

SAFETY DATA SHEET

"REVISION"

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Name **CHROMIC ACID**
CAS No. 1333-82-0
EINECS No. 215-607-8

Synonyms Chromium trioxide, Chromium (VI) oxide, Chromic anhydride, CA21

Molecular Formula CrO_3

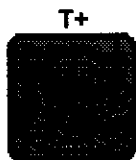
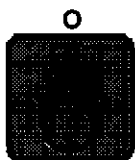
Intended/Recommended Uses Chromium plating to produce durable, tarnish resistant, high lustre finishes, and to increase wear and corrosion resistance.
Wood preservative ingredient acting as a fixative to bind biocides to wood.
Surface passivation of metals to improve corrosion resistance.
Production of potassium dichromate and ammonium dichromate.
Production of chromium dioxide in production of high fidelity audio, data and video tapes.
Manufacture of other chromium chemicals.

Company **ELEMENTIS CHROMIUM**
Eaglescliffe, Stockton-on-Tees, United Kingdom, TS16 0QG
Telephone + 44 (0)1642-780682
Fax No. + 44 (0)1642-791866
Emergency Telephone No. + 44 (0)1642-780757

♦ Company **ELEMENTIS CHROMIUM LP**
Castle Hayne, Wilmington, North Carolina 28429, USA
Telephone 00 1 910 675 7200

♦ 2. COMPOSITION/INFORMATION ON INGREDIENTSTypical Analysis*

	<u>%</u>	<u>CAS No.</u>	<u>EINECS No.</u>	<u>Supply Classification</u>	
CrO_3 Chromium Trioxide	99.8	1333-82-0	215-607-8	O; R9 Carc Cat 1; R45 Muta Cat 2; R46 Repr. Cat 3; R62 T+; R26 T; R24/25-48/23 C; R35 R42/43 N; R50-53 (see section 15 for R phrases)	[15]
NaHSO_4	0.1	7681-38-1	231-665-7		



Restricted to professional users

* Not to be used as a specification.

♦ 3. HAZARDS IDENTIFICATION

Classification	O - Oxidising	Carc. Cat 1	Muta Cat 2	Repr. Cat 3
	T+ - Very Toxic	C - Corrosive	N - Dangerous for the Environment [15]	

Hexavalent chromium compounds are listed as carcinogenic by IARC. NTP classifies hexavalent chromium and certain hexavalent chromium compounds as carcinogenic.

♦ Human Effects

May cause cancer
May cause heritable genetic damage
Possible risk of impaired fertility
Very toxic by inhalation
Inhalation can cause burns to the respiratory system and may lead to ulceration of the mucus membranes of the nose. Prolonged or repeated exposure may lead to perforation of the nasal septum
May cause sensitisation by inhalation
Toxic in contact with skin
Dry or wet chromic acid is corrosive to the eyes and skin - causes severe burns
Can cause external ulcers or chrome sores
Toxic if swallowed
Ingestion can cause burns to the digestive tract as well as systemic effects

Chromium(VI) soluble salts are absorbed by the body after direct contact with the skin and mucous membranes - can cause systemic poisoning and subsequent liver and kidney damage.

Chemical Hazards

Chromic acid is a strong oxidizing agent as a solid and in solution. Contact with organic materials, oils, greases or other readily oxidizable material should be avoided.

Environmental Effects

Cr(VI) compounds are toxic in the aquatic environment. When added to natural waters containing organic material Cr(VI) is reduced to Cr(III) being precipitated as the hydroxide.

4. FIRST-AID MEASURES**Skin Contact**

Wash affected areas with large quantities of water. After contact wash immediately with plenty of water and soap. Seek immediate medical attention. Thoroughly clean contaminated clothing and shoes before re-use or discard.

Eye Contact

Irrigate with copious quantities of water.
Seek immediate medical attention.

Inhalation

Remove to fresh air.
If breathing is difficult have trained person administer oxygen. If breathing has stopped, give artificial respiration. If conscious irrigate mouth and nasal passages with water. Seek immediate medical attention.

