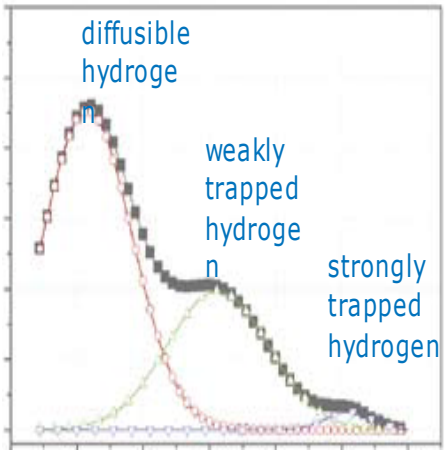
原理图解

什么是扩散氢？



金属中氢的存在形式:

- 扩散氢
  存在于晶格中，可自由移动
- 残余氢
  被捕获的分子氢，不可自由移动
- 键合氢
  形成稳定化学键的氢化合物

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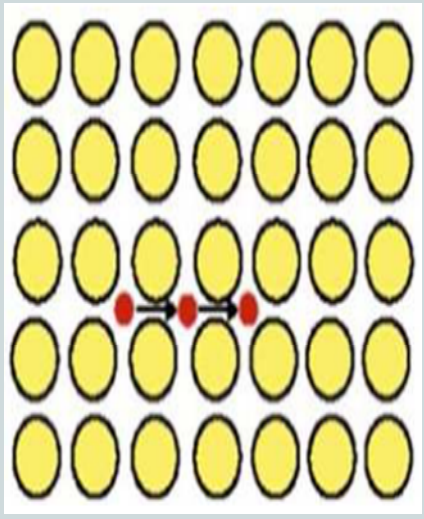
May 19, 2012 22

扩散氢的危害



扩散氢特点

- 氢是元素周期表中最小的原子
- 氢原子很容易进入金属并在晶格中移动
- 氢原子可以在一些晶格缺陷中重新化合为氢气分子
- 这种现象导致氢脆

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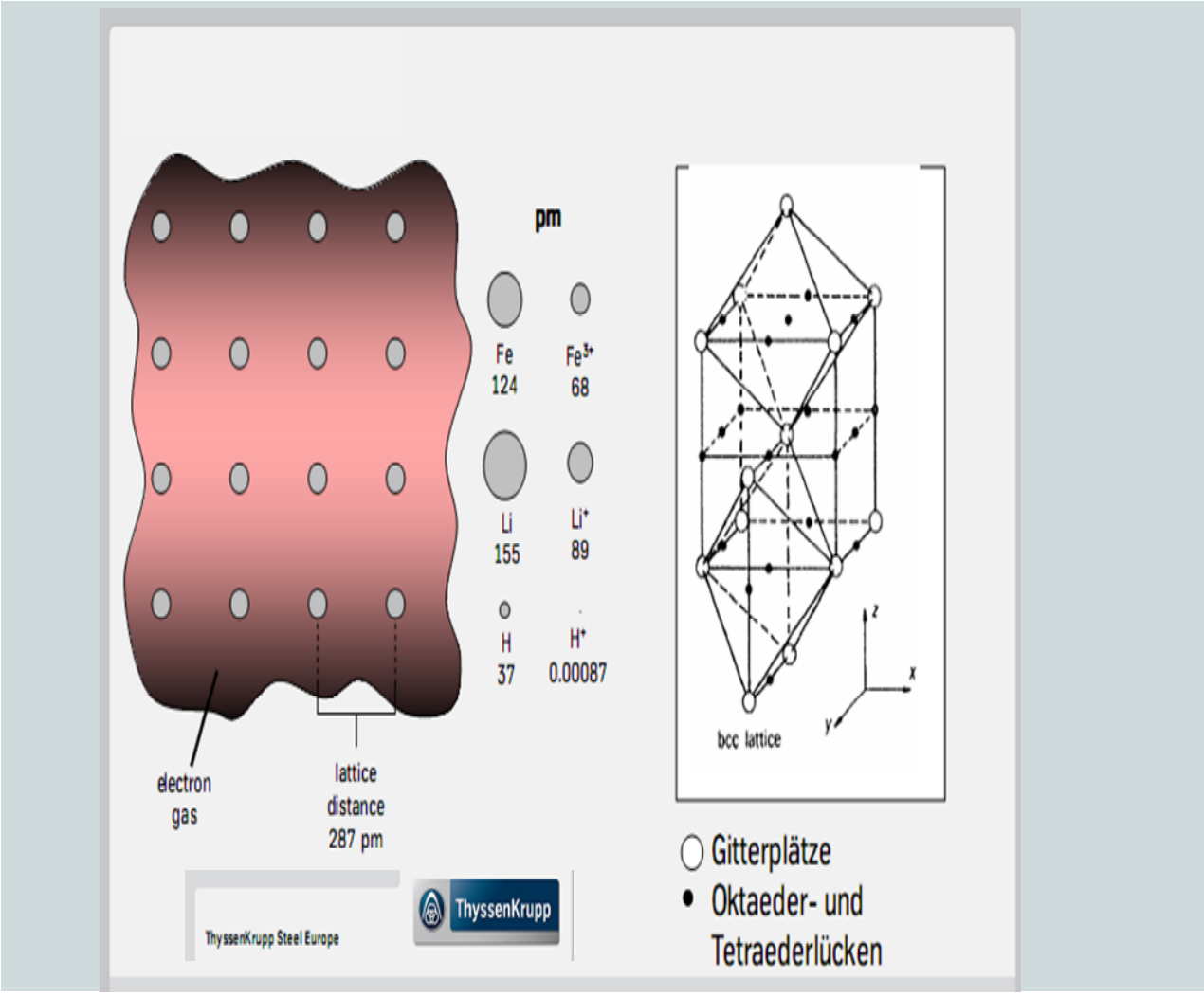
钢铁中的扩散氢



