this disclosure is not limited to particular methods, and experimental conditions described, as such methods and conditions may vary.

In an example implementation, the mechano-chemical modification of the engineered concrete binder composition is carried out using the hydraulic material PCE/PCP, lime, slag sand, and the pozzolan material fly ash and the pozzolan activator sodium sulphate. The materials are ground at 40 RPM for 2 hours. The particle size for each of the fractions is determined such that the hydraulic material comprising the PCE/PCP has Blaine's fineness in a range of 3000 to 4000 cm^2/gm and mode average particle size (MAPS) in a range of 70 to 80 microns. The fraction comprising the pozzolan material and activator has Blaine's fineness in a range of 10000 to 15000 cm^2/gm and mode average particle size (MAPS) in a range of 20 to 30 microns. The composition as then cast into cubes and then tested for strength and durability for a period of 1, 3, 7, 14, 28, and 56 days.

In an exemplary implementation, the proportion of hydraulic material, pozzolan material, and pozzolan activator are varied in each sample cube cast with the engineered concrete binder composition. For instance, one cube may contain 50% hydraulic material and 50% pozzolan material without pozzolan activator, while another cube may contain 50% hydraulic material and 50% pozzolan derivatives such that the pozzolan derivatives comprises 96% pozzolan material and 3% pozzolan activator. This is illustrated in Table 1 and Table 2 wherein the composition of the engineered concrete binder composition is varied, for instance, the control compositions primarily contain the pozzolan fly ash and OPC but do not contain pozzolan activator material sodium sulphate. Compositions CA1-CA4 may contain fly ash, sodium sulphate in varying proportions together with other components and also contain varying proportions of OPC as illustrated in Table 1. All compositions are then tested for penetration and consistency, and the strength tested periodically as shown in Table 2.

Table 1

Mix	**% Fly Ash**	**% Slag Sand**	**% Sodium Sulphate**	**% Lime**	**% PCE/PCP**
Control 1	50				
Control 2	60				
Control 3	70				
CA1	96.17	0	3.66	0	0.17
CA2	88			12	

CLAIMS:

1. A concrete binder composition, comprising:

a first set of cementitious material comprising hydraulic material optionally along with pozzolanic material, and

a second set of cementitious material comprising pozzolanic material and pozzolan activator material, the second set of cementitious material having a mode average particle diameter (D2) not greater than 1/3 of the mode average particle diameter of the first set of cementitious material (Dl),

wherein the first set of cementitious material have Blaine's fineness in a range of 3000 to 4000 cm^2/gm and mode average particle size (MAPS) in a range of 70 to 80 microns;

the second set of cementitious material have Blaine's fineness in a range of 10000 to 15000 cm^2/gm and mode average particle size (MAPS) in a range of 20 to 30 microns;

the pozzolan activator material is selected from a group comprising of sodium sulphate, slag sand, lime and combination thereof;

the second set of cementitious material comprises 70 to 97 wt.% of the pozzolanic material and 3 to 30 wt.% of pozzolan activator material; and

the pozzolanic material is present at an amount in greater than 50 wt.% of the concrete binder composition.

2. The concrete binder composition as claimed in claim 1, wherein the pozzolanic material is present at an amount in an amount up to 80 wt.% of the concrete binder composition.

3. The concrete binder composition as claimed in claim 1, wherein the pozzolanic material is selected from a group comprising of fly ash, blast furnace slag, volcanic ash material, a quartz material, pond ash, chemically modified fly ash, chemically modified blast furnace slag, chemically modified quartz, and combinations thereof.

4. The concrete binder composition as claimed in claim 1, wherein the hydraulic material is selected from a group comprising of Portland cement, modified Portland cement, or masonry cement, ground granulated blast-fumace slag, hydraulic hydrated lime, white

cement, calcium aluminate cement, silicate cement, phosphate cement, high-alumina cement, magnesium oxychloride cement, oil well cements, and combinations thereof.