Ingestion

Never give anything by mouth to an unconscious person.
DO NOT INDUCE VOMITING.

If conscious, give several glasses of water or milk if available to drink. If vomiting occurs spontaneously, keep airway clear and give more fluid to drink. Seek immediate medical attention.

Obtain advice from:
UK National Poisons Information Service
Telephone: 0870-600-6266
Fax: 0121 507 4105

♦

American Association of Poison Control Centers
Telephone: 1-800-222-1222

♦ 5. FIRE-FIGHTING MEASURES Not flammable

Incompatibility	Explosive when mixed with combustible material This product may act as an oxidizing agent to initiate or sustain a fire involving organic matter or other easily oxidizable material.
Decomposition	Decomposition begins at 196°C liberating oxygen, no hazardous decomposition products observed under normal conditions of use.
Measures	All extinguisher types can be used, select on the basis of other materials present.
Transport	Use water fog - in the absence of fog a fine spray may be used. Contain.
Equipment	Use self contained breathing apparatus. Full protective clothing.

♦ 6. ACCIDENTAL RELEASE MEASURES

After Spillage/Leakage Dust Leakage	Prevent contact with combustible material. SPILLS SHOULD BE CLEANED IMMEDIATELY TO PREVENT DISPERSION OF AIRBORNE MISTS AND DUSTS. Isolate hazard area and deny entry to unauthorised and/or unprotected personnel. Any spilled Chromic Acid should be placed in a separate clean dry closed container. Dyke spilled liquid material with suitable inert sorbent (i.e. sand, soil, vermiculite) and place in a clean dry container for later recycle or disposal. DO NOT DRY SWEEP if dust is generated. Clean spills using wet clean up methods or with a vacuum equipped with a High Efficiency Particulate Air (HEPA) filter.
Personal Precautions	Operatives to use Personal Protective Equipment i.e. eye protection, appropriate respiratory equipment, gloves, overalls and safety footwear.
Environmental Precautions	Do not empty into drains, sewers/watercourses i.e. contain . If spillage does enter watercourses or sewers, inform the appropriate local water authority or National Regulatory body immediately.
Groundwater Directive ♦ 80/68/EEC	Chromium and its compounds are List II substances. Small areas of contamination which cannot be removed may be treated with ferrous sulphate solution or sodium metabisulphite solution to reduce the hexavalent chromium to the trivalent form and the pH adjusted to 8.5 with sodium carbonate or sodium hydroxide solution to precipitate chromium hydroxide.

7. HANDLING & STORAGE

	Oxidizer
Storage	Store in a cool dry place away from foodstuffs and oxidizable/combustible material. Keep product away from heat and sun. Keep container closed when not in use.
Ventilation	Container may only be opened under local exhaust ventilation.
Handling	Wear Personal Protective Equipment to avoid contact with skin, eyes and clothing. Remove any contaminated clothing and launder before re-use. Wear respiratory protection where there is risk of exposure to the product.

♦ 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

<u>OCCUPATIONAL EXPOSURE REQUIREMENTS</u>	<u>Country</u>		<u>Type</u>	<u>8 hr. TWA</u>
	UK	HSE	WEL	0.05 mg Cr/m ³
	DE	MAK	TRK	0.05 mg Cr/m ³
	USA	ACGIH	TLV	0.05 mg Cr/m ³
	USA	OSHA	PEL	0.10 mg CrO ₃ (Ceiling)

Control Measures The control measures necessary to prevent/minimise exposure to chromic acid are ideally totally enclosed process and handling systems. Where, however, user operations are likely to generate dust, fume or mist/spray, local exhaust ventilation with partial enclosure should be employed [2]

Maximum Exposure Limit The user must take precautions to ensure that the employed controls maintain exposure as low as is reasonably practicable and at least below the **Workplace Exposure Limit of 0.05 mg Cr/m³ 8 hr. TWA** [2]

Monitoring It may be necessary, dependent upon the users assessment of the process(es) employed to undertake a programme of monitoring to demonstrate that the WEL is not exceeded. [2]

PERSONAL PROTECTION

Respiratory Protection Selection of type should be based upon the likely workplace concentrations and the **Workplace Exposure Limit of 0.05 mg Cr/m³**. For half mask respirators, use filter type P3. Reference to HSE Guidance is recommended. [3]

Hands Impervious PVC gloves.