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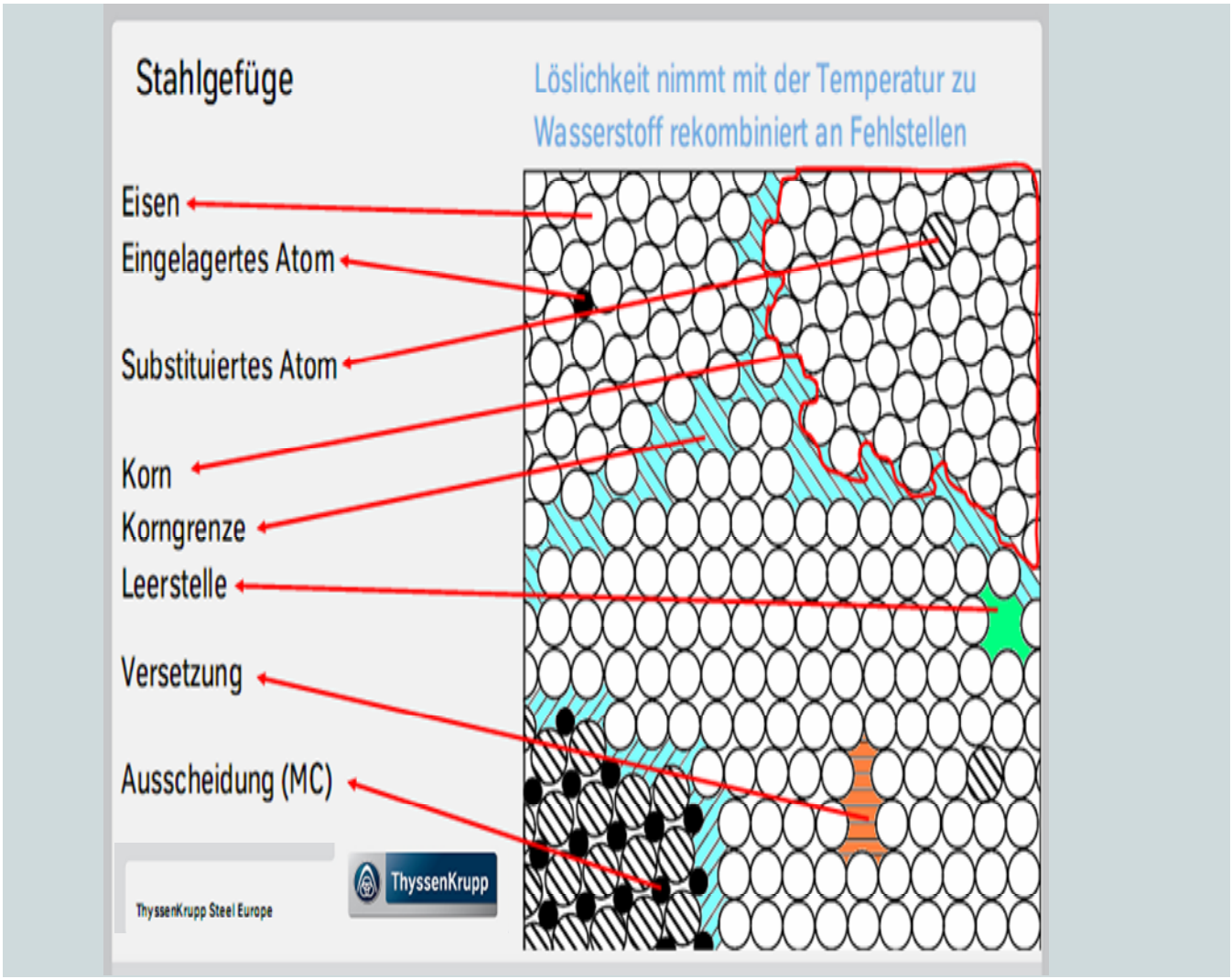
钢铁中的扩散氢



