3D Carbon

Any traces of gases and vapors other than the natural constituents of air are usually called as gaseous contaminants. Although the concentrations of these gaseous pollutants in air is very small, they may severely impact the indoor air quality (IAQ) and have serious effects on human health. Thus, it's necessary to remove such gaseous contaminants to improve the IAQ. There may be different physical and chemical processes available to remove these gases or vapors from air, but in the HVAC as well as the indoor air cleaning devices the activated carbon is widely used. Due to its physical adsorption and chemisorption properties, the activated carbon is one of the most effective solutions.

The CI 3D carbon is designed to have three functions, physical adsorption, chemisorption and catalysis. Physical adsorption is a surface phenomenon similar to condensation, where the gaseous molecules are transported from the air stream, diffused to the carbon pores and attach to the surface where they remain attached (adsorbed) for a limited period due to the weak molecular attraction (van der waals forces). This process is effective to some extent but is a reversible process and desorb these molecules, either when clean air passes through it or a different concentration of same or different gas molecules may partially replace these molecules. Chemisorption occurs in pretty much similar was as physisorption, but is highly specific because the gaseous molecules react with the chemisorbent and it's a non-reversible process. The gas molecules are not desorbed but there is a reaction product is formed, which is different than the original contaminant. Catalysis is also a surface reaction wherein it oxidizes the contaminant molecules.

With the combination of an appropriate chemisorbent and catalyst, the 3D carbon completely oxidizes the volatile organic compounds (VOCs) into water and carbon dioxide and also enhances the removal of other inorganic gases like H2S, SO2, O3, NH3 and NOx emissions at ambient temperature. With such three dimensional synergetic functions, catalytic oxidation is extremely effective in removing indoor air pollutants.

Using this 3D carbon platform, CI has developed a more efficient class of gas-phase filters with least pressure drop and highest molecular filtration efficiency. Some of the filter forms and structures are presented here:

- Immobilized carbon pleat media entrapped with fine carbon particles
- Lamination composite of carbon and particulate filtration layers
- Honeycomb form factors: GAC or Carbon Pellets
- Ultrasorb®: Open cell foam or mesh material entrapped with GAC
- Polysorb®: Fine micro-fibrous sheets coated with fine carbon
- Netted Carbon filters: Immobilized Pelletized or granulated carbon