5. The concrete binder composition as claimed in claim 1, further comprising at least one additive selected from a group comprising of micro silica, nano-silica, metakaoline, carbon nanotube (CNT) based additives, and combinations thereof.

6. The concrete binder composition as claimed in claim 1, wherein the second set of cementitious material have a mode average particle diameter (D2) in the range of 1/3 to 1/5 of the mode average particle diameter of the first set of cementitious material (Dl).

7. The concrete binder composition as claimed in claim 1, wherein the pozzolan activator material is provided as a coat of on an external surface of the pozzolanic material.

8. The concrete binder composition as claimed in claim 1, wherein a mode average particle diameter of the pozzolan activator material is less than the mode average particle diameter of the pozzolanic material.

9. A process for preparing a concrete binder composition, said process comprising:

mixing a first amount of a first set of cementitious material with a second amount of a second set of cementitious material to obtain the concrete binder composition,

wherein:

the first set of cementitious material comprises hydraulic material optionally along with pozzolanic material; and

the second set of cementitious material comprises comprising a pozzolanic material and pozzolan activator material, the second set of cementitious material having a mode average particle diameter (D2) not greater than 1/3 of the mode average particle diameter of the first set of cementitious material (Dl);

wherein the first set of cementitious material have Blaine's fineness in a range of 3000 to 4000 cm^2/gm and mode average particle size (MAPS) in a range of 70 to 80 microns;

the second set of cementitious material have Blaine's fineness in a range of 10000 to 15000 cm^2/gm and mode average particle size (MAPS) in a range of 20 to 30 microns;

the pozzolan activator material is selected from a group comprising of sodium sulphate, slag sand, lime and combination thereof;

the second set of cementitious material comprises 70 to 97 wt.% of the pozzolanic material and 3 to 30 wt.% of pozzolan activator material; and

the pozzolanic material is present at an amount in greater than 50 wt.% of the concrete binder composition.

10. The method as claimed in claim 9, wherein the pozzolanic material is present at an amount in an amount up to 80 wt.% of the concrete binder composition.

11. The method as claimed in claim 9, wherein the pozzolanic material is selected from a group comprising of fly ash, blast furnace slag, volcanic ash material, a quartz material, pond ash, chemically modified fly ash, chemically modified blast furnace slag, chemically modified quartz, and combinations thereof.

12. The method as claimed in claim 9, wherein the hydraulic material is selected from a group comprising of Portland cement, modified Portland cement, or masonry cement, ground granulated blast-furnace slag, hydraulic hydrated lime, white cement, calcium aluminate cement, silicate cement, phosphate cement, high-alumina cement, magnesium oxychloride cement, oil well cements, and combinations thereof.

13. The method as claimed in claim 9, further comprising adding at least one additive selected from a group comprising of micro silica, nano-silica, metakaoline, carbon nanotube (CNT) based additives, and combinations thereof to obtain the concrete binder composition.

14. The method as claimed in claim 9, wherein the second set of cementitious material have a mode average particle diameter (D2) in the range of 1/3 to 1/5 of the mode average particle diameter of the first set of cementitious material (Dl).

15. The method as claimed in claim 9, wherein the second set of cementitious material is obtained by:

- mixing pozzolanic material and pozzolan activator material to obtain a mixture; and

- grinding the mixture thus obtained to obtain the second set of cementitious material having the mode average particle diameter (D2) not greater than 1/3 of the mode average particle diameter of the first set of cementitious material (Dl).

16. The method as claimed in claim 9, wherein the second set of cementitious material is obtained by:
    - mixing pozzolanic material with pozzolan activator material, both of the pozzolanic material and the pozzolan activator material having mode average particle diameter not greater than 1/3 of the mode average particle diameter of the first set of cementitious material (Dl).

17. The method as claimed in claim 9, wherein the second set of cementitious material is obtained by:
    - providing a coat of pozzolan activator material on an external surface of the pozzolanic material.

18. The method as claimed in claim 17, wherein a mode average particle diameter of the pozzolan activator material is less than the mode average particle diameter of the pozzolanic material.