

Good Practice Sheet for Uses of Chromium Trioxide

A1 Formulation – addition of solid chromium trioxide to mixtures

This sheet will help employers to comply with the requirements of EU Directive 2004/37 and the terms of the REACH authorizations for uses of chromium trioxide. Working with chromium trioxide may cause cancer. This sheet describes good practice to reduce exposure. It covers the points that should be followed to reduce exposure. It is important to follow all the points, or use equally effective measures. This document should be available to all persons who may be exposed to chromium trioxide in the workplace so that they may make the best use of the control measures available.

The Process

This GPS covers blending of solid (dry) chromium trioxide (with or without additives) in water-based solutions by formulators during the manufacture of proprietary products or by downstream users during preparation of electrolytes prior to plating.

Solid chromium trioxide is supplied in drums as crystals or flakes. Formulators dissolve the chromium trioxide in a mixing vessel before adding water and other raw materials. After mixing, the formulation is transferred to (ADR approved) containers.

Downstream users either dissolve the chromium trioxide directly into the mixture in the plating tank or pre-mix it and then add the aqueous solution to the tank. The mixing vessel or plating tank may be fed by automated loading or manually.



Photograph shows open drums containing chromium trioxide flakes



Photographs show (left) chromium trioxide flakes with addition of water to reduce dust during mixing and (right) empty drums

Equipment Design and Access

Formulation is preferentially carried out in a dedicated mixing vessel.

- The mixing vessel is normally closed with an opening for addition of chromium trioxide and other raw materials. ✓
- The mixing vessel has local exhaust ventilation (LEV), a manual or automated stirrer and a pump to transfer the product to the containers. ✓
- LEV is provided at the point at which solid chromium trioxide is weighed and added to the mixing vessel. ✓
- The water supply to the mixing tank is designed to prevent splashing of chromium trioxide. ✓
- The speed of the mixer is sufficiently low to prevent splashing. ✓

Where a dedicated mixing vessel is not available, formulation may be carried out directly in the plating tank or bath. ✓

- Where a separate vessel is not available, the chromium trioxide must be dosed into to the plating tank when the plating line is not operational (i.e. in maintenance mode). ✓
- LEV must be provided at the dosing point. ✓

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Chromium Trioxide Emissions

Chromium trioxide in solid form can generate dust. Exposure to chromium trioxide dust is possible when drums are opened, during weighing and during transfer to the mixing vessel or plating tank. Splashing can occur when adding water to chromium trioxide or vice versa. Residual chromium trioxide on equipment surfaces might be possible in some systems. Appropriate risk management measures should be adopted, as necessary.

Risk Management Measures - Workers

- At the chromium trioxide drum, slowly add 1-3 litres of water to the top of the drum.
- At the mixing vessel, first add a small amount of water, then slowly invert chromium trioxide drum close to the LEV, releasing the contents to the mixing vessel without splashing.
- Flush residues from the drum to the vessel with low pressure water. Carefully add other raw materials / water to prevent splashing.
- LEV must be regularly inspected and maintained to ensure full working order.
- Regularly inspect and rinse equipment to remove residual chromium trioxide.
- Implement appropriate measures to prevent cross-contamination between equipment and personal protective equipment (PPE).
- Restrict access to the process area to permitted workers only by appropriate measures.

Risk Management Measures – Environment

- The air extraction system must discharge to the atmosphere via a filtration or scrubber unit with State-of-the-Art chromium trioxide removal efficiency.
- Wastewater containing hexavalent chromium should not be discharged to surface or groundwater, but treated to effectively remove hexavalent chromium prior to release to the environment or managed as a hazardous waste.
- Floors, drains and equipment in process and chemical and waste storage areas should be sealed and regularly maintained to ensure integrity.

PPE

To minimize potential exposure to chromium trioxide, all persons accessing the formulation process must wear:

- Protective goggles.
- Protective gloves.
- Acid-resistant clothing / footwear.
- Respiratory protection (P3 filter) when handling open drums.

GPS E7 and your supplier's extended Safety Data Sheet (SDS) provide relevant information on PPE.

Training and Supervision

All persons with access to the formulation/mixing area must be instructed about the risks of working with chromium trioxide, the safe way of handling chromium trioxide and use of PPE and other control equipment. Workers must be properly trained and equipped to carry out their duties, and to safely cease such duties as needed. Adequate supervision must be provided at all times.

Monitoring

Adequate monitoring data must be available to evidence absence of worker exposure and evaluate environmental release. GPS E1-E4 provide further information on monitoring. Expert input is advisable to ensure an appropriate monitoring program that also meets regulatory requirements.

A typical worker exposure monitoring program will include collection of 2 personal measurements covering each position of the formulation/mixing area with potential for release of chromium trioxide during a normal formulation/mixing cycle.

Monitoring should be carried out annually until there is adequate evidence that exposure is minimized. Monitoring may be reintroduced following significant changes to the system.

Other Relevant Good Practice Sheets

Other GPS are also likely to be applicable. A full list can be accessed at [link](#).