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CHROMITE ORE HAZARD CLASSIFICATION

Main constituents

Principally a solid solution of oxides of aluminium, chromium, iron(divalent and trivalent) and magnesium in a spinel structure with general formula $Fe^{II}Mg(Al\ Cr\ Fe^{III})_2O_4$. Some sources of chromite ore also contain gibbsite$(AlCrFe)_2O_3$.

None of the individual constituent oxides or end-members of the system($FeCr_2O_4$, $FeFe_2O_4(Fe_3O_4)$, $FeAl_2O_4$, $MgAl_2O_4$, $MgCr_2O_4$,$MgFe_2O_4$) was classified as hazardous via Annex I of the EU Dangerous Substances Directive 67/548.

The information shown in the registered substances section of the ECHA website indicates that Al_2O_3,Cr_2O_3, FeO, Fe_2O_3, Fe_3O_4, $FeCr_2O_4$ and $MgAl_2O_4$ are not classified as hazardous but some notification entries in the CLP inventory on the same website are not consistent with dossier classifications. There is no registered substance entry for magnesium oxide but the entry for the hydroxide indicates no classification. There are no registered substance entries for the remaining system end-members listed above.
It is reasonable to conclude on the basis of these data that chromite ore should not be classified under GHS on the basis of its main constituents.

It is important to note the each entry on the registered substances list contains the following warning:"Use of this information subject to copyright-may require permission of the owner of the information".

Impurities

Chromite concentrates normally contain >1% silica equivalent usually in a mineral such as olivine, not classified as hazardous, and elements such as cobalt, manganese, nickel and vanadium which are included within the spinel structure.

Some forms of crystalline silica are classified as carcinogenic because of the crystal shape rather that bioavailability.

Of the metallic element impurities, cobalt and nickel present a potential problem because both are present in an oxidised state but are incorporated into the spinel matrix. Of greatest significance is evidence relating to either a genotoxic or carcinogenic classification that would bring a generic hazard concentration threshold of 0.1%.

Cobalt Oxide

Reports on the carcinogenicity of cobalt oxide are inconsistent:

- Registered substance section of the ECHA website has two entries: one indicates data lacking for both genotoxicity and carcinogenicity; the entry for classification via Regulation 1272/2008(CPL) indicates that evidence is conclusive but insufficient for classification for the same endpoints.
- IARC considers that: “There is sufficient evidence for the carcinogenicity of cobalt(II) oxide in experimental animals.”The same conclusion is applied to cobalt metal.

Nickel Oxide

Already classified as carcinogenic.

Possible actions

1. Classify as non hazardous based on the available animal cancer study data but do nothing more to defend against any challenge by regulators or others based on content of silica and/or nickel oxide and probably cobalt oxide in the future. This option is not recommended as it is not that of a responsible industry and would be unlikely to be secure in the event of a challenge.

2. Check representative samples of ore for the presence of detectable amounts of carcinogenic forms of silica and for the bioaccessibility of cobalt and nickel to support the animal evidence. Recommended that data from such a programme be subjected to competent independent assessment. It is essential to document all of the relevant evidence and data.