Eyes Close fitting chemical goggles to BS EN 166 349-B.

Body Protection Where overalls or other protective clothing are supplied to the operator, it is recommended that this clothing be laundered at the end of the working period.[4]

General Precautions Clean protective equipment should be used daily. Cover cuts, grazes or broken skin with impervious dressings to avoid contamination. Workers should take a hot shower at the end of the working period or day. Emergency shower should be in close proximity to work area [4]

Hygiene When using chromic acid, do not eat, drink or smoke. Take off immediately all contaminated clothing. Wear suitable protective clothing. [2]

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance/ Physical state	Dark red solid
Odour	None
Molecular Weight	99.99
pH	ca. 1 at a concentration of 10 g/l water @ 20°C
Boiling Point	Decomposes above the melting point
Flash Point	N/A
Flammability	N/A
Autoflammability	N/A
Explosive Properties	N/A
Oxidising Properties	Strong oxidising agent
Vapour Pressure	N/A
Density	2.7 g/cm ³ @ 20°C
Bulk density	ca. 1400 kg/m ³
Solubility - water	62.5% w/w @ 20°C
- fat	N/A
Partition Coefficient	N/A
Viscosity	N/A

Vapour Density	N/A
Evaporation Rate	N/A
Melting Point	196°C

10. STABILITY AND REACTIVITY

Stability	Under normal use conditions, this product is stable.
Conditions to avoid	Chromic acid is a strong oxidizing agent as a solid and in solution. Store away from combustible materials and other chemicals. Keep container closed when not in use.
Materials to avoid	Contact with organic materials, oils, greases or other readily oxidizable material should be avoided.
Thermal Decomposition	Decomposition starts above the melting point of 196°C. Decomposes to chromic oxide evolving oxygen.
Hazardous Decomposition Products	Thermal decomposition may produce chromic oxide (Cr ₂ O ₃) or other oxides of chromium which may be hazardous.
♦ Hazardous Reactions	Explosive when mixed with combustible material

♦ 11. TOXICOLOGICAL INFORMATION

[9]

ACUTE TOXICITY	Oral LD ₅₀	(rat)	52 mg/kg	(both sexes)	[5]
	Inhalation LC ₅₀	(rat)	0.217 mg/l/4 hr.	(both sexes)	[6]
	Dermal LD ₅₀	(rabbit)	57 mg/kg	(both sexes)	[7]
	Corrosivity test	(rabbit)	corrosive to skin		[8]

ROUTES OF EXPOSURE

Highly water soluble Cr(VI) compounds such as chromic acid are very toxic by inhalation and toxic by ingestion. Following inhalation and oral exposure, these compounds can damage the respiratory tract and the kidney respectively. Although acutely harmful or toxic by the dermal route, more severe responses may be observed due to greater uptake via the skin if there is any prior or simultaneous damage to the skin.

