Claims

1. A method for processing incinerator bottom ash (IBA) aggregate material comprising the steps of:

   (i) carbonating IBA aggregate material by CO_2 sequestration; and

   (ii) providing a stabilizing additive for mixing with the carbonated IBA aggregate material;

   (iii) adding the stabilizing additive to, and mixing that stabilizing additive with, the carbonated IBA material to form a stabilized IBA composition, wherein the additive comprises one or more components from group (b1) and one or more components from group (b2), wherein group (b1) consists of aluminium chloride and at least one other metal chloride, and wherein group (b2) consists of silica, zeolite and apatite.

2. The method for processing IBA aggregate material as claimed in claim 1, wherein the additive is mixed with the carbonated IBA material as an aqueous solution.

3. The method for processing IBA aggregate material as claimed in claim1 or claim 2, wherein step (i) comprises exposing the IBA aggregate material to atmospheric CO_2 and/or non-atmospheric CO_2.

4. The method for processing IBA aggregate material as claimed in any preceding claim, wherein step (i) comprises windrowing the IBA aggregate material.

5. The method for processing IBA aggregate material as claimed in any preceding claim, comprising the further step of (iv): combining the carbonated IBA aggregate material and the additive of steps (i) and (ii), or the stabilised carbonated IBA aggregate composition of step (iii), with cement to form a binder composition.

6. The method for processing IBA aggregate material as claimed in any preceding claim, wherein the at least one other metal chloride in group (b1) is

selected from: sodium chloride, potassium chloride, magnesium chloride, calcium chloride, barium chloride, strontium chloride, and combinations thereof.

7. The method for processing IBA aggregate material as claimed in any preceding claim, wherein the one or more components from group (b1) make up 70.0-99.0 wt.% of the total weight of the components (b1) and (b2).

8. The method for processing IBA aggregate material as claimed in any preceding claim, wherein the one or more components from group (b2) make up 1.0-30.0 wt.% of the total weight of the components (b1) and (b2).

9. The method for processing IBA aggregate material as claimed in any preceding claim, wherein the additive comprises 1 to 10% by weight of aluminium chloride; 45 to 90% weight of the at least one other metal chloride from group (b1); and 1 to 10% by weight of the components from group (b2).

10. The method for processing IBA aggregate material as claimed in any preceding claim, wherein the additive further comprises one or more components from a group (b3), wherein group (b3) consists of magnesium oxide, calcium oxide and a combination thereof.

11. The method for processing IBA aggregate material as claimed in claim 10, wherein the one or more components from group (b3) make up 5-40 wt.% of the total weight of components (b1), (b2) and (b3).

12. The method for processing IBA aggregate material as claimed in any one of claims 5 to 11, wherein the binder composition comprises carbonated IBA aggregate and cement in a 70% / 30 % by weight and/or by volume ratio.

13. The method for processing IBA aggregate material as claimed in any preceding claim, further comprising the precursor processing steps of:

(a) grinding IBA to form IBA aggregate material;

(b) separating ferrous and non-ferrous metals from the IBA aggregate material; and

(c) grading the IBA aggregate material obtained from precursor step (a) or precursor step (b) into suitable size ranges for step (i).

14. The method for processing IBA aggregate material as claimed in claim 13, wherein precursor step (b) (separating of ferrous and non-ferrous metals from the IBA aggregate material) includes the sub-step of transferring the separated metals for metal recycling.

15. The method for processing IBA aggregate material as claimed in claim 13 or claim 14, wherein precursor step (c) includes the sub-steps of grading the IBA aggregate material to separate particles of greater than 28 mm in size, and optionally returning said particles to precursor step (a) for further grinding.

16. The method for processing IBA aggregate material as claimed in claim 15, wherein precursor step (c) includes grading the IBA aggregate material to separate particles of less than 28mm, and preferably less than 25 mm, for step (i).

17. The method of processing IBA aggregate material as claimed in any preceding claim, wherein step (i) of carbonating the IBA aggregate material by CO_2 sequestration is conducted until carbonation results in a decrease of the IBA aggregate material's pH in contact with water from approximately pH 12 to approximately pH 8.5-10.5.

18. The method of processing IBA aggregate material as claimed in any of claims 1 to 16, wherein step (i) of carbonating the IBA aggregate material by CO_2 sequestration is conducted until carbonation results in a decrease of the IBA aggregate material's pH in contact with water from approximately pH 12 to pH 9-10.5.

19. The method for processing IBA aggregate material as claimed in any of claims 1 to 16 and claim 18, wherein step (i) of carbonating the IBA aggregate material by CO_2 sequestration is conducted until the IBA aggregate material's pH is measured to be approximately 8.5.

20. A stabilized IBA aggregate material formed in accordance with the method defined in any preceding claim.

21. A binder composition comprising cement and the stabilised carbonated IBA aggregate material formed in accordance with the method defined in any one of claims 1 to 20.

22. A construction composition comprising a binder composition as claimed in claim 21.

23. The construction composition as claimed in claim 22, wherein said construction composition further includes an aggregate component in addition to the stabilised carbonated IBA aggregate material.