CLAIMS,

1. A **system for safe storage, separation, and recycling of components from emissions and effluents**, said system comprising:

- a storage tank configured to elute fluids which are to be separated and / or purged;
- a **filtering cartridge (600)**, fluidically coupled to said storage tank, in order to receive said eluted fluids that are to be separated and / or purged,
    - said **filtering cartridge (600)** achieves separation and / or purging of said fluids on the basis of polarity, thermal stability, dielectric constant, viscosity, surface tension, molecular weight, molecular size,
    - said **filtering cartridge (600)** achieves separation and / or purging of said fluids by a process selected from a group of processes consisting of physisorption process and chemisorption process,

in that, said **filtering cartridge (600)** comprising:

- a hollow tubular casing (505) having an inlet (510) to receive the fluids for separation and an outlet (515) for egress of separated fluids with a **molecular filter (600)** therebetween, said molecular filter (600) configuring a fluid flow path such that said eluted fluids pass through said molecular filter (600), said molecular filter consisting of at least a **substrate** and at least a **defined pathway**, lined with said **substrate**, in order for said fluid to pass through said defined pathway while, simultaneously, reacting with said substrate, order to cause said separation, said molecular filter being selected from a group of molecular filters consisting of:
    - a spiral pipe (Fig. 3a) packed with a substrate,

- a block (Fig. 3b) with a substrate having a plurality of internal tortuous paths,
- a plurality (Fig. 3c) of stacked porous substrate blocks,
- a plurality (Fig. 3d) of spherical substrate beads, and
- a porous substrate block (Fig. 3e).

2. The system as claimed in claim 1 wherein, said spiral pipe (Fig. 3a) being packed with a substrate and having an internal flow path, for fluid flow, configured in a direction extending between said inlet (510) and said outlet (515), said spiral pipes or channels allowing maximum flow path of said fluid for separation, said substrate being solid packed or lined liquid and porous matrices.

3. The system as claimed in claim 1 wherein, said block (Fig. 3b) of substrate having an internal flow path, for fluid flow, configured in a direction extending between said inlet (510) and said outlet (515).

4. The system as claimed in claim 1 wherein, said plurality of stacked porous substrate blocks (Fig. 3c) and said plurality of spherical substrate beads (Fig. 3d) having an internal flow path, for fluid flow, configured in a direction extending between said inlet (510) and said outlet (515).

5. The system as claimed in claim 1 wherein,

- said substrate including at least one of ceramic, carbon, polymer, and / or combinations thereof, said substrate has a pre-defined pore size

ranging between 1 to 60 Å, said pore size being sufficient to allow entry of molecules of fluids to be separated; and

- - said substrate is at least one of inorganic metallic oxide, nitride, carbide material, carbon, polymeric materials, metal oxides such as zeolites and alumina beads or advanced carbon materials or polymeric materials such as polyacrylate-polyalcohol beads, polydimethyl siloxane beads, poly (methyl methacrylate) microspheres (PMMA), divinyl benzene beads, polyethylene glycol granular or polyethylene glycol (PEG), and combinations thereof.

6. The system as claimed in claim 1 wherein, said system comprising a negative pressure applicator fluidically coupled to said filtering cartridge (600).

7. The system as claimed in claim 1 wherein, said system comprising a carrier gas applicator (500c) from which gas is introduced from a pressurized cylinder and is flow controlled using mass flow controllers, said carrier gas applicator (500c) is fluidically coupled to said filtering cartridge (600), in that, said molecular filters (600) being polar in nature and said carried gas being non-polar in nature.

8. The system as claimed in claim 1 wherein, said substrate having adsorbent layers of same or different materials packed in a column or a spiral tube filled with selected adsorbents where the fluids flow in and out.

9. The system as claimed in claim 1 wherein, in order to achieve physisorption, said **filtering cartridge (600)** being jacketed by a heat

exchanger, thereby controlling temperature of the molecular filters and, optionally, being connected to a vacuum pump to adjust pressure that enhances fluid separation, in that,

- said gases, selectively, adsorb on the molecular filters at low temperatures and desorb at higher temperatures; and- said gases desorb with change in pressure or with increase in negative pressure at the outlet.

10. The system as claimed in claim 1 wherein, in order to achieve chemisorption, said **filtering cartridge (600)** includes an active molecule infused on the molecular filter (600) to help with chemisorption reactions for separation of the gases, said active molecule adapted to undergo chemisorption type of reactions with the emissions to enable recycling of un-adsorbed gas, in that, said active molecule, is at least one of thiosulphates, oxidizers such as permanganates, phosphoric acid, ferrous sulphate, metal hydroxides, iodides, bicarbonates, amines and certain metal oxides such as calcium oxide, and combinations thereof.

11. The system as claimed in claim 1 wherein,

- said substrate being filled into a spiral pipe (520) running between the inlet (510) and the outlet (515), said spiral pipes or channels allowing maximum flow path of said fluid for separation; and
- said substrate being solid packed or lined liquid and porous matrices.

12. The system as claimed in claim 1 wherein,

- said substrate being in the form of a block (523) having a plurality of internal tortuous hollow paths (525, 530, 535) configured there within,

- each of the tortuous paths (525, 530, 535) being configured as longitudinal channels consisting of different connected but staggered sections (525a, 525b, 525c) to configure a plurality of parallel running gas flow paths; and
- each staggered section (525a, 525b, 525c) being connected to a section preceding it and to a section succeeding it.

13. The system as claimed in claim 1 wherein,
- said substrate comprising a plurality of porous substrate blocks (540, 545, 550) that are stacked over each other and adapted to be positioned in a stacked manner within said hollow casing (505); and
- a gas flow path being configured by pores in each of the porous substrate blocks (540, 545, 550) that interconnect once the blocks are stacked over each other extending between the inlet (510) and the outlet (515) of the hollow casing (505).

14. The system as claimed in claim 1 wherein,
- said substrate being configured in the form of a plurality of spherical beads (555, 560) that are filled in the hollow casing (505) to extend between the inlet (510) and the outlet (515), said beads (555, 560) having a high surface area and being made of ceramic and / or carbon in different sizes to enhance packing density and functions for storage and separation of fluids.

15. The system as claimed in claim 1 wherein,
- said substrate being a porous substrate block (565) that has internal hollow channels (570, 575) configured therewithin to enable passage

of gases therethrough, said porous substrate block (565) being adapted to be positioned within the hollow casing (505) such that the internal hollow channels (570, 575) extend in the direction running from the inlet (510) to the outlet (515) such that gases entering through the inlet (505) enters the internal hollow channels (570, 575) where the adsorption process happens as the gas moves towards the outlet (515).