Skin & Eye Irritation / Corrosivity	Chromic acid is corrosive. Severe and persistent eye and skin effects, including ulcers, have been observed in humans following single or repeated exposures.
Skin Sensitisation	Data in humans and standard animal tests show that Cr(VI) compounds are skin sensitisers.
Respiratory Sensitisation	Case reports and evidence from well conducted bronchial challenge tests indicate that inhalation of Cr(VI) compounds can cause occupational asthma.
Repeated Dose Toxicity	With respect to repeated exposure, a large number of studies are available relating to exposure of workers to highly water soluble Cr(VI), specifically sodium or potassium chromate/dichromate and chromic acid. The main effects reported are irritant and corrosive responses in relation to inhalation and dermal exposure. These include inflammation in the lower respiratory tract, and nasal septum perforation in the upper respiratory tract. It is not possible to relate these effects to reliable measures of Cr(VI) exposure. Although in principle a threshold dose should be identifiable, in practice the location of such a threshold is not possible from the data available. Some evidence of kidney damage has also been found among chromate production and chromium plating workers. No exposure-response data or no-effect levels are available. However, it appears that the exposure levels

at which kidney toxicity occurs overlap with the airborne concentrations at which respiratory tract effects have been reported. Only limited animal repeated dose toxicity testing is available and, in general, the effects seen are consistent with those found in humans.

Chronic Toxicity

Mutagenicity

Few studies of genotoxic potential in humans are available. No evidence of genotoxic activity has been found in adequately conducted studies in circulating lymphocytes from chromium exposed workers. In contrast, there is a vast array of genotoxicity data *in vitro* and less extensive testing in animals which clearly indicate that highly water soluble Cr(VI) compounds can produce significant mutagenic activity *in vitro* and *in vivo*. Cr(VI) compounds such as chromic acid are therefore regarded as *in vivo* somatic cell mutagens. In addition, toxicokinetic and dominant lethal data suggest that water soluble Cr(VI) has the potential to be an *in vivo* germ cell mutagen.

Carcinogenicity

Epidemiological studies in the chromate production, chromate pigment and chromium plating industries indicate that long term exposure to dusts and mists containing Cr(VI) compounds is associated with increased risk of respiratory tract cancer in humans.

Cr(VI) trioxide is regarded as a human carcinogen. Evidence from epidemiological studies has shown an excess in lung cancer in workers exposed to Cr(VI) trioxide. However, this excess in lung cancer cannot be related to particular airborne Cr(VI) levels in any reliable manner.

Toxicity to Reproduction

Adverse effects on fertility have been found in studies in mice following repeated oral exposure to highly water soluble Cr(VI) compounds. In addition, adverse effects on the testes have been seen following repeated oral exposure in the rat

12. ECOLOGICAL INFORMATION - Dangerous for the Environment

[15]

Persistence/degradability

Chromium(VI) may react with particulate matter or pollutants to form Cr(III) [10]
Generally, chromium is removed from the atmosphere through wet and dry deposition. The major form of soluble chromium in sea water is Cr(VI).

Hexavalent chromium may remain unchanged or change slowly in many natural waters with low concentrations of reducing/organic matter. The oxidising ability of hexavalent chromium in water increases at lower pH values. Most chromium released in water will ultimately be deposited in the sediment as the hydroxide after being reduced to Cr(III).

Bioaccumulation Potential

Bioaccumulation of chromium from soil to above ground parts of plants is unlikely. [11]

There is no indication of biomagnification of chromium along the terrestrial food chain (soil-plant-animal). [12]

♦Aquatic Toxicity

Fish	96 hr.	LC ₅₀	Colisa fasciatus	20mg Cr/l	[13]
Invertebrates	24 hr.	EC ₅₀	Daphnia magna	0.53 mg Cr/l	[17]
Algae	72hr.	EC ₅₀ (growth rate)	Scenedesmus Subspicatus	0.30 mg Cr/l	[17]

Do not allow to enter into local drains/watercourses/sewers or soil.

Directive 76/464/EEC

Chromium and its compounds are List II substances.

13. DISPOSAL CONSIDERATIONS

This material is special waste. Dispose of via a licensed Waste Contractor to a licensed disposal site. Duty of Care Regulations [Section 34 of the Environmental Protection Act (1990)] and Special Waste Regulations 1996 apply.

