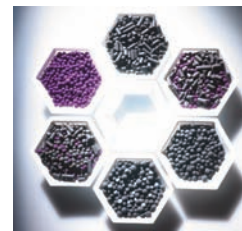


## GAS-PHASE AIR FILTRATION

### PURAFIL MANUFACTURES MEDIA 4 ODOR & CORROSION CONTROL

#### ABOUT PURAFIL CHEMICAL MEDIA

Various odor removal companies market dry-scrubbing media and systems for removal of odorous gases. These products consist of activated carbon systems, impregnated carbon systems and sodium or potassium permanganate impregnated media. However, there are fundamental differences between Purafil ESD media and our competitors'.



#### THE CARBON CONNECTION

Activated carbon removes gases by adsorption. By definition, adsorption is the process by which one substance is attracted to and held on the surface of another. It is a function of the dry-scrubbing media's surface area, of which activated carbon has the highest surface area to mass ratio. Since adsorption is a surface phenomenon, it is essentially totally reversible, i.e. desorption. Adsorption works well for higher molecular weight organics (i.e. toluene), but for lower molecular weight compounds (i.e. hydrogen sulfide), carbon capacities are lower and desorption often occurs. Figure 1 depicts the adsorption on activated carbon.



Figure 1 – Visualization of Adsorption

For years, carbon bed fires have been documented in carbon odor control systems. Fires may occur when heat or a static condition is present. If the airflow through the odor control unit is restricted, it could create a hazardous condition and the media could spontaneously combust. These fires are safety hazards and they often cause significant economic losses. Purafil media is UL listed and thus does not promote combustion.

#### THE PURAFIL ADVANTAGE

Chemically impregnated media remove gases by chemisorption. Chemisorption is defined as an interaction between a gas compound and the media, which results in transferred or shared electrons, i.e. a chemical reaction. It is a function of the surface area of the media and its chemical makeup (base materials, impregnant, and moisture content). Chemisorption is not a pure physical interaction. It is, however, a permanent process that involves a chemical change. The reactions typically form stable, organic or inorganic salts or convert the compound to water vapor, carbon dioxide, and some compounds more readily absorbed by other adsorbents. Figure 2 depicts chemisorption on chemically impregnated media. Both adsorption and chemisorption occur on the chemically impregnated media's surface, but chemisorption is the most effective removal method.



Figure 2 – Visualization of Chemisorption

All impregnated media is not the same. Several factors effect impregnated media and how it removes gaseous contaminants. Some of these factors are as follows: 1) the surface area available, which is measured as a percentage of macro- and micropores of the impregnant contained in the media, 2) size of the pores, 3) the amount of impregnant contained in the media, and

4) moisture content. Two cross-sections of spent media are shown below – a competitors' media appears in Figure 3 and Purafil ESD Odoroxidant SP media in Figure 4. When the outer shell of the competitor's media reacted with contaminants, its gases were unable to penetrate the pellet. Only the pellet's outer shell reacted with the contaminants. On the other hand, the Odoroxidant SP media's core is spent (grey or white), which proves the impregnant is applied throughout the pellet. The sodium impregnate efficiency for Purafil's patented Odoroxidant SP is 12%, which is the highest available on the market.



Figure 3 – Spent Competitor Media



Figure 4 – Spent Odoroxidant SP Media

The media's capacities depend on the targeted compound as well as the dry-scrubbing media itself. Although activated carbon has a high capacity for increased molecular weight, less reactive gases and impregnated media have higher capacities for both a broad and more specific range of reactive gases. The table below projects which media types will have the highest capacity for common gases.

Purafil ESD customizes odor and corrosion solutions by manufacturing and often combining its media. As activated carbon adsorbs high molecular weight organics, Purafil's ESD Engineered Media (chemically impregnated) reacts with lighter, more reactive gases. A broad range of gases can be removed while high capacities for targeted contaminants is also achieved. Typically in odor control applications, a mixture of Odorcarb Ultra and Odormix SP is recommended. Odormix SP is a 50/50 mixture of Odorkol and Odoroxidant SP.

Purafil Media Effectiveness			
Contaminant	Odorkol	Odoroxidant SP	Odorcarb Ultra
Carbon Disulfide	X		
Hydrogen Sulfide		X	X
Methyl Mercaptan	X	X	
Nitric Oxide		X	
Nitrogen Dioxide	X	X	
Sulfur Dioxide		X	X

In the table (shown above):  
 Odorkol = Purafil Proprietary Activated Carbon  
 Odoroxidant SP = NaMnO<sub>4</sub> Impregnated  
 Odorcarb Ultra = Purafil Proprietary Non-Impregnated