

## Tensile Properties of Iron Ore Tailings Filled Epoxy Composites

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**Abstract:** Iron ore tailings reinforced epoxy composite (ITR-EC) is produced by reinforcing epoxy with iron ore tailings, which is the waste material derived from the beneficiation of iron ore. Two particle sizes, namely; 150  $\mu\text{m}$  and 300  $\mu\text{m}$  of varying percentage volume 0 to 30% at intervals of 5% were considered. Prior to this, particle size analysis over the range of -63  $\mu\text{m}$  and +2000  $\mu\text{m}$  in 8 different mesh sizes and chemical tests were carried out on the iron ore tailings. A uniaxial tensile test was carried out on the ITR-EC produced to obtain stress-strain curves from which tensile yield, tensile strength and Young's modulus curves with varying volume content of iron ore tailings and particle size were generated. Empirical data from the tensile test were compared with the Nielsen's, Bigg's and Einstein's equations. It was discovered that 30% volume content of 300  $\mu\text{m}$  iron ore tailings gave the maximum Young's modulus; 4.83% greater than that for pure epoxy. Addition of 300  $\mu\text{m}$  iron ore tailings causes an increase in yield strength with increasing percentage volume content of iron ore tailings but reduced yield strength when compared with 150  $\mu\text{m}$  ITR-EC.

**Keywords:** Compo-indirect squeeze casting, Compo-casting, Iron ore tailings, Epoxy, Composite, Particle size