Solid	If quantity is substantial, return to supplier or manufacturer. Small quantities should be disposed via a licensed Waste Contractor.
Liquid	Reduce to the trivalent Cr(III) by the methods described under "Accidental Release Measures".
Groundwater Directive	Chromium and its compounds are List II substances.
Contaminated Containers	Can be washed free of chromic acid prior to disposal. Treat washings prior to disposal by the methods described under "Accidental Release Measures".

14. TRANSPORT INFORMATION (Regulations)

Substance	Chromic Acid (Chromium trioxide, anhydrous)
Packaging	50 kg, 25 kg drums, 200 kg drums and IBC's.
Carriage Classification	Oxidising Substance, Corrosive Substance
Substance Identification No.	1463 [UN No. 1463], Packaging Group II
Emergency Action Code	2W
Hazard Identification No.	58
ICAO/IATA Class	5.1 + 8 UN No. 1463, PG II
IMDG Class	5.1 + 8 UN No. 1463, PG II, EMS No. 5.1-05 F-A, S-Q
ADR/RID	Class 5.1 + 8 OC2
Transport Hazard Symbol	



OXIDISING SUBSTANCE



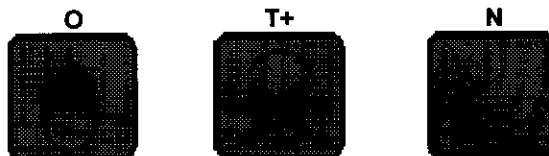
CORROSIVE SUBSTANCE

♦ 15. REGULATORY INFORMATION (Supply & Labelling)

[15]

Substance	Chromic Acid	CAS No. 1333-82-0 EINECS No. 215-607-8
Supply Classification	O - Oxidiser; R9 Carc Cat 1; R45 Muta Cat 2; R46 Repr Cat 3; R62 T+ - Very Toxic; R26 T - Toxic; R24/25-48/23 C - Corrosive; R35 Sensitiser; R42/43 N - Dangerous for the Environment; R50-53	

Hazard Pictogram



Restricted to professional users

[16]

Risk Phrases

- R45 May cause cancer
 R46 May cause heritable genetic damage
 R9 Explosive when mixed with combustible material
 R24/25 Also toxic in contact with skin and if swallowed
 R26 Also very toxic by inhalation
 R35 Causes severe burns
 R42/43 May cause sensitisation by inhalation and skin contact
 R48/23 Also toxic: danger of serious damage to health by prolonged exposure through inhalation
 R62 Possible risk of impaired fertility
 R50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

Safety Phrases

- S53 Avoid exposure - Obtain special instructions before use
 S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)
 S60 This material and its container must be disposed of as hazardous waste
 S61 Avoid release to the environment. Refer to special instructions/safety data sheets

Concentration Limits

C ≥ 25 %: T+, N; R24/25-26-35-42/43-45-46-48/23-50/53-62
 10 % ≤ C < 25 %: T+, N; R21/22-26-35-42/43-45-46-48/23-51/53-62
 7 % ≤ C < 10 %: T+, N; R21/22-26-34-42/43-45-46-48/20-51/53-62
 5 % ≤ C < 10 %: T, N; R21/22-23-34-42/43-45-46-48/20-51/53-62
 3 % ≤ C < 5 %: T, N; R21/22-23-36/37/38-42/43-45-46-48/20-51/53
 2,5 % ≤ C < 3 %: T, N; R23-36/37/38-42/43-45-46-48/20-51/53
 1 % ≤ C < 2,5 %: T; R23-36/37/38-42/43-45-46-48/20-52/53
 0,25 % ≤ C < 1 %: T; R20-45-46-52/53
 0,1 % ≤ C < 0,25 %: T; R20-45-46

<u>OCCUPATIONAL EXPOSURE REQUIREMENTS</u>	<u>Country</u>		<u>Type</u>	<u>8 hr. TWA</u>
	UK	HSE	WEL	0.05 mg Cr/m ³
	DE	MAK	TRK	0.05 mg Cr/m ³
	USA	ACGIH	TLV	0.05 mg Cr/m ³
	USA	OSHA	PEL	0.10 mg CrO ₃ (Ceiling)

Directive 76/464/EEC
 Groundwater Directive

Chromium and its compounds are List II substances.
 Chromium and its compounds are List II substances.

