

Behavior of concrete incorporating waste plastic as fine aggregate subjected to compression, impact load and bond resistance

Sheelan Mahmoud Hama

This work is about investigated the effectiveness of inclusion of local waste, represented by plastic water drink bottles caps (CPPA), in the concrete as a partial substitute for coarse aggregates. Compressive, flexural and splitting strengths were evaluated for plain concrete. For reinforced concrete (R.C.), bond strength between reinforced bar and surrounding concrete has been evaluated. In additional, impact resistance, energy absorption capacity, mid-span deflection and crack width for Two-way R.C. slab subjected to repeated impact load have been evaluated. Five different content of plastic aggregate were examined; 0%, 15%, 30%, 45%, 60% and 75% of CPPA. Tests Results showed that strengths (compressive, splitting, flexural and bond strengths) improved for plastic content 15% and 30% especially at 15%. While these strengths began to decrease with increasing plastic's content over 30%. For R.C. slabs, number of blows that caused failure increased with increasing plastic content up to 45%, which mean increasing in impact resistance and increasing in energy-absorbed capacity. Based on the experimental results, empirical equations were proposed of calculating splitting, flexural, bond strengths and energy-absorbed capacity for concrete incorporating CPPA. According to results of this investigation, for structural reinforced concrete, 15% and 30% of this type of plastic is recommended to be used as partial replacement of gravel.