Supplemental materials for

# Sequestration of $CO_2$ by Concrete and Natural Minerals - Current Status, Future Potential, and Additional Benefits

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Chemical analyses of > 23,800 basalt samples yields median Ca + Mg of 11.4% by weight, 6.3% at 5 percentile, and 17.1% at 95 percentiles[1].

Peridotite as an example of ultramafic minerals has median Ca + Mg of 28.5% by weight (https://www.remineralize.org/2023/01/crash-course-on-enhanced-rock-weathering-for-carbon-removal/).

Ordinary Portland cement as a component of concrete has median Ca + Mg of 46.9% by weight (https://uobabylon.edu.iq/eprints/publication_1_302_1586.pdf#:~:text=Chemical%20Composition%20of%20Cement%20The%20raw%20materials%20used,at%20high%20temperature%20to%20form%20more%20complex%20compounds.).

Concrete also contains sand and larger-sized mineral components (aggregates), that may or may not include Ca and Mg silicates. Typical proportions are 23% cement, 12% sand, and 65% aggregates (https://www.concrete.org/Portals/0/Files/PDF/E1_07.PDF), or for M15 concrete, 14, 29%, and 57% of those three respectively (https://civilrnd.com/calculate-cement-sand-and-aggregate-for-nominal-mix-concrete/). Concrete constructions rarely if ever provide details about those components used, so only ranges of Ca + Mg content can be presented here, based on proportions mentioned above. We suggest that concrete may include 10 to 18% Ca + Mg by weight.

Sand is generally quartzite, lacking Ca and Mg. Higher values are possible where the sand component is micaceous (e.g., Anorthite, Biotite, Glauconite, or Phlogopite). The aggregate fraction may be basalt with 11.4% Ca + Mg available for carbonation, or other minerals with less Ca + Mg. Chenistry of aggregates in concrete is generally not known.

## Reference

1. Gard M, Hasterok D, Halpin JA. 2019. Global whole-rock geochemical database compilation. Earth Syst. Sci. Data, 11, 1553–1566 https://doi.org/10.5194/essd-11-1553-2019