

Link

<https://www.sciencedirect.com/science/article/pii/S2238785421011285>

Development and assessment of cement and concrete made of the burning of quinary by-product [Year 2024](#), Volume: 6 Issue: 1, 18 - 24

Author links open overlay panel Muhammad Syarif a, Mehmet Serkan Kirgiz b, André Gustavo de Sousa Galdino c, M. Hesham El Naggar d, Jahangir Mirza e, Jamal Khatib f, Said Kenai g, Moncef Nehdi d, John Kinuthia h, Anwar Khitab i, Carlos Thomas j, Ravindran Gobinath k, Muhammad Irfan Ul Hassan l, Yan Kai Wu m, Ahmed Ashteyat n, Ahmed Soliman o, Khairunisa Muthusamy p, Thaarrini Janardhanan q, Trinity Ama Tagbor r, Tuan Anh Nguyen s...Chandra Sekhar Tiwary v

## Abstract

The aim of this study is to evaluate the usability of new cement (NC) made by the burning of quinary by-product to make commercial binders. Chemical analysis of the by-products and NC as well as X-ray diffraction (XRD) analysis of NC, fineness, density, consistency, and setting time of NC paste, and slump in addition to compressive strength (CS) and splitting tensile strength (STS) of NC concrete (NCC) were conducted. The results suggested that chemical composition of by-products is suitable to make NC binder. The NC contains  $\text{Ca}_3\text{SiO}_5$ ,  $\text{Ca}_2\text{SiO}_5$ ,  $\text{Ca}_3\text{Al}_2\text{O}_6$ , and  $\text{Ca}_3\text{Al}_2\text{FeO}_{10}$ . The particles passing through the 200  $\mu\text{m}$  Sieve were 56% compared with 52% for Portland cement (PC). The density of the of NC was similar to that of PC. The NC needed 48% more water than PC for normal consistency. The initial and final setting-time of NC was 105 min and 225 min respectively which is much higher than that of PC (15 and 45 min). The slump, compressive strength and splitting tensile strength were slightly lower for concrete containing NC compared with that of PC concrete. Although the CS and STS of NCC are the lowest, the rate of the CS and STS gain of NCC is greater than that of PCC. It was concluded that NC is a viable alternative to PC for the production of greener concrete.