



Mineral Acids for Activation vs. Acid Salt

Mineral acids like hydrochloric and sulfuric have been used in metal finishing from the beginning. Acid salts have also been available for many years. The benefits of using acid salt in place of mineral acids have been overlooked in many applications.

This article will discuss a few of the reasons for replacing mineral acid with acid salt, which include:

- Improved activation of alloyed brass resulting in reduced scrap.
- Improved activation of alloyed steel resulting in reduced scrap.
- Corrosive action of hydrochloric fumes on equipment and finished parts.
- Environmental considerations on water treatment of spent acids and rinse water.
- Operator safety when handling mineral acid versus acid salt.
- Total operating cost when considering scrap, fumes, water treatment, and safety.



Beam on the left is near an HCL tank. The beam on the right is the same age, runs the same process but does not include an HCL tank. HCL is very corrosive to equipment.

Environmental Concerns

Water treatment is always an essential consideration in metal finishing. Acid salts have high ionic strength but a buffered pH. This allows for effecting pickling with less attack on the base metal. Less attacks result in less metal in the acid bath and less metal dragging into the rinse water. The result is that fewer metals need to be treated, and less sludge is formed.

- Lower concentration of metals in the effluent stream using acid salt as an activator.
- Less caustic is needed to adjust pH in water treatment using acid salt than Sulfuric.
- Often acid salt baths will last longer, requiring fewer dumps due to the slow build of metals.

Safety And Handling: Liquid vs. Powder

Liquid acids are used in many finishing and waste treatment applications. The inherent safety-related issues are well known. Using proper techniques and precautions, trained personnel handle and use these acids without harmful effects. Nevertheless, accidents have been known to happen.

Where possible, moving from a hazardous material to one that is less hazardous will reduce the chances of a mistake. Here is a look at liquid minerals and powdered acid salts, as well as a health and shipping data comparison:

Liquid Mineral Acids

These usually refer to hydrochloric and sulfuric acid. Safety-related issues include:

- Mineral acids can cause rapid and severe burning of exposed skin. Hydrochloric acid generates dangerous fumes.
- Additions to tanks must be made gradually with good mixing. Sulfuric acid is especially exothermic, rapidly giving off heat, resulting in localized boiling and splash-back.
- Extreme care is necessary to prevent potentially catastrophic accidents. Accidental mixing of Hydrochloric



- Fewer metals in the effluent rinse water.
- Safer for operators.
- Boiling from mixing, buffered pH, Fumes, Spills.
- Catastrophic accidents from accidentally mixing with incompatible chemicals.

Summary and Conclusions

Acid salt is good for many applications for the bottom line, equipment, operator safety, and water treatment. It reduces operating costs while improving health and safety concerns.

Newer developments include “liquid” versions of acid salt if the convenience of pumping the solution is desired, while maintaining many of the benefits of salt.

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