

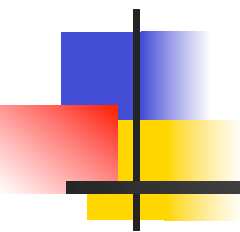


得利環球有限公司

C.K. YEUNG WORLDWIDE LIMITED

香港, 港灣道18號, 中環廣場5401室

Suite 5401, Central Plaza, No.18 Harbour Road, HONG KONG



The Metal Analysis in Alloy & Metal
Samples by ICP-OES & AAS Instrument,
Set up and Lab Preparation (检测金属:
ICP-OES和AAS设备以及实验室准备)

得利環球有限公司 C.K. Yeung Worldwide Ltd. Tel: 2802-3322 Fax: 2802 8988

Email: joseph@ckyeung.com



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Suite 5401, Central Plaza, No.18 Harbour Road, HONG KONG

We delivers customer growth & productivity ...

\$1.7B Revenue

10,700 employees

Operating in 125 countries

Member S&P 500 Index

Division : Life & Analytical Science

Division: Opto-Electronics

Global technology leader providing products and services to customers in health sciences and other advanced technology markets that require innovation, precision and reliability

FROST & SULLIVAN

PerkinElmer, Inc.

Analytical Instrumentation Company of the Year

2003

PerkinElmer AcycloPrime-FP SNP Detection System Named 'Product of the Year' by Genome Technology Magazine

BOSTON, Oct 7, 2002 (BUSINESS WIRE) -- PerkinElmer, Inc. (NYSE: PKI), a leading provider of drug discovery, life science research and genetic disease screening solutions, was selected for "Product of the Year" honors for its AcycloPrime(TM)-FP SNP Detection System by readers of Genome Technology magazine, an independent provider of news and information covering the business and technology of genomics, proteomics, and bioinformatics. PerkinElmer was also a finalist in the "Company of the Year" category. The Company was honored and presented a trophy at a ceremony recognizing the 2002 Genome Technology Leaders at The Institute for Genomics and Bioinformatics, held in Boston.

FROST & SULLIVAN

PerkinElmer, Inc.

Customer Value Enhancement Award



2003

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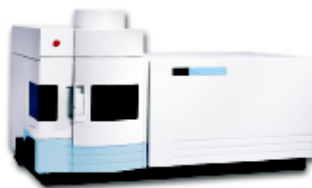
Email through@innovation,precisionandreliability.com

