

Know Your Hazards: How to Handle Cleaners Safely

Safety is and will always be Job One, and critical to the success of any process line. Regardless of size or degree of automation, this imperative extends to the selection and use of various types of chemical process baths and treatments. (Of course, in the use of all surface-prep materials, adherence to vendor recommendations, drum labels, SDS, proper clothing and in-house safety training are all strongly recommended.)

Alkaline Cleaning

Two types of product concentrates – liquid and powdered cleaners – are widely used for soak and electro-cleaning. These systems contain similar additives: alkalinity builders, buffers, surfactants, wetting agents, de-scalers, water conditioners and inhibitors. Their cleaning dynamics and bath-service lives are comparable, and their upfront operating costs are also similar.

This is where relative similarities end. Liquid cleaners are more economical (thanks to less sludging, easier make up, easier addition, and greater amenability to waste treatment). On the surface, these handling features also make these cleaners inherently safer. Let's consider some practical items related to this.

Rules of the Road: Liquid Cleaners: Storage and Use

Liquid Cleaners were developed to meet the same rigorous cleaning applications as powdered blends. In fact, concentrated liquid blends offer significant safety advantages to finishers, including the following:

- Supplied in robust polyethylene drums and bulk sizes of totes, liquid-cleaner containers withstand handling better than fiber drums. Totes are placed inside a protective mesh metal cage.



- The concentrated liquid is a stable blend. As such there is never any clumping or hardening with time. (However, protection from freezing temperatures may be required.)
- Liquids eliminate the problem of dustiness. Of course, spillage can be a problem, with burns, rashes and slippery floors a possible result, as would occur with powdered blend cleaners.
- Additions can be made directly from a drum pump to the process tank – product-handling that eliminates exposure. It also provides a quick, uniform dispersion of the added cleaner to the process tank. The drum or tote can be stored safely away from the cleaner tank and contents automatically added by a pump activated by a conductivity meter.
- Liquid blends are 100% mixed upon initial blending and stable when stored as recommended. Moderate, thorough mixing of additions in the tank is simple, while minimizing any incidence of splashing.
- Tank clean-out is simpler and safer vs. powdered cleaners due to the potential for significantly less sludge removal in the liquid cleaner tank.
- Empty drums may be recycled. In fact, deposit totes are generally returnable, making them truly recyclable.

Liquid cleaners have found their niche, operating in an increasing number of cleaning lines. Although total safety is never 100% guaranteed, the use of liquid cleaners does provide the finisher overall significant safety advantages when compared to powders.

Rules of the Road: Powdered Cleaners: Storage and Use

In no way do we mean to minimize the efficacy of powdered cleaners. For decades, and into the foreseeable future, powdered cleaners comprise the first, critical step in many process cycles. Acknowledging the following safety do's and don'ts – and observing OSHA's regulations and others - finishers will continue to use them safely and successfully.

- Powdered cleaners are typically supplied in fiber drums. Mishandling or poorly storing these drums can cause them to crack open, spilling their corrosive contents and presenting hazards to personal safety.
- Aging drums of opened or unopened cleaner tend to harden due to moisture absorption. Clumping of product concentrate makes it difficult to remove the contents when making additions. (In fact, we have seen shovels and pick axes at work to “remedy” this situation, causing broken clumps to fly off in all sorts of unintended directions.)



- Among “do’s and don’ts,” here’s an absolute don’t: Don’t – as some “innovators” have done – suspend drums above a tank. Cutting away the drum result in “boulders” of cleaner tumbling into the process tank (a hazardous solution all around).
- Manual additions may give rise to dustiness, with fine powders settling on unprotected skin, causing burns and rashes.
- Additions must be made in gradual steps, to avoid possible splash back, due to localized boiling of added cleaner.
- Good mixing is essential to prevent formation of un-dissolved clumps that settle to the bottom of the tank. Care must be taken to avoid splashing and spray.
- Cleaner spilled on catwalks pick up moisture, resulting in a slippery condition. This is as stated previously critical with regards to liquid and powder blended cleaners.
- Any un-dissolved cleaner – particularly when accompanied by sludging – takes time to clean out and further exposes workers to hazardous conditions.