♦ 16. OTHER INFORMATION**RELEVANT REGULATIONS AND DOCUMENTS**

The Chemical (Hazard Information and Packaging For Supply) Regulations (revised regularly).
 The Carriage of Dangerous Goods by Road Regulations.
 The Carriage of Dangerous Goods by Rail Regulations.
 International Maritime Dangerous Goods Code.
 Carriage of Dangerous Goods and use of Transportable Pressure Equipment Regulations.
 Control of Substances Hazardous to Health Regulations.
 Environmental Protection Act.
 Duty of Care Regulations (Section 34 of EP Act).
 Special Waste Regulations.

- ♦ 29th ATP to EC Directive 67/548/EEC.
EC Directive 2001/58/EC – Safety Data Sheets
Control of Major Accident Hazards Regulations.
EH 40. Occupational Exposure Limits (revised annually).
HSE Guidance Note EH2 (Rev) - Chromium and its Inorganic Compounds.
"Chromium and You" - HSE Guidance; MS(A)16 (free issue).
Approved Supply List.
Approved Guide to the Classification and Labelling of substance and preparations dangerous for supply.

OTHER INFORMATION

Additional advice on specific questions can be obtained from Elementis Chromium, Eaglescliffe.

This information is provided to enable customers to assess the health and safety requirements of products. Whilst it is given in good faith, and is believed to be accurate, Elementis Chromium cannot accept responsibility for loss or damage arising from use, or reliance upon this information.

The above information complies with Regulation 5 of The Chemicals (Hazard Information and Packaging for Supply) Regulations - revised regularly.

A ♦ in the left hand margin indicates an amendment/addition to the previous version.

REFERENCES

- [1] Correspondence with National Poisons Information Service (Birmingham Centre) 11.9.93.
- [2] Control of Substances Hazardous to Health General ACOP L5 (revised annually).
- [3] The selection, use and maintenance of respiratory protective equipment; HSE publication HS(G)53.
- [4] Personal Protective Equipment at Work. HSE publication - Guidance on Regulations; L25.
- [5] Ricerca Inc. Document No. 1628-87-0071, April 21 (1989).
- [6] Biodynamics Report - Project No. 87-8039, July 6 (1989).
- [7] Ricerca Inc. Document No. 1628-87-0072, April 21 (1989).
- [8] Inveresk Research International, IRI Project No. 230154, Report No. 2606, June (1983).
- ♦[9] Existing Substances Regulation EC 793/93 Summary Assessment report for chromium trioxide, sodium chromate, sodium dichromate, ammonium dichromate and potassium dichromate.
- [10] ATSDR, Toxicological Profile for Chromium, April 1993.
- [11] Petruzzelli G. et al, Water Air Soil Pollut. 32, 389-395 (1987).
- [12] Cary E E, Langards S, ed. Elsevier Science Publ. 49-64 (1982).
- [13] Srivastava A K, et al., Ecotoxicol. Environ. Safety, 3, 321-324 (1979).
- [14] Determination of the toxic effect on bacteria in wastewaters. Dev.L8 (modified). Untersuchungen Bayer AG.
- ♦[15] 29th A.T.P. to EC Directive 67/548/EEC.
- [16] The Chemicals (Hazard Information and Packaging for Supply) Regulations - revised regularly.
- ♦[17] EEC (1992) Acute Toxicity for Daphnia and C3 Algal inhibition test. Official journal of the European Communities No. L383/A3, 29/12/92.
This data is for potassium dichromate. European Union Risk Assessment report for chromium trioxide, sodium chromate, sodium dichromate, ammonium dichromate, potassium dichromate, indicates that there are no significant differences in aquatic toxicity for these substances.