CLAIMS

1. A method for determining an amount of activator to be added to a GGBS-treated soil, the method comprising:

determining a prefix amount of a binder based on a water content of a soil sample, wherein the binder comprises GGBS;

determining prefix amounts of the activator based on a mass of a dried sample of soil which the soil sample was prepared from;

determining, based on a mass of a wet soil sample, an amount of the binder corresponding to the prefix amount of the binder and amounts of the activator respectively corresponding to the prefix amounts of the activator;

mixing each one of the amounts of the activator determined and the amount of binder determined with a soil sample which has a mass equal to the mass of the wet soil sample so as to form soil-activator-binder mixtures;

obtaining pH values respectively from the soil-activator-binder mixtures; and

establishing a relationship between the pH values and the amounts of the activator corresponding to the pH values so as to identify from the relationship the amount of activator to be added to the GGBS-treated soil, wherein identifying from the relationship the amount of activator to be added comprises identifying a lowest activator content after which two successive activator additions present a negligible increase in the pH values as a most desirable activator content.

2. The method of claim 1, wherein the activator is a lime-based activator or a magnesia-based activator.

3. The method of claim 2, wherein the lime-based activator comprises quicklime, hydrated lime, carbide sludge, or any mixture which produces $Ca(OH)_2$ when mixed with water.

4. The method of claim 2, wherein the magnesia-based activator comprises magnesia, or any mixture which produces $Mg(OH)_2$ when mixed with water.

5. The method of any one of claims 1 to 4, wherein the GGBS-treated soil comprises solids and water.

6. The method of any one of claims 1 to 5, further comprising determining the water content of the soil sample, wherein determining the water content of the wet soil comprises:

obtaining an initial wet soil sample;

weighing the initial wet soil sample;

drying the initial wet soil sample to obtain the dried sample of the soil;

weighing the dried sample of the soil; and

calculating the water content by dividing the difference between the initial wet soil sample and the dried soil sample with weight of the dried soil sample.

7. The method of any one of claims 1 to 6, wherein determining the prefix amount of the binder based on the water content comprises:

identifying a liquid limit of the dried soil sample; and

identifying the prefix amount of the binder by comparing the water content with the liquid limit to determine whether (i) the water content is less than the liquid limit or (ii) the water content is equal to or more than the liquid limit.

8. The method of claim 7, wherein the prefix amount of the binder is:

10% to 30% by mass of the dried soil sample if the water content is less than the liquid limit; or

5% to 10% by mass of the dried soil sample if the water content is equal to or more than the liquid limit.

9. The method of any one of claims 1 to 8, wherein determining the prefix amounts of the activator based on the mass of the dried soil sample comprises identifying 5 to 10 prefix amounts of the activator based on the mass of the dried soil sample.

10. The method of claim 9, wherein the 5 to 10 prefix amounts range from 1% to 5% by mass of the dried soil sample with each prefix amount differing from each other by 0.25% to 1% by mass of the dried soil sample.

11. The method of any one of claims 1 to 10, wherein determining, based on the mass of the wet soil sample, the amount of the binder corresponding to the prefix amount of the binder and the amounts of the activator respectively corresponding to the prefix amounts of the activator comprises:

calculating the amount of the binder based on the formula:

$$M_G=M_S/(1+W)*C_G$$

wherein M_G is the mass of the binder corresponding to the prefix amount of the binder, M_S is the mass of the wet soil sample, W is the water content, and C_G is the prefix amount of the binder;

and

calculating each of the amounts of the activator based on the formula:

$$M_A=M_S/(1+W)*C_A$$

wherein M_A represents one of the masses of the activator corresponding to one of the prefix amounts of the activator, M_S is the mass of the wet soil sample, W is the water content, and C_A represents one of the prefix amounts of the activator.

12. The method of any one of claims 1 to 11, wherein the mass of the wet soil sample is 100 g to 300 g.

13. The method of any one of claims 1 to 12, wherein mixing each one of the amounts of the activator determined and the amount of binder determined with a soil sample which has a mass equal to the mass of the wet soil sample so as to form soil-activator-binder mixtures comprises:

(i) mixing each one of the amounts of the activator determined with the amount of binder determined to form activator-binder mixtures, and mixing each one of the activator-binder mixtures with the soil sample to form the soil-activator-binder mixtures;

or

(ii) mixing directly each one of the amounts of the activator determined and the amount of binder determined with the soil sample to form soil-activator-binder mixtures.

14. The method of 13, further comprising:

preparing a plurality of the soil sample, which is a wet sample, for mixing with each of the activator-binder mixtures to form the soil-activator-binder mixtures.

15. The method of claim 13 or 14, wherein mixing each one of the activator-binder mixtures with the soil sample to form the soil-activator-binder mixtures comprises:

placing the soil-activator-binder mixtures in separate containers, and mixing each of the soil-activator-binder mixtures for several times within a duration of 1 hour to 24 hours.

16. The method of any one of claims 1 to 15, wherein obtaining pH values respectively from the soil-activator-binder mixtures comprises:

(i) extracting a portion of one of the soil-activator-binder mixtures;

(ii) centrifuging the portion to obtain a filtrate and a residue;

(iii) measuring the pH of the filtrate; and

(iv) repeating steps (i) to (iii) to obtain the pH value of the other soil-activator-binder mixtures.

17. The method of any one of claims 1 to 16, wherein establishing a relationship between the pH values and the amounts of the activator corresponding to the pH values so as to identify from the relationship the amount of activator to be added to the GGBS-treated soil comprises:

plotting each of the pH values against one of the amounts of the activator used in forming one of the soil-activator-binder mixtures which the pH value is correspondingly derived from to form a pH-activator content plot; and

identifying from the pH-activator content plot the amount of activator to be added to the GGBS-treated soil.