Claims

~~1. A metal doped powdered activated carbon (PAC) catalyst for catalytic ozonation, wherein the catalyst has an average size of 5-150 mm.~~

~~2. The catalyst according to claim 1, wherein the catalyst is a monometallic or a bimetallic doped PAC catalyst.~~

~~3. The catalyst according to claim 1 or 2, wherein the metal comprised in the PAC catalyst is: iron (Fe), manganese (Mn), copper (Cu), magnesium (Mg), nickel (Ni), cobalt (Co), or a combination thereof.~~

~~4. The catalyst according to claim 2 or 3, wherein the bimetallic doped PAC catalyst comprises: Fe-Mn, Fe-Ni, Fe-Co, Ni-Cu, Mn-Co, Mg-Cu, Mg-Ni, or Fe-Cu.~~

~~5. The catalyst according to any preceding claim, wherein the catalyst is in the form of a pellet.~~

~~6.~~1. A method of forming a metal doped powdered activated carbon (PAC) catalyst for catalytic ozonation, the method comprising:

- mixing a metal ion solution in an acidic solvent to form a first mixture;
- adding powdered activated carbon (PAC) to the first mixture to form a second mixture;
- adding an organic solvent to the second mixture to form a xerogel;
- drying the xerogel; and
- calcinating the xerogel to form the metal-doped PAC catalyst.

~~7.~~2. The method according to claim ~~6~~1, wherein the acidic solvent is: citric acid, acetic acid, formic acid, oxalic acid, propionic acid, lactic acid or a combination thereof.

~~8.~~3. The method according to claim ~~6~~1 or ~~7~~2, further comprising ultrasonicating the second mixture prior to the adding an organic solvent.

9.4. The method according to any of claims 61 to 83, wherein the organic solvent is: ethylene glycol, glycerol, 1,2-propane diol, triethylene glycol, polyethylene glycol, or a combination thereof.

10.5. The method according to any of claims 61 to 94, wherein the calcinating is at a temperature of 400-800°C.

11.6. The method according to any of claims 61 to 105, wherein the method further comprises pelletizing the catalyst.

12.7. A catalytic ozonation system for wastewater treatment comprising:

- a wastewater inlet for receiving wastewater;
- an ozone inlet for receiving ozone gas;
- an ozone reactor for catalytic ozonation of wastewater, the ozone reactor in fluid communication with the wastewater inlet and the ozone inlet, wherein the ozone reactor is loaded with the catalyst according to any of claims 1 to 5 a metal doped powdered activated carbon (PAC) catalyst having an average size of 5-150 mm; and
- a water outlet for discharging treated wastewater.

13.8. The system according to claim 127, wherein the system further comprises a microbubble generator in fluid communication with the ozone inlet for forming ozone microbubbles.

14.9. A method for catalytic ozonation comprising ozonising wastewater over the catalyst according to any of claims 1 to 5 a metal doped powdered activated carbon (PAC) catalyst having an average size of 5-150 mm.