**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 ~~about~~ 350 ˚C to ~~about~~ 500 ˚C in order to form the activated carbon;

wherein the weight ratio of carbon black to activation catalyst is ~~of about~~ 1:0.1 to ~~about~~ 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, <u>wherein the mixture is mixed for at least 1 h; and/or</u> wherein the mixture is heated at ~~about~~ 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 ~~about~~ 1:5 to ~~about~~ 1:100.

~~6. The method according to any one of claims 1 to 5, wherein the mixture is mixed for at least 1 h.~~

~~7~~<u>6</u>. The method according to any one of claims 1 to ~~6~~<u>5</u>, further comprising adding a co-catalyst to the mixture~~.~~

~~8. The method according to claim 7~~, wherein the co-catalyst is mixed with the mixture for at least 3 h.

~~9~~7. The method according to claim 6~~s 7 or 8~~, wherein the co-catalyst is ammonia or ammonium hydroxide~~.~~

~~10. The method according to any one of claims 7 to 9~~, wherein the weight ratio of the activation catalyst to the co-catalyst is ~~about~~ 1:0.1.

~~11~~8. The method according to any one of claims 1 to ~~10~~7, wherein the pH of the mixture is maintained at ~~about~~ 7 to ~~about~~ 9.

~~12~~9. The method according to any one of claims 1 to ~~11~~8, wherein the mixture is heated at a rate of ~~about~~ 1 ˚C/min to ~~about~~ 5 ˚C/min.

~~13~~10. The method according to any one of claims 1 to ~~12~~9, further comprising a step after step (a) of drying the mixture.

~~14~~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 ~~about~~ 350 ˚C to ~~about~~ 500 ˚C in order to form the silane functionalised activated carbon;

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

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

~~15~~12. The method according to claim ~~14~~11, wherein the mixture is stirred for at least 3 h at room temperature~~.~~

~~16. The method according to claims 14 or 15,~~; and/or wherein the mixture is heated at ~~about~~ 350 ˚C for at least 6 h.

~~17~~13. The method according to any one of claims 14 to 16, wherein the weight ratio of carbon black to silane agent is ~~of about~~ 1:0.18 to ~~about~~ 1:0.25.

~~18~~14. The method according to ~~any one of~~ claim~~s 14 to 17~~ 11 or 12, wherein the weight ratio of silane agent to catalyst is ~~of about~~ 1:0.5 to ~~about~~ 1:1.7.

~~19~~15. The method according to any one of claims ~~14~~ 11 to ~~18~~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..

~~20~~16. An activated carbon formed from the method according to any one of claims 1 to ~~13~~10, wherein the activated carbon is characterised by a micropore ratio relative to a total porosity of 40% to 99%.

~~21~~17. The activated carbon according to claim ~~20~~16, wherein the activated carbon is characterised by at least one of the following:

a) ~~having~~ a particle size of ~~about~~ 40 nm to ~~about~~ 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.

~~22. The activated carbon according to claims 20 or 21, having a BET surface area of more than 600 $m^2$/g.~~

~~23. The activated carbon according to any one of claims 20 to 22, having a pore diameter of at least 1.5 nm.~~

~~24. The activated carbon according to any one of claims 20 to 23, having a dye~~

~~adsorption of at least 170 mg/g.~~

~~25~~18. A silane functionalised activated carbon formed from the method according to any one of claims ~~14~~ 11 to ~~19~~15, wherein the silane functionalised activated carbon is characterised by a micropore ratio relative to a total porosity of 10% to 50%.

~~26~~19. The silane functionalised activated carbon accordingly to claim ~~25~~18, wherein the silane functionalised activated carbon is characterised by at least one of the following:

a) ~~having~~ a particle size is ~~about~~ 140 nm to ~~about~~ 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 $m^2/g$.

~~27. The silane functionalised activated carbon according to claims 25 or 26, comprising at least 4 carbon particles.~~

~~28. The silane functionalised activated carbon according to any one of claims 25 to 27, having a silica shell with a thickness of about 10 nm on at least a surface of the activated carbon.~~

~~29. The silane functionalised activated carbon according to any one of claims 25 to 28, having 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.