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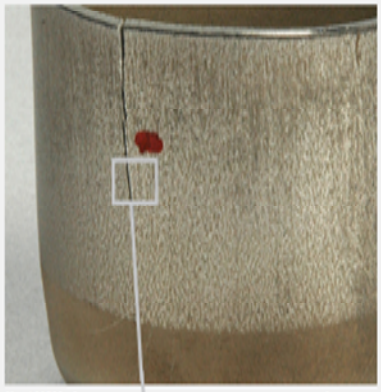
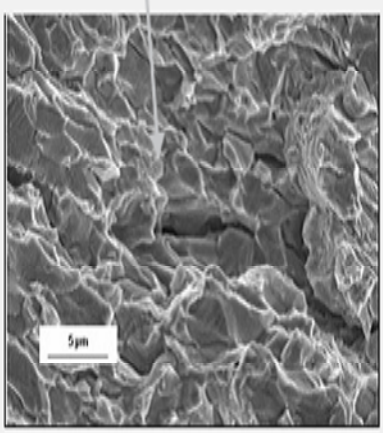
钢铁中的扩散氢

高强度钢中由扩散氢引起的延迟裂缝





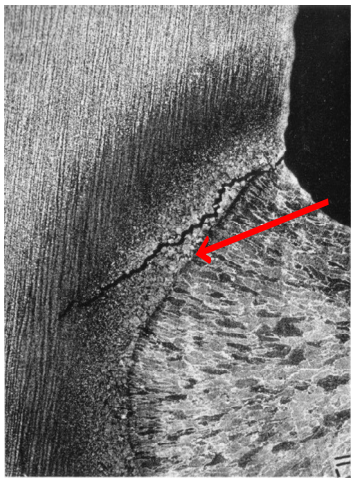
- Hydrogen induced delayed crack formation/fracture
- Intercrystalline fracture

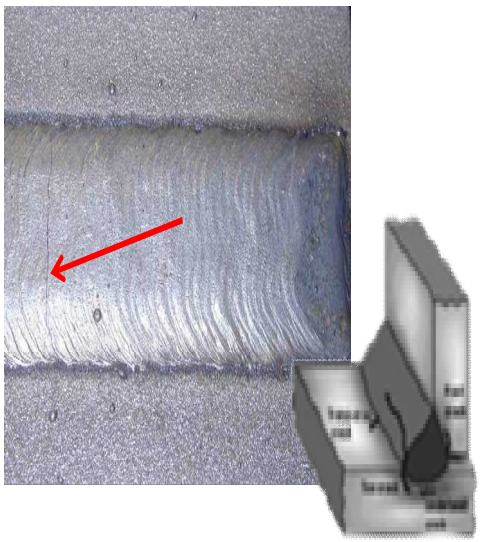
ThyssenKrupp Steel Europe

ThyssenKrupp

Bruker Elemental

焊缝中的扩散氢





焊缝中由于扩散氢的存在而导致的延迟裂缝，

扩散氢的主要来源

- 焊接填充填充材料
- 周围大气中的水湿气
- 添加物
- 冷凝在焊接部位的水

G4 PHOENIX DH
扩散氢分析仪

分析原理:

