Effects of steel slag substitution in geopolymer concrete on compressive strength and corrosion rate of steel reinforcement in seawater and an acid rain environment

Henki Wibowo Ashadi, author

Abstrak

The effect of steel slag substitution as coarse aggregate on compressive strength in fly ash based-geopolymer concrete was studied. The compressive strength was evaluated by measuring the maximum acceptable load using compression testing equipment. Compressive strength depends on several factors, such as time and temperature of curing and the mixing proportion. The compressive strength of geopolymer concrete with steel slag substitution was higher compared to geopolymer concrete with gravel aggregate. The optimum compressive strength was found on the third day of curing at a temperature of 60oC for both the geopolymer concrete with steel slag substitution and normal geopolymer concrete. Reinforcement corrosion was evaluated by measuring the corrosion current density using a linear polarization potentiostatic scan. The corrosion rate of reinforcing steel in geopolymer concrete with steel slag substitution was found to be higher compared to normal geopolymer concrete without steel slag in seawater medium, whereas in an acid rain environment, steel slag substitution increased corrosion resistance. The corrosion rate of geopolymer concrete with steel slag substitution was found to be lower compared to normal geopolymer concrete. The corrosion rate was found to be very high at an early stage and decreased with time.