CLAIMS

1. A process for making molecular filter media, said process comprising:
   (a) mixing, 30-85% by final weight, activated beads in about twice quantity of water for at least 10 minutes;
   (b) decanting the water and washing / rinsing the activated beads with distilled water to remove impurities;
   (c) incubating the washed and activated beads for at least one hour at 60℃ temperature in order to obtain a high-surface area activated substrate;
   (d) taking at least 5% wt/vol of actives and, optionally, mixing it with at least 10-20% wt/vol of metal oxide powder;
   (e) adding distilled water into the mixture (of step (d));
   (f) drying the mixture (of step (e)) in order to obtain an active reagent wherein the active reagents are active ingredients for facilitating the reactions of adsorption of the toxic components and neutralization thereof;
   (g) impregnating the obtained high-surface area activated substrate (of step (c)) with the obtained activated reagent (of step (f)) in a ratio 1:1 to 5:1 in order to obtain an impregnated mixture; and
   (h) extruding and spheronizing the impregnated mixture (of step g) into pellets to make the molecular filter media.

2. The process for making molecular filter media as claimed in claim 1, wherein said regenerant is a water-based formulation which has about 4 to 10 percent actives that wash away the by-product of the gas and molecular filter and infuse the active back into the molecular filter readying it for the next cycle.

3. The process for making molecular filter media as claimed in claim 1, wherein said regenerant comprises aqueous solutions with the actives and or gases such as air, oxygen, hydrogen and / or ozone, one or more liquid, gas or solid particles dispersed.

4. The process for making molecular filter media as claimed in claim 1, wherein said active reagent is at least one of reducers like metabisulphite, permanganates, oxidizers, organic acids salts of trisodium citrate and other acids and bases, metals salts of iron, silver, zinc, palladium and combinations thereof.

5. The process for making molecular filter media as claimed in claim 1, wherein an active component in the regenerant is at least one or more liquid, gas or solid particles such as NaOH, oxidants, potassium bicarbonate, palladium and combinations thereof.

6. The process for making molecular filter media as claimed in claim 1, wherein said activated substrate is at least one of carbon, metal oxides, metal carbides, ceramics, porcelain, clay, porous glass, mixed metal oxides comprising binary, ternary and quaternary with respect to the presence of the number of different metal cations and combinations thereof.

7. The process for making molecular filter media as claimed in claim 1, wherein said filter media is formed as a high-surface area carbon or high-surface area metal oxide pellet which is impregnated with active reagents which adsorbs the pollutants in the emissions.

8. The process for making molecular filter media as claimed in claim 1, wherein said filter media are palladium coated substrates for removing carbon monoxide from the emissions and converting into CO_2 as a by-product, wherein the by-product is trapped by the regenerant NaOH and converted into the carbonate salts, yielding a repurposed by-product for the industry by use of catalysis and neutralization reactions

9. The process for making molecular filter media as claimed in claim 1, wherein said filter media is an oxidizer with permanganate coated substrates for removing ethylene from rotting vegetables and converting into carbon dioxide as a by-product, wherein the by-product forms a blanket on the produce and the regenerant is an oxidant for replenishing the media.

10. The process for making molecular filter media as claimed in claim 1, wherein said filter media is metabisulphite coated substrates for removing oxygen from produce.

11. A rechargeable filter media composition for removing toxic components from gas emissions comprising:
    - 30-85 % by weight activated substrates;
    - 15-25 % by weight active reagents, wherein the actives are active ingredients for facilitating the reactions of adsorption of the toxic components and neutralization thereof.

12. The rechargeable filter media composition as claimed in claim 11, wherein said regenerant is a water-based formulation which has about 4 to 10 percent actives that wash away the by-product of the gas and molecular filter and infuse the active back into the molecular filter readying it for the next cycle.

13. A system for removing toxic components from gas emissions comprising:
    - at least one gas inlet in a reaction chamber with a gas passageway for drawing gas emissions into the reaction chamber, wherein the said reaction chamber is packed with a molecular filter media for trapping and neutralizing the toxic components from the gas emissions to generate cleaned gas;
    - providing at least one gas outlet for release of the cleaned gas into the environment;
    - providing at least an inlet for adding a regenerant into the reaction chamber for recharging the filter media and removing the regenerant from at least an outlet at one end of the reaction chamber,
        - wherein the regenerant repurposes the contaminant for reuse;
        - wherein the filter media removes the contaminants by at least one of trapping and neutralizing, catalysts and redox transformation; and

          the regenerant repurposes the contaminant species into salts for use as raw material in industry by at least one of thermal evaporation, membrane technology, osmosis, reverse osmosis and combinations thereof but not limited to.

14. The rechargeable filter media composition as claimed in claim 13, wherein said regenerant is a water-based formulation which has about 4 to 10 percent

actives that wash away the by-product of the gas and molecular filter and infuse the active back into the molecular filter readying it for the next cycle.