- 热萃取，惰性气体载气方法，热导检测器
- 将被测样品在样品管中加热
- 加热炉:
  - 红外炉，最高 900°C
  - 管式炉，最高 1100°C
- 氢气被释放出通过载气进入检测器检测
- 通过积分面积计算扩散氢含量

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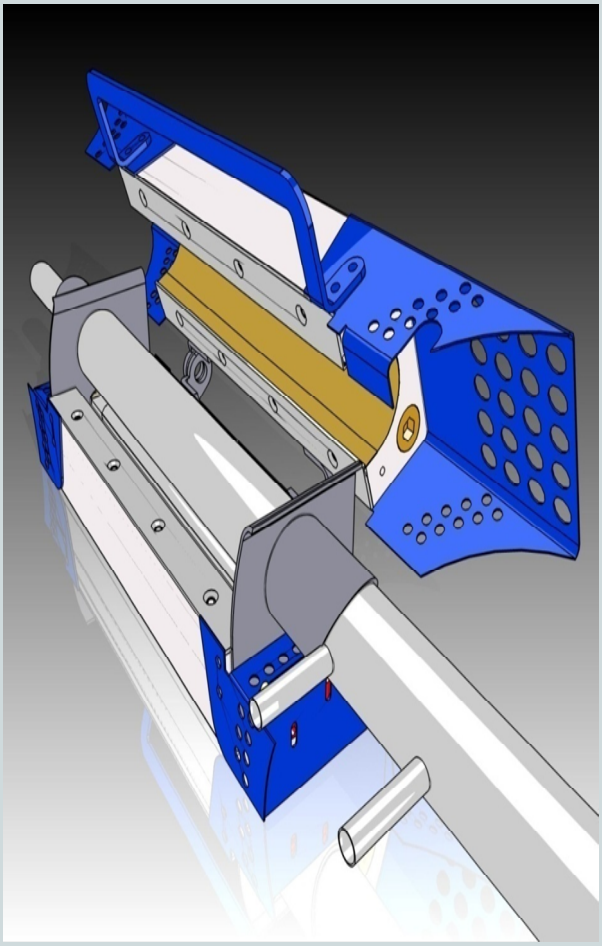
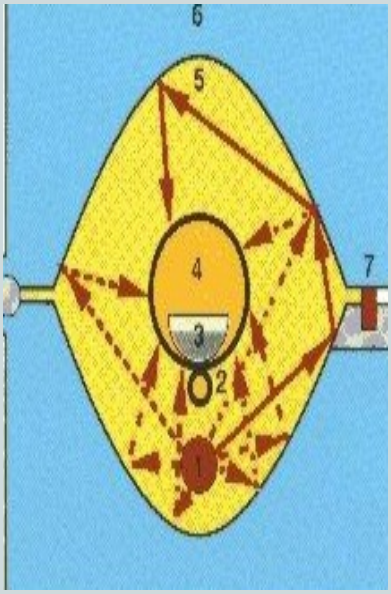
G4 PHOENIX DH
红外炉





