

- 2- A similar finding of those specimens with BIO and specimens with BS was also observed with the addition of TiO.
- 3- A significant increase in slump was measured in concrete specimens with PAA. An average of 24% increase in slump with every percent increase in PAA was obtained.
- 4- There was an also increase of 6.4 % and 3.4 % in the 7 days compressive strength of concrete at every 0.5 % increase in specimens with BIO and specimens with BS respectively.
- 5- The addition of 1 % TiO and 1 % PAA by cement weight to concrete gave 18.5 % and 6.3 % improvement in the 7 days compressive strength, respectively. This gain in strength started to decrease beyond the 1 % TiO and 1 % PAA with a decreasing rate of 1.34 % and 0.7 % respectively at every 1% increment of these NM.
- 6- An improvement of 6.9 % and 3.0 % in the 28 days strength was measured at every percent increase of BIO and BS to the concrete, respectively. The total improvement obtained in the 28 days strength at 2.5 % of BIO and 2.5 % BS by cement weight was 34.3 % and 15.2 %, respectively.
- 7- The maximum strength of 3.6 % and 16 % for the PAA specimens and TiO specimens was obtained at 1% content of each of them, respectively. Beyond this 1 % content of PAA and TiO, there was a loss in the gained strength.
- 8- The addition of 5 % PAA to the 2.5 BIO specimens increased the slump from 90 mm to 170 mm (88.9 % increase) and improved the 28 days compressive strength from 37.37 kg/cm² to 49.35 kg/cm² (32.1 % increase).
- 9- By adding 5 % PAA to the 1 % TiO specimens, the slump increased from 90 mm to 145 mm (61.1 % increase) and the 28 days compressive strength improved from 37.37 kg/cm² to 44.12 kg/cm² (18.1 % increase).
- 10- Adding 5 % PAA to the 2.5 % BS specimens gave an increase in slump from 108 mm (for BS alone) to 150 mm with 5 % PAA and 2.5 % BS together. Also, a slight enhancement of 8.1 % was obtained in the 28 days compressive strength.

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