Analytical Science: 化学实验室全面解决方案

原子光谱



AAAnalyst™ 200 AA



Optima™ Series ICP-OES



ELAN® 9000 ICP-MS



Multiwave™ 3000
Sample Digestion

色谱



Clarus™ 500
Gas Chromatograph



Clarus™ 500
GC/MS



TotalChrom® LC Plus HPLC



TotalChrom®
Data Stations

分子光谱



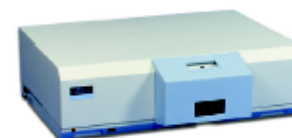
Lambda™ Series UV



Spotlight
FT-IR Imaging



Spectrum™ One
FT-IR



LS 55 Fluorescence



Diamond™ DSC
with HyperDSC™



Diamond™ TG/DTA



Diamond™ DMA

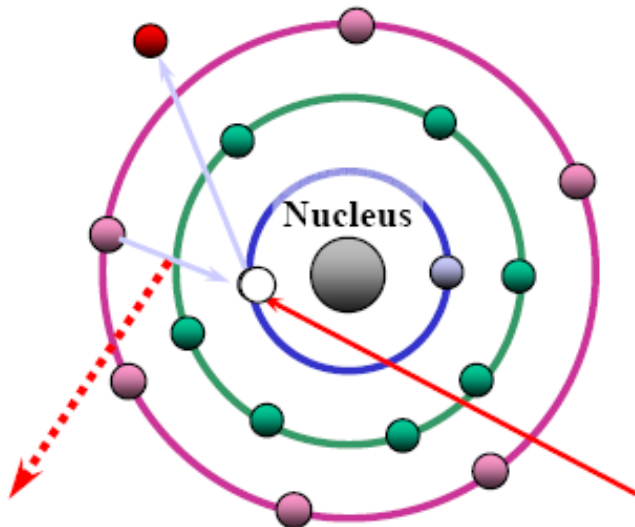


2400 Series II
CHNS/O

热分析和元素分析

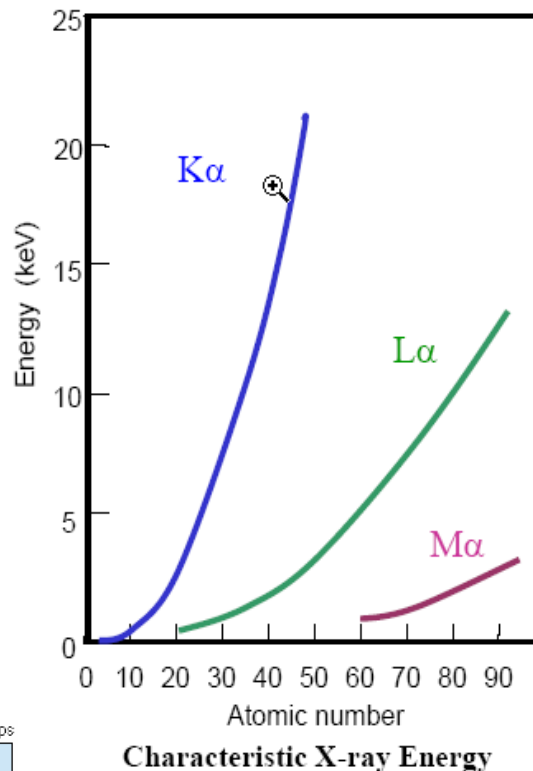
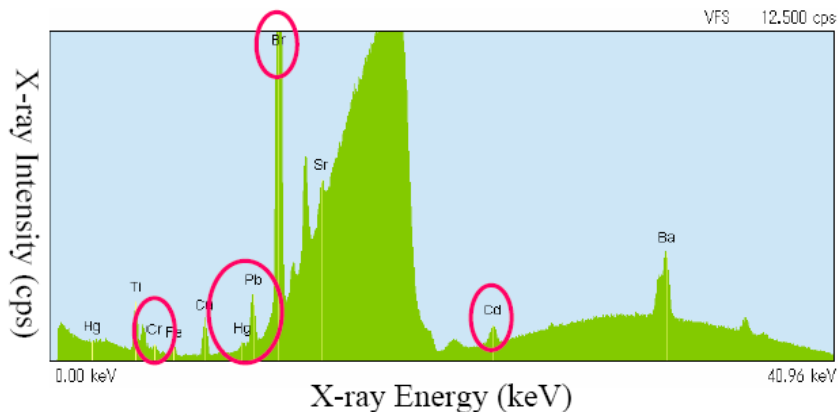
XRF 原理說明

Ejected electron Valence electrons



Fluorescent X-ray

Primary X-ray



X-ray Energy (keV) → Element
 X-ray Intensity (cps) → Concentration

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Why EDXRF is a popular tool in metal analysis ?

- Fast (real time information display), easy to operation
- Excellent screening tool for metals; 1.0 – xx%
- Non-destructive sample pre-treatment
- Low maintenance

XRF 之分析方法 *Disadvantage*

➤ Measurement time 1,800 sec.

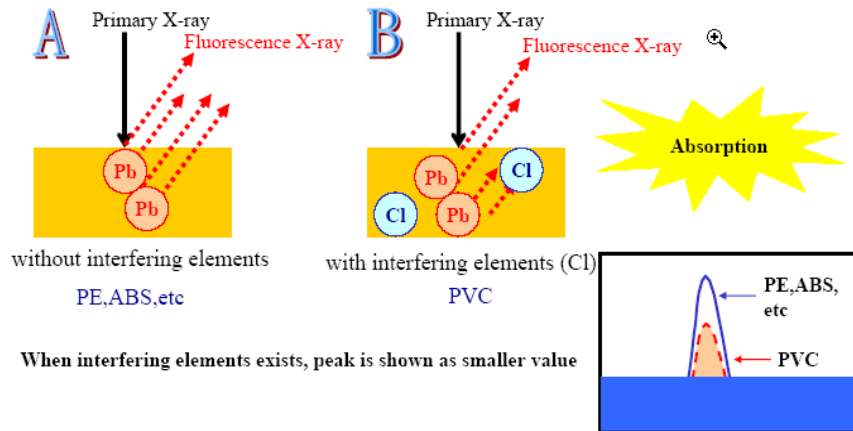
- Detection limit Pb, Cd, Br and Hg : 2 ppb
- Cr : 5 ppm

➤ Measurement time 100 sec.

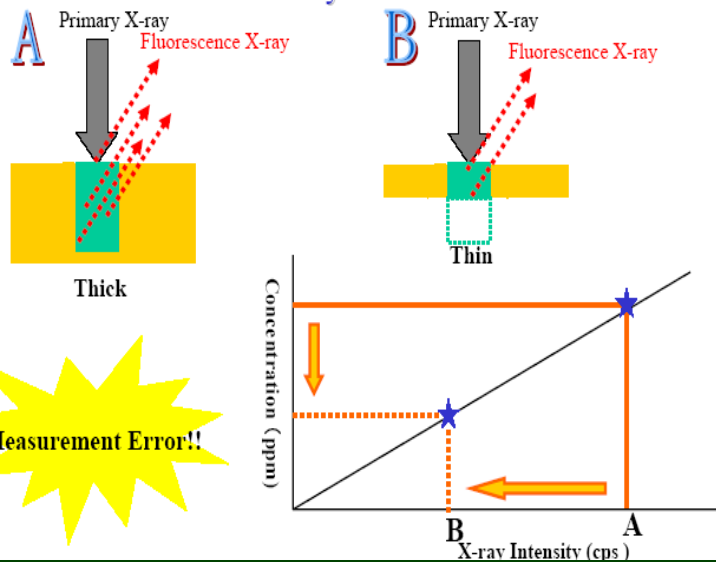
- Detection limit Pb : 36 ppm
- Cd : 20 ppm
- Br and Hg : 40 ppm
- Cr : Approx. 100 ppm

