NR	739
Date:	26-May-04

Application Data Sheet

Hydrochloric acid, Iron(II) & Iron(III)

Matrix

Etching bath.

Principle

Iron(II) is determined by titration with potassium dichromate in sulfuric acid medium.
6 Fe2+ + 14 H+ + (Cr2O7)2- ==> 6 Fe3+ + 7 H2O + 2 Cr3+

Iron(III) is determined by titration with EDTA.
Fe3+ + (H2Y)2- ==> FeY- + 2 H+

HCl is determined by titration with sodium carbonate.
2 HCl + Na2CO3 ==> 2 NaCl + H2O + CO2

Detection method

	Method:	Detector	Ion:	λ:
Fe2+	Titration - Redox	Pt electrode	n.a.	n.a.
Fe3+	Titration - Complexometric	Pt electrode	n.a.	n.a.
HCl	Titration - Acid/base	pH Glass electrode	n.a.	n.a.

Specification

	Range	Standard Dev.	Repeatability	Inaccuracy	Analysis time
Fe2+	10 - 200 g/l	< 1 g/l	+/- < 3 g/l	+/- < 3 g/l	30 minutes
Fe3+	1 - 20 g/l	< 0.1 g/l	+/- < 0.3 g/l	+/- < 0.3 g/l	in total
HCl	15 - 250 g/l	< 1.4 g/l	+/- < 4 g/l	+/- < 4 g/l	

Interferences

Other acids and metals.

Reagents

H2SO4 (2 M) — 10 ml per analysis
K2Cr2O7 (0.03 M)
EDTA (0.02 M)
Na2CO3 (0.2 M)

Procedure

- clean the analysis vessel with water
- take 0.5 ml of filtered sample and transfer to the analysis vessel with 10 ml of water
- add H2SO4 solution
- perform inflection point titration with K2Cr2O7
- clean the analysis vessel with water
- take 0.5 ml of sample and transfer to the analysis vessel with 15 ml of water
- perform endpoint titration with H2SO4 to pH 1.0
- perform inflection point titration with EDTA
- perform inflection point titration with Na2CO3
- calculate results

Remarks

Sample filtration is needed to prevent clogging of the sample loop valve.

Possible Analyzer

- [x] 2040
- [ ] 2016
- [ ] 2018 HD
- [ ] 2019 HD
- [ ] 2019 Special
- [ ] 2003 Alert
- [ ] 2004 Alert

Typical Wet Part layout

(Other layouts may be realised in order to meet desired criteria, e.g measuring range.)