

Prevention and Control of Exposure to Chromic Acid

Introduction

Breathing an aerosol of chromic acid can cause cancer and this route of exposure has created most concern. But the nature of chromic acid (damaging DNA) suggests cancer can be caused through any form of contact (and reclassification in 2005 will reflect this). In addition, it is: toxic (poisoning) through skin contact and by ingestion; causes severe burns; and can cause allergic contact dermatitis and asthma.

You must, therefore, establish safe working practices to minimize any risk of contact.

All areas where exposure may occur need to be tackled - from storage through to disposal.

Safe Storage

Whether supplied as crystals or liquid, chromic acid must be stored in closed and clearly labelled containers. It should be kept away from oxidisable and combustible materials eg. organic solvents, oils, greases etc because it is a strong oxidizer and may cause fires. Consequently, chromic acid 'containers should be removed from wooden delivery pallets before they are opened. Emergency procedures should set out the action to take in the event of spillage and cover issues such as secondary containment, drainage, and the wearing of appropriate personal protective equipment (PPE).

Safe Handling and Use

A quarter of all accidents in electroplating facilities reported to HSE (and 36% of fatalities) involve contact with hazardous substances. These include accidents due to unsafe transfer (eg using buckets), splashing while making additions or removing objects to the tank or unsafe systems for connecting or disconnecting pumps and hoses. Fatalities have occurred when people have taken inadequate precautions when working above tanks and have fallen into them. Details of safe working procedures in electroplating facilities are given in BSTSA's Health and Safety Guide for Surface Treatment Tank Side Personnel.

1. Total enclosure of the process and handling systems unless it is not reasonably practicable;
2. Prohibiting eating, drinking or smoking in areas that may be contaminated;
3. Cleaning floors, walls and other surfaces at regular intervals and whenever necessary;

4. Designating areas and installations that may be contaminated by chromic acid. Non-essential personnel should be excluded and warning signs similar to this must be displayed in these areas.



May cause cancer

5. Chromic acid must be stored, handled and disposed of safely, including using closed and clearly labelled containers.

Checking for contamination

Two of the five requirements above use the phrase 'may be contaminated' and a third requires cleaning 'whenever necessary'. Surface sampling test kits are available to carry out swab checks for chromic acid and chromates. Such checks can help demarcate the area where restrictions, signage etc is required. The alternative is to err on the side of caution and extend the 'may be contaminated' area to include all areas where contamination could possibly occur.

Protective clothing

With the exception of falls into tanks, most of the accidents listed above would have been much less serious if staff were wearing adequate protective clothing. For those working with chromic acid this should include, as a minimum:

- **washable overalls or disposable overalls of a suitably chemical resistant material that provide a similar level of protection;**
- **safety boots or wellingtons as appropriate;**
- **impervious apron;**
- **suitable gloves/gauntlets; and**
- **a full-face visor.**

Overalls should be replaced or laundered if they become contaminated and at least once per week. Readily accessible changing facilities with clothing accommodation (eg a lockable locker for each worker) must be provided to prevent worker's own clothing becoming contaminated.

Washing Facilities and Messrooms

Adequate washing facilities are essential to allow a high standard of personal hygiene - hands should be washed before and after going to the toilet. Pre and post work creams help keep skin in good condition and should be provided via dispensers or personal issue. Where protective gloves or gauntlets are required, cotton or silk inner gloves should be used to reduce the effects of sweating. It is very important that these do not become contaminated. After use, the outer gloves should be rinsed/washed whilst still being worn to reduce the risk of contamination. Inner gloves should be washed and left to dry, ready for the next day.

Areas must be set aside where employees can eat and drink without risk of being contaminated by chromic acid.

Emergency Procedures

The precise requirements for emergency showers/eye-wash stations and their locations should be determined by your risk assessment. But given the hazardous nature of the chemicals used in a plating shop and the number of injuries

resulting from gross exposure, a suitable combination of accessible and operable emergency showers, eyewash, eye/face wash, or hand-held drench hoses will need to be provided in the work place.

The delivery of water should be at high volume but low pressure to reduce the risk of injury or further contamination. The volume should be sufficient to immediately drench the person (for showers, typically 75 l/min; for eye-wash 1.5 l/min) and there should be sufficient flow to last around 15 minutes. Consequently, simply using hoses connected to mains water is not suitable.

Employees must be trained in the proper use of such equipment and it should be maintained in accordance with the manufacturer's instructions and tested weekly.

All shut-off valves between the sanitary water supply and the eyewash and/or safety shower should be secured in the open position. Routes to the shower/eyewash station and the area around the equipment must be kept clear.