1 Infrared Radiator
2 Thermocouple
3 Sample
4 Quartz Tube
5 Elliptical Reflector
6 Furnace Body
7 Safety Switch

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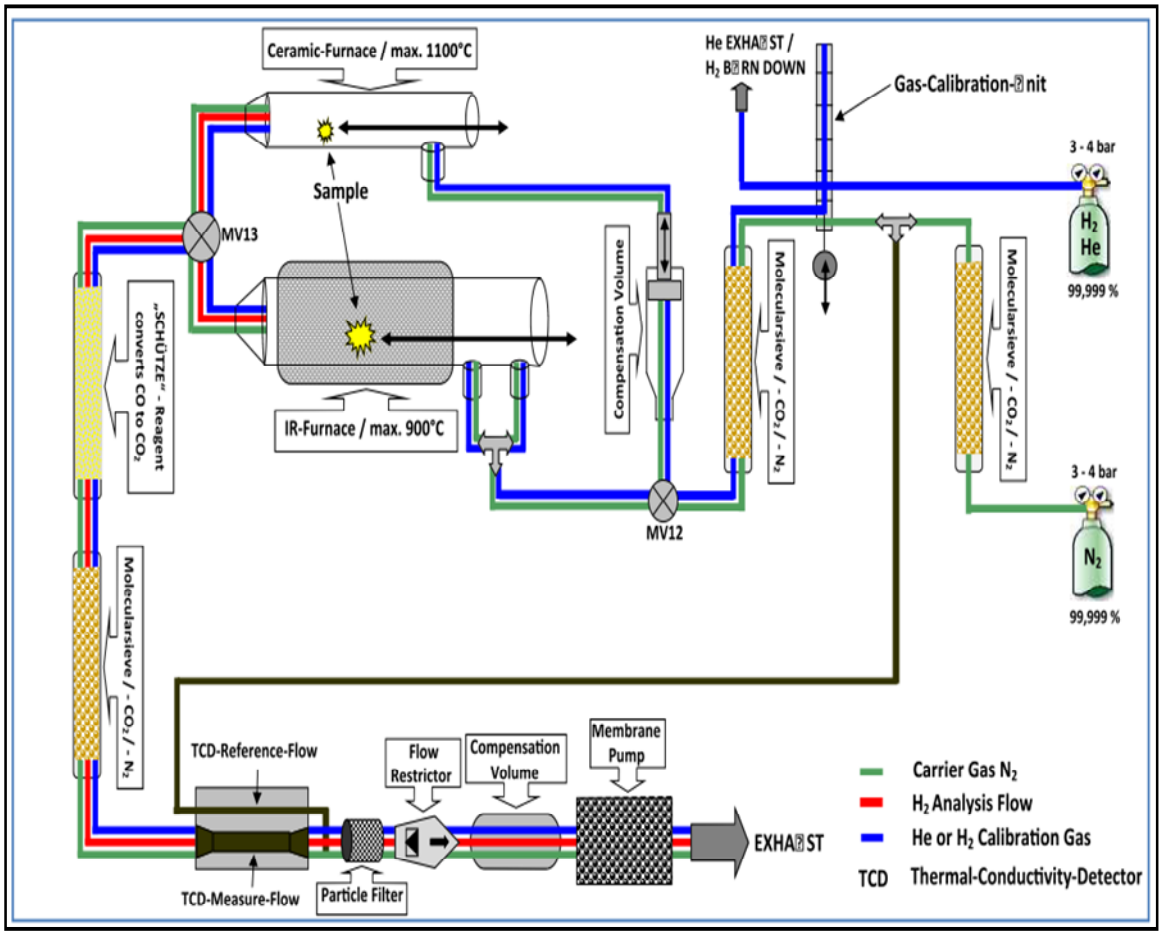
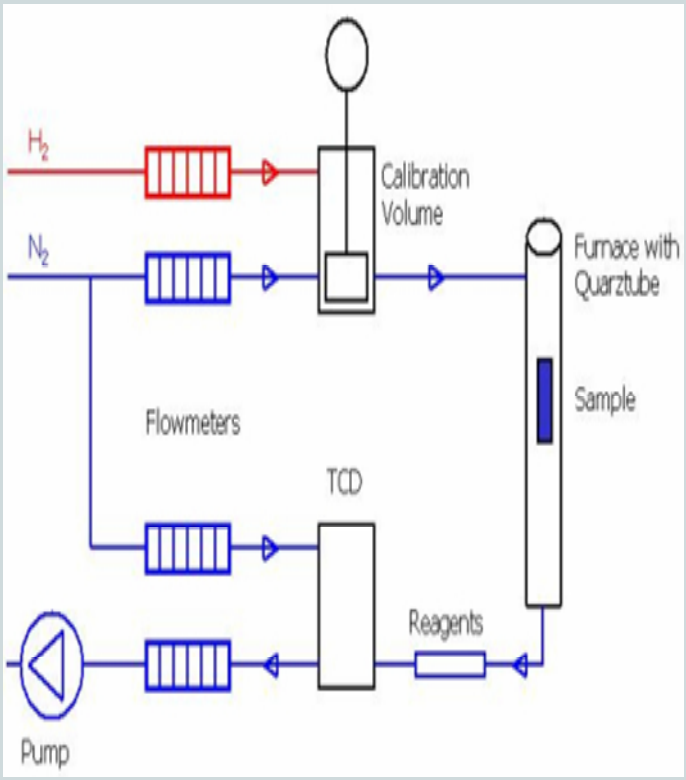
G4 PHOENIX DH

