Are Corrosion Inhibitors Needed in Adhesive Bond Primers for Bondline Durability?

In the mid-1990s, chromated inhibitors were eliminated from structural adhesive bonders for use in the military. Since that time, bondline durability has been achieved with non-chromated bond primers. The interest in the use of chromated inhibitors within the military has resurfaced. The propulsion is driven by the need to reduce the biodiesel content in military aircraft, resulting in increased metallic corrosion rates. This has led to a focus on the use of corrosive inhibitors to improve bondline durability. This article reviews the environmental and human health impacts of chromated inhibitors, as well as the technical considerations for their use in adhesive bond primers. The article also discusses the potential benefits and drawbacks of using chromated inhibitors, and provides recommendations for future research and development in this area.

The environmental and human health impacts of chromated inhibitors are significant. Chromated inhibitors are used in a variety of industrial applications, including adhesive bond primers, where they serve as corrosion inhibitors. However, these inhibitors have been linked to a range of environmental and human health impacts, including soil and water contamination, human exposure through ingestion, dermal contact, and inhalation, and respiratory effects. These impacts can be exacerbated by the use of chromated inhibitors in adhesive bond primers, as the bondline environment is subject to moisture and atmospheric contaminants.

The technical considerations for using chromated inhibitors in adhesive bond primers are complex. The use of chromated inhibitors can improve bondline durability, which is critical for the performance of military aircraft and ground support equipment. However, the use of chromated inhibitors can also lead to increased corrosion rates and potential negative impacts on the environment and human health. The technical considerations for using chromated inhibitors in adhesive bond primers include assessing the trade-offs between bondline durability and environmental and human health impacts, as well as developing new adhesive bond primer technologies that can achieve bondline durability without the use of chromated inhibitors.

It is important to consider the potential benefits and drawbacks of using chromated inhibitors in adhesive bond primers. The use of chromated inhibitors can improve bondline durability, which is critical for the performance of military aircraft and ground support equipment. However, the use of chromated inhibitors can also lead to increased corrosion rates and potential negative impacts on the environment and human health. It is important to carefully consider the trade-offs and develop new adhesive bond primer technologies that can achieve bondline durability without the use of chromated inhibitors.

To summarize, the use of chromated inhibitors in adhesive bond primers is a complex issue that requires careful consideration. The use of chromated inhibitors can improve bondline durability, but it can also lead to increased corrosion rates and potential negative impacts on the environment and human health. It is important to carefully consider the trade-offs and develop new adhesive bond primer technologies that can achieve bondline durability without the use of chromated inhibitors. This will require a multidisciplinary approach that involves researchers from a variety of fields, including materials science, environmental science, and public health.

References: