QuikAir® V

Understanding Active Chemistry

QuikAir® V **is a product designed to function in the vapor phase as a means of decomposing, modifying, and/or complexing odorous molecules such that their odor is eliminated or greatly reduced.**

Many of the odorous compounds associated with waste processes are the products of incomplete oxidation[1]. Others odors are the inevitable result of uncontrolled decomposition (aerobic and anaerobic) of the organic fraction of these waste materials. Decomposition occurs due to biological activity, but also due to stresses in temperature, moisture, and pressure during grinding, sorting, compacting, materials movement, and other processing activities[2].

QuikAir® V **was developed to function in the same phase as the odors – the gaseous or vapor phase. Using wet technologies – misting and fogging systems are acceptable if all odorous gas can be collected and passed through the mist or fog, and if the added water is not a problem to personnel and equipment. But it must always be remembered that a water based particle of even 5 microns (about the smallest particle size available in these systems) will never move as fast or as far as even the largest gas particle. Consider the example of ammonia gas, which has a density of 0.589 that of air. When you consider that any volume of water, regardless of how small, will have a density 784 times that of the same volume of air (at sea level), the relative impossibility of chasing gas with water becomes obvious. Even a "heavy" odor, such as methyl mercaptan (1.66 times the density of air), still has a density of 0.002 that of an equal volume of water. This is the scientific reason for choosing vapor as the best method of odor control. There are other reasons. As previously mentioned, keeping moisture low in enclosed areas can be essential for visibility and safety reasons. In large scale outdoor operations, conservation of water can be an important motivation.**

To summarize, vapor emissions are created at approximately the same range of densities as the odors they are trying to contact and react with. No water is added, and the treatment is invisible, quiet, and dry.

But how does QuikAir® V **work? What is the methodology od deodorization?** QuikAir® V **is composed of many different compounds. However, they fall into three main structural and functional groups. The first of these groups combines a variety of amine and amino compounds**

with highly reactive hydroxyls (OH) to form amino hydroxyl groups. The function of the amino hydroxyl groups is to facilitate and speed certain reactions in known compounds of decomposition that are odorous or are precursors to odorous compounds. These amino hydroxyl groups are semi-catalytic in that they reform at the conclusion of the reaction without being consumed, decomposed, or bonded to the products of the reaction. Each group is capable of facilitating the same reaction ten or more times in the air.

These compounds are effective against mercaptans, organic acids, ketones, and other types of odorous compounds.

The second type of group is similar to the amino hydroxyl groups but an amine is added to a sugar replacing the sugar's hydroxyl group. Acyclic (open chain) disaccharides are used in what are called amino sugars or aminoglycosides. They react with a wide variety of nitrogen compounds, primarily inhibiting complexification of simple compounds into complex nitrous odors such as cadaverine and putrescine.

In some cases, the groups are formed when an amine joins with a sugar but does not replace the hydroxyl. These are called amino sucroates. They are highly ionic, and the hydroxyls can be released to react with a wide variety of VOC's – including mercaptans. In some cases, the amino sucroate simply contributes enough electrons to the VOC to decrease its vapor pressure and therefore its volatility. They are especially effective against aldehydes and ketones, and at increasing chemical reactivity in the low moisture vapor state.

(These formulas and specific compounds are proprietary. However, a generic example would be Tremalose (C12H22O11) which exhibits some of the above properties in its natural form.)

The third type of functional group in QuikAir® V **contains both ionic and non-ionic surfactants. The ionic surfactants are designed to attract odorous compounds rich in the opposite ionic charge. When this occurs, the resulting unit typically loses odor, volatility, or both.**

The non-ionic surfactants are designed to allow faster penetration and reaction between the other components of QuikAir® V and the odorous molecules they encounter. They improve the speed and efficiency of the overall product.

The above groups constitute the active portions of QuikAir® V. There is, however, another ingredient. The final component of QuikAir® V is simply a cyclic hydrocarbon with a slight detergent smell. Its function is not deodorization of external compounds, but rather to homogenize the smell of the various ingredients in QuikAir® V.

1: Examples are alcohols oxidized to aldehydes or ketones, further oxidized to carboxylic acids yielding esters including acetates. If the oxidation sequence ceases at any point – including oxidation of the acetates – the resulting compounds are odorous.

2: Examples are reduced sulphur compounds such as dimethyl disulfide and hydrogen sulphide, and reduced nitrogen compounds such as ethylamine and trimethylamine. Reduced nutrient compounds have distinctive, strong, and unpleasant odors.

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