Acid Treatment as the Final Surface Preparation before Finishing

Now consider the use of liquid (generic and proprietary) acids versus powdered acids. Both are essential to cleaning, descaling, derusting and overall activation of the surface before plating or other finishing process. Both adequately condition the surface, with one system employing generic acids and the other providing salts of acids that ionize when dissolved in water.

Liquid Acids

Liquid acids are used daily in many finishing and waste treatment applications. Trained personnel, using proper techniques and precautions, generally handle and use these acids safely. Generic acids will always have a place in metal finishing, because of their importance to specific surface treatments, primarily in conditioning and activating the base metal surface. Safety in understanding these materials and how to handle them is critical.

Liquid acids are typically referred to as:

- Hydrochloric and sulfuric acids, and to a lesser degree phosphoric and acetic acid. (Here we’ll reference hydrochloric and sulfuric, those most commonly used.)
- Proprietary blended liquid acid concentrates providing a product easier to handle and dispense.

Safety related issues related to both include:



- Corrosiveness, which can result in rapid, severe burning of exposed skin, and possible hydrochloric acid concentrate fumes. The proprietary liquid acids are typically non-fuming and although aggressively corrosive, are less so compared to generic acids.
- Sulfuric acid is especially exothermic, rapidly giving off lots of heat, resulting in localized boiling and splash back. Additions to tanks must be made to cold water gradually, with good mixing. (Proprietary liquid acids are blended with the sulfuric acid component having been already added, thus eliminating the extreme heating that occurs handling generic sulfuric acid.)
- Pickling and activation of the metal surface results in corrosive fumes must be properly vented.
- Extreme care is necessary to prevent potentially catastrophic accidents, particularly when mixing of acids is required. Example: De-smutting aluminum, which requires handling nitric, sulfuric, and hydrofluoric acids in specific combinations.
- Empty carboys, drums, and totes of acids must be returned for refill promptly. Sometimes overlooked, reducing hazard clutter is imperative in maintaining overall safety.

Powdered acids

- Powdered acids were specifically developed to increase the effect of acid treatments in a safer handling situation. Powdered acids offer several advantages with respect to improved safety. Some things to consider:
 - Upon dissolution, acid salt ionizes to generate active acid in the bath. Common among these is sodium bisulfate, the acid salt of sulfuric acid. Powder acids eliminate the handling of sulfuric acid and its accompanying exothermic heating.
 - Acid salts are blended to offer additional acid accelerators in the form of chlorides and fluorides. These agents also ionize in solution, providing hydrochloric and hydrofluoric acids. A single concentrate can eliminate the handling of two or three separate generic acids - another safety "plus."
 - Unlike liquid acids, powdered acids may contain surfactants and wetting agents. These allow for improved penetration for surface action, which in turn could result in using less product compared to a higher concentration of liquid for the same application. The less to handle, the safer the situation.
 - Surfactants and wetters in powdered acids form a stable, light foam blanket which may effectively eliminate more 99% of potentially corrosive fumes and mists.
- Powdered acids may contain special inhibitors to prevent immersion deposits, thereby extending the bath service life. These products are also buffered, to provide longer functioning acid action over time. The benefits here include less frequent solution dumps, which means fewer incidences of handling.



Takeaways

Far more than in most industries, safety is of the utmost importance in metal finishing. Suppliers and finishers – spanning installations both captive and job – understand and appreciate its primacy. Still, there’s a difference between being alert and remaining alert, which is why we’ve chosen to highlight:

- Accurate labeling of chemical product and detailed SDS forms, as per OSHA and Federal regulations.
- In house safety training and proper use of protective clothing.
- Available chemicals in their generic and proprietary blended forms.
- The benefits of powdered and liquid concentrate products compared to simple generic chemicals.
- The benefits of the use and storage of cost-effective, easier-to-handle product containers.

Astute and focused installations prioritize safety. Finishers like these have a range of effective surface preparation products that incorporate a safety profile in every drum and tote. That said, there is no upper limit to how smart anyone can be about safety. If you have any more specific questions about keeping hazards at bay, talk to us at Hubbard-Hall at [PHONE and URL].

Our people. Your problem solvers.



For questions or comments on this information please call us at

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