Claims

1. A method of forming activated carbon, comprising:

a) mixing carbon black with an activation catalyst in a polar solvent to form a mixture; and

b) heating the mixture at 350 ˚C to 500 ˚C in order to form the activated carbon;

wherein the weight ratio of carbon black to activation catalyst is 1:0.1 to 1:0.5; and wherein the activation catalyst is selected from ammonium persulfate, sodium persulfate, potassium persulfate or a combination thereof.

2. The method according to claim 1, wherein the mixture is mixed for at least 1 h; and/or wherein the mixture is heated at 400 ˚C for at least 3 h.

3. The method according to claims 1 or 2, wherein the solvent is selected from water, ethanol, ethylene glycol or a combination thereof.

4. The method according to any one of claims 1 to 3, wherein the solvent is a mixture of water and ethanol at a weight ratio of 85:15, a mixture of water and ethylene glycol at a weight ratio of 85:15, or a mixture of ethanol and ethylene glycol at a weight ratio of 85:15.

5. The method according to any one of claims 1 to 4, wherein the weight ratio of carbon black to solvent is 1:5 to 1:100.

6. The method according to any one of claims 1 to 5, further comprising adding a co-catalyst to the mixture, wherein the co-catalyst is mixed with the mixture for at least 3 h.

7. The method according to claim 6, wherein the co-catalyst is ammonia or ammonium hydroxide, wherein the weight ratio of the activation catalyst to the co-catalyst is 1:0.1.

8. The method according to any one of claims 1 to 7, wherein the pH of the mixture is maintained at 7 to 9.

9. The method according to any one of claims 1 to 8, wherein the mixture is heated at a rate of 1 ˚C/min to 5 ˚C/min.

10. The method according to any one of claims 1 to 9, further comprising a step after step (a) of drying the mixture.

11. A method of forming silane functionalised activated carbon, comprising:

a) mixing carbon black with a silane agent and an activation catalyst in a polar solvent to form a mixture; and

b) heating the mixture at 350 ˚C to 500 ˚C in order to form the silane functionalised activated carbon;

wherein the weight ratio of carbon black to activation catalyst is of 1:0.1 to 1:0.5; and

wherein the activation catalyst is selected from acetic acid and/or ammonia.

12. The method according to claim 11, wherein the mixture is stirred for at least 3 h at room temperature; and/or wherein the mixture is heated at 350 ˚C for at least 6 h.

13. The method according to any one of claims 14 to 16, wherein the weight ratio of carbon black to silane agent is 1:0.18 to 1:0.25.

14. The method according to claim 11 or 12, wherein the weight ratio of silane agent to catalyst is 1:0.5 to 1:1.7.

15. The method according to any one of claims 11 to 14, wherein the silane agent is selected from bistriethoxysilane (1,2-bis(triethoxysilyl)ethane), 1,2-Bis(trichlorosilyl)ethane, 1,2-Bis(trimethoxysilyl)ethane or a combination thereof..

16. An activated carbon formed from the method according to any one of claims 1 to 10, wherein the activated carbon is characterised by a micropore ratio relative to a total porosity of 40% to 99%.

17. The activated carbon according to claim 16, wherein the activated carbon is characterised by at least one of the following:

a) a particle size of 40 nm to 80 nm;

b) a BET surface area of more than 600 m^2/g;

c) a pore diameter of at least 1.5 nm; and

d) a dye adsorption of at least 170 mg/g.

18. A silane functionalised activated carbon formed from the method according to any one of claims 11 to 15, wherein the silane functionalised activated carbon is characterised by a micropore ratio relative to a total porosity of 10% to 50%.

19. The silane functionalised activated carbon accordingly to claim 18, wherein the silane functionalised activated carbon is characterised by at least one of the following:

a) a particle size is 140 nm to 500 nm;

b) comprising at least 4 carbon particles;

c) a silica shell with a thickness of 10 nm on at least a surface of the activated carbon; and

d) a BET surface area of more than 600 m^2/g.

20. The silane functionalised activated carbon accordingly to claim 18 or 19, wherein the silane functionalised activated carbon is characterised by a pore diameter of at least 9 nm.