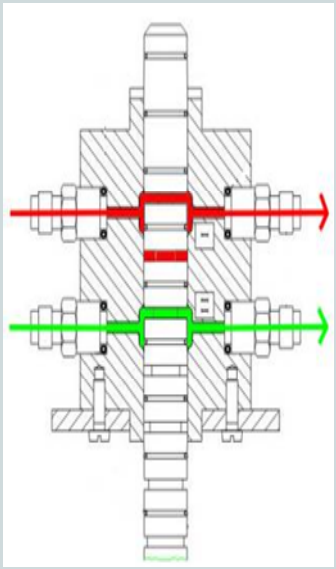
Gas flow



G4 PHOENIX DH

气标校准(10种体积)





Volume 1:	0.03488	Volume 6:	0.42338
Volume 2:	0.07997	Volume 7:	0.50427
Volume 3:	0.16358	Volume 8:	0.59202
Volume 4:	0.24364	Volume 9:	0.66760
Volume 5:	0.32641	Volume 10:	0.75912

Volumes in ml

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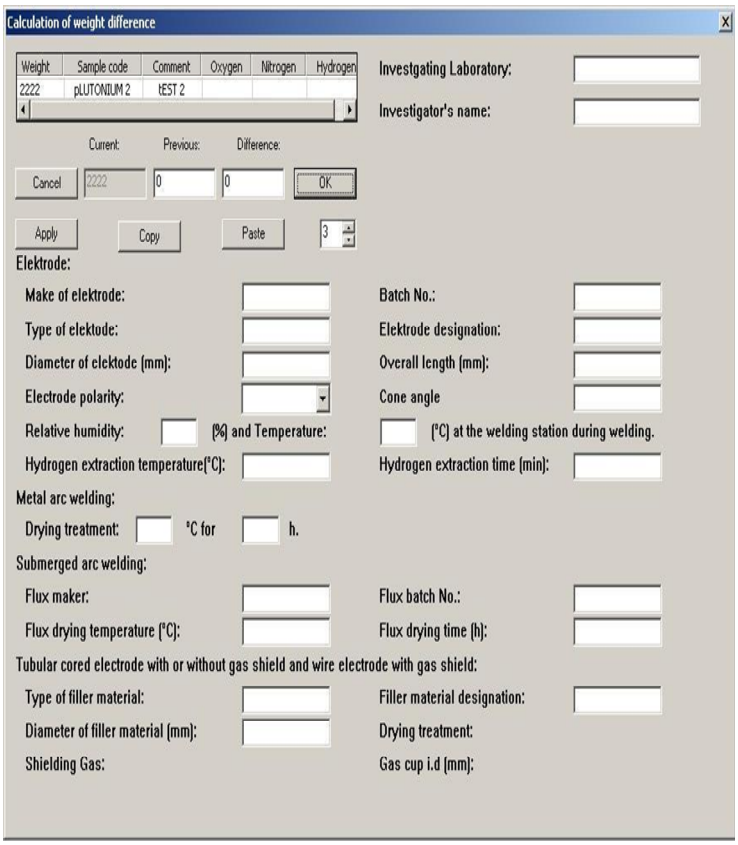
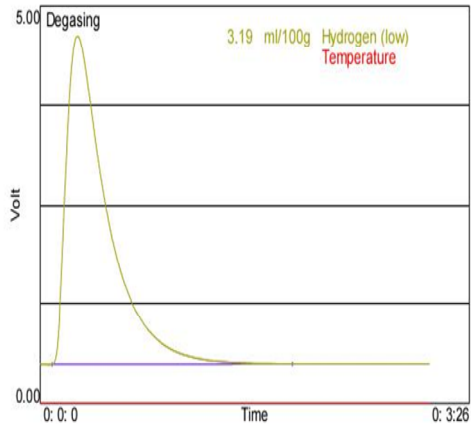
G4 PHOENIX DH

分析报告——符合ISO3690及AWS A4.3





Sample code :	OS81NI1-H
Comment :	251
Time :	13:42:02
Date :	16.05.2006
Weight incl. unit :	5.9443 g
Hydrogen (low)	
Result :	3.1928 ml/100g
Factor :	1743
Blindvalue :	0
Investgating Laboratory: :	Company Name
Investigator's name: :	-
Make of elektrode: :	-
Batch No.: :	-
Type of elektode: :	-
Elektrode designation: :	-
Diameter of elektode (mm): :	-
Overall length (mm): :	-
Electrode polarity: :	d.c. +ve
Cone angle :	-
Relative humidity during welding (%)::	20
Temperature during welding (%)::	-
Hydrogen extraction temperature(° C)::	-
Blindvalue :	

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