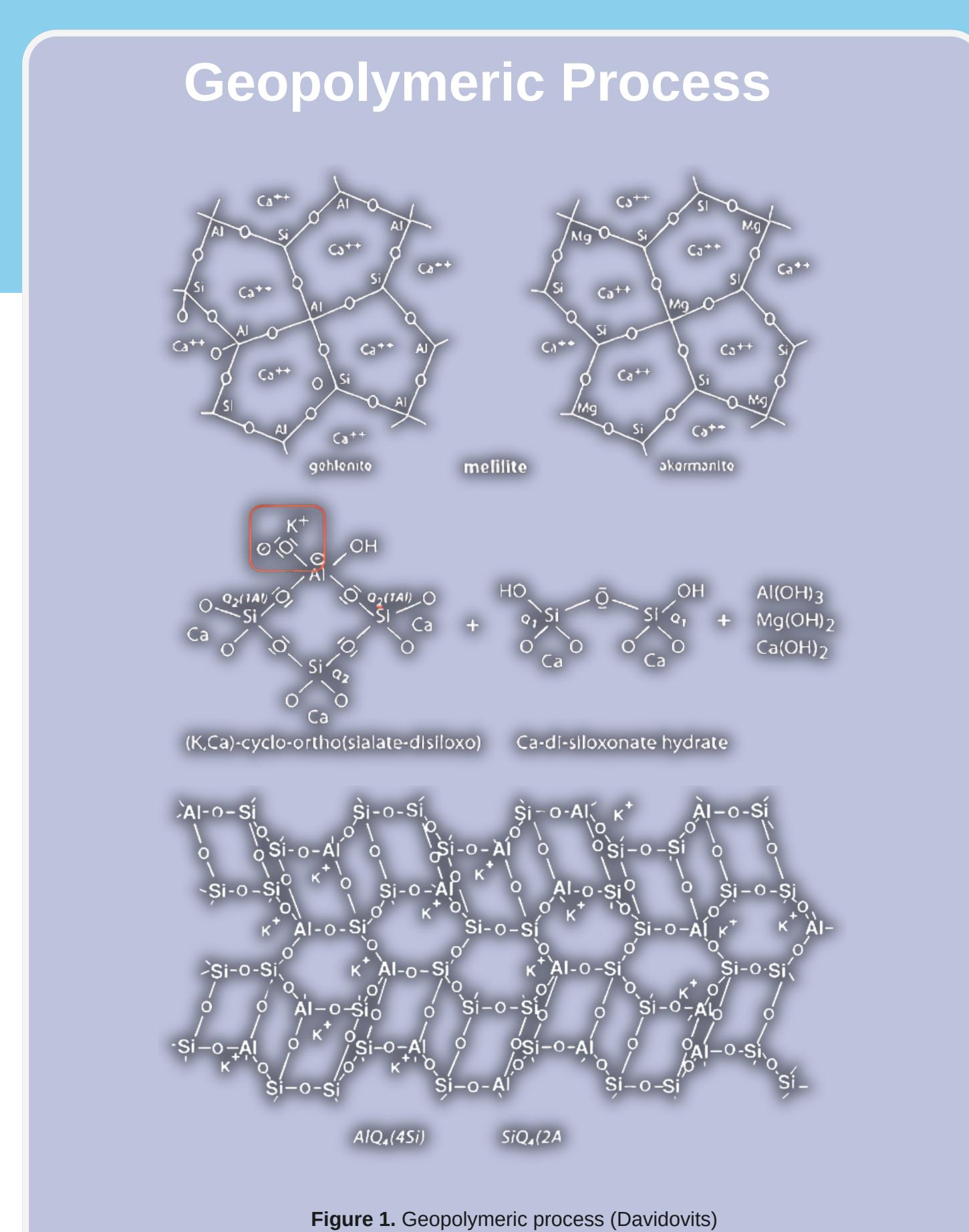


Efflorescence and Alkali Leaching in Slag-Based Geopolymer Tiles for Wet Environments

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The Wet Cell:

The Wet Cell project focuses on developing water-resistant paneling solutions for wet environments such as bathrooms and showers, using sustainable and biobased materials. The project addresses the significant environmental impact of conventional concrete by investigating alternative binders, including geopolymers produced from industrial by-products such as blast furnace slag.



Methods

Efflorescence characterization

- Crude method via Flame test - yellow indicating Na
- Effervescence in contact with Acetic acid indicate carbonate presence

Leachates

- Over a period of 2+ week, material samples were fully submerged in water
- The Leached water was then separated and completely evaporated then measured
- Similarly, Acetic acid was applied and effects for Effervescence were observed

Efflorescence Results

- 3g of Efflorescence was collected
- Effervesce in presence of Acetic acid

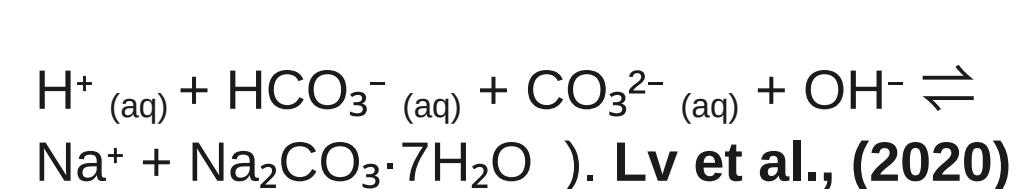


Figure 5. Efflorescence in Contact with Acetic acid indicating the presence of carbonates

Dried Leachate Results

- Average : 5.08g
- Only partially Effervesced in Acetic acid
- This may indicate Na-silicate being leached out of the sample



Figure 6. Dried Leachate in Contact with Acetic acid

Conclusions

- ✓ Geopolymeric nature of samples is unlikely
- ✓ Efflorescence is likely to be Na_2CO_3
- ✓ Silicates are likely leached from samples
- ✓ Using dried mass of leachate is not feasible for determining compatibility with Škvára model

Discussion

Due to the Bicarbonate Buffer reaction: $\text{CO}_2 + \text{CO}_3^{2-} + \text{H}_2\text{O} \rightarrow 2\text{HCO}_3^-$ the mass of the final leachate is affected. Alternative methods like Optical Emission Spectroscopy will better record compatibility with the Škvára model.

Geopolymerization within samples is unlikely given the behaviour of the material. The material produced is more akin to a class of Alkali Activated Materials with hydrate chemistry similar to that of cement. For geopolymerization, needed is the addition of alumino-silicates (identified by ^{27}Al NMR resonances between 20 and 50 ppm)

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