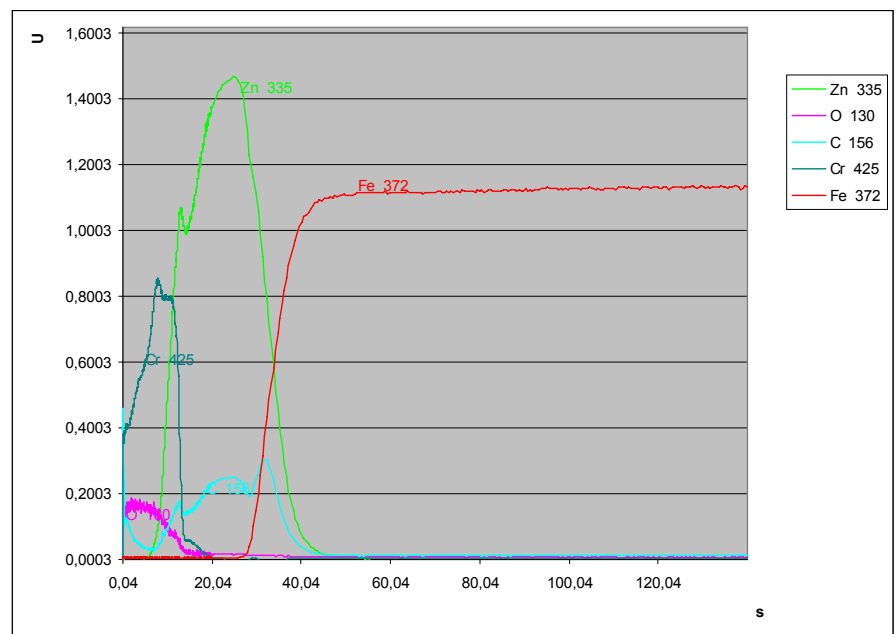


# Speciation of Cr in GD

Chromium oxides are a powerful means for passivation or pre-treatment of commercial metal surfaces, such as galvanized steel. The treatment forms a thin layer of mixed  $\text{Cr}^{3+}$  and  $\text{Cr}^{6+}$  oxides on the metal surface. The  $\text{Cr}^{3+}$  oxide acts as a barrier film

and the  $\text{Cr}^{6+}$  oxide as a sacrificial film. Unfortunately the sacrificial nature of  $\text{Cr}^{6+}$  makes it a health risk to humans and so its level must be carefully controlled. It is therefore not sufficient to measure the total amount of Cr on the surface, it is also necessary to know the  $\text{Cr}^{6+}$  to  $\text{Cr}^{3+}$

Analysis of a chromated sample



The current norms tolerate a minimum level of  $\text{Cr}^{6+}$  and the plans are to ban completely the  $\text{Cr}^{6+}$  from all treatments.

$\text{Cr}^{6+}$  is predominantly  $\text{CrO}_3 + \text{CrOOH}$  while  $\text{Cr}^{3+}$  is  $\text{Cr}_2\text{O}_3$ . The atomic ratio of O/Cr is therefore 2.5 in  $\text{Cr}^{6+}$  and 1.5 in  $\text{Cr}^{3+}$ .

Since GD-OES is capable of measuring O/Cr atomic ratios, GD-OES can therefore be used to estimate  $\text{Cr}^{6+}$  to  $\text{Cr}^{3+}$  ratios on surfaces and is a quick way to estimate if  $\text{Cr}^{6+}$  is present or not.

*Key points: though giving atomic information GD can help on molecular or speciation issues.*