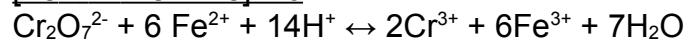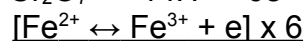# Ω Metrohm

Thermo. Titr. Application Note No. H-107

Title:	Determination of Ferrous Ion in Hydrometallurgical Leach Liquors

Scope:	Determination of the ferrous ion content of hydrometallurgical leach liquors

Principle:	A measured amount of acidic hydrometallurgical leach liquor is further acidified with sulfuric acid, prior to being titrated with standard potassium dichromate solution to an exothermic endpoint.

$$Cr_2O_7^{2-} + 14H^+ + 6e \leftrightarrow 2Cr^{3+} + 7H_2O$$
$$\underline{[Fe^{2+} \leftrightarrow Fe^{3+} + e] \times 6}$$
$$Cr_2O_7^{2-} + 6 Fe^{2+} + 14H^+ \leftrightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$$

Thus, 1 mol $K_2Cr_2O_7 \equiv 6$ mol Fe^{2+}

Reagents:	*Titrant:* Standard potassium dichromate solution $c(K_2Cr_2O_7) = 0.1$ mol/L *Acid:* ~25% v/v sulfuric acid

Method:	*Basic Experimental Parameters:*

Titrant delivery rate (mL/min.)	4
No. of endothermic endpoints	1
Data smoothing factor (DSF)	50
Stirring speed (802 stirrer)	8
Delay before start of titration (secs.)	10

Basic titration procedure.
A 15mL aliquot of acidic process liquor is pipetted by volumetric glass pipette into a PP titration tube, and 5mL 25% v/v H_2SO_4 solution plus 10mL DI water added. The sample solution is swirled to mix prior to being placed in the sample rack.
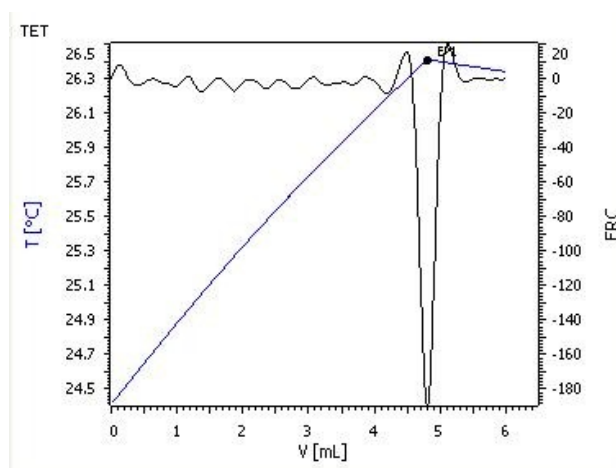
Example:	*Acidic hydrometallurgical leach liquor, containing Fe(II), Fe(III)), Mg, Al, Mn, Cr, Cu, Co and Ca.*

	Fe(II) = 10.66±0.02 g/L (n=5)

Calculation:

Fe, g/L = $\dfrac{((\text{EP vol., mL} - \text{Blank, mL}) \times c(K_2Cr_2O_7)\ \text{mol/L} \times AW\ Fe \times 6)}{\text{Sample vol., mL}}$

Titration Plot:

Fig.1. Titration of Fe(II) in test sample with 0.1 mol/L $K_2Cr_2O_7$

Legend:
Blue curve = solution temperature
Black curve = second derivative (ERC)