Sample: PVC

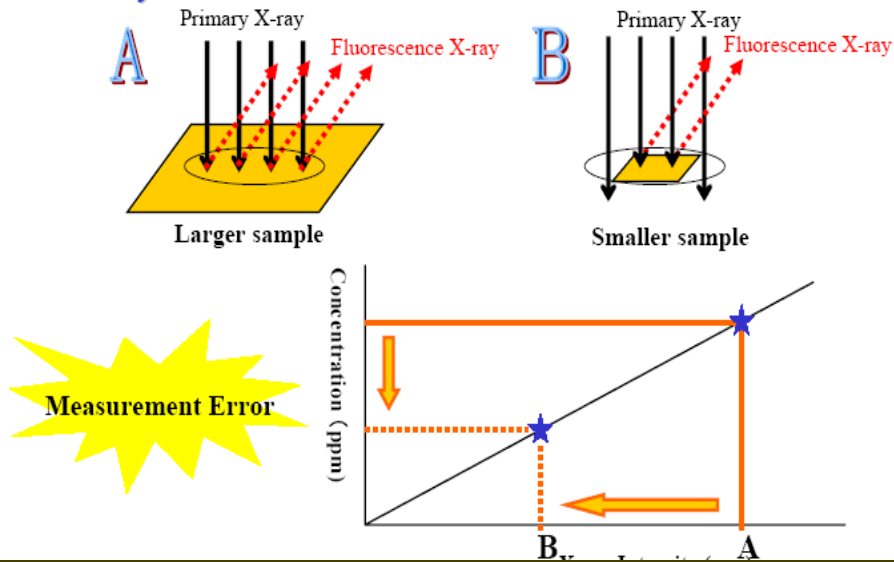
■ Absorption of Cl



➤ Excitation volume of X-rays



➤ X-ray irradiation area



XRF 之分析方法



SECURITY GRADE
CLASS B

MANUAL FOR MEASUREMENT OF Cd AND Pb
BY NITON XRF (XL-700 SERIES) ANALYZER

Cd, Pb の XRF による測定マニュアル
— Niton 社製 (XL-700 シリーズ) —

STM-0082

SECOND EDITION

ESTABLISHED 2002-04-29
REVISED 2003-02-28

松下电器集团

化学物质管理等级准则

第三版 (产品版)

I. 铅, 镉及其化合物

(1) 筛别分析

荧光X射线分析



通过把试料进行切断, 粉碎等简单的前处理, 采取所定的体积, 重量的试料, 导入分析装置, 可以简易地进行铅及镉的有无含有及含有程度的分析。适于树脂, 橡胶, 金属, 玻璃, 陶瓷等的构件的分析。

利用装置内装的半定量分析软件 (基础参数法), 定量分析软件 (检量线法) 测定含有量。

分析装置

能量分散型荧光X射线分析装置

(2) 定量分析 (正确判定含有量)

ICP发光光谱分析

作为前处理, 进行把试料在硫酸, 硝酸, 盐酸, 氢氟酸, 过氧化氢酸等的存在下的湿式分解 (包含加压分解), 在硫酸存在下的灰化分解, 利用氧等离子照射的低温灰化分解, 调制溶液试料。产生沉淀物时通过氟酸分解, 碱熔融分解等把沉淀物再溶解, 溶液化, 以供分析。把调制成的溶液试料导入ICP发光光谱分析装置, 由利用标准溶液所制定的检量线, 测定溶液试料中的铅, 镉的浓度, 换算为固体试料中的铅, 镉含有量。

还有, 亦可把固体试料直接导入分析装置, 利用可以作定量分析的无焰原子吸光分析。

分析装置

装置以ICP发光光谱分析装置 (ICP-OES) 为基本, 但亦可使用具有同等或同等以上性能的ICP质谱分析装置 (ICP-MS), 原子吸光分析装置 (ASS, FLAAS)。



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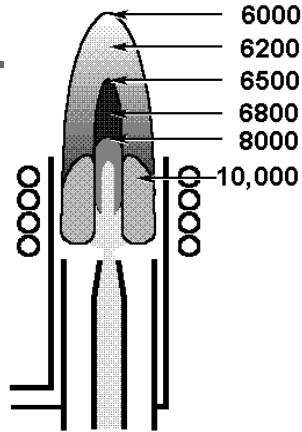
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ICP-OES (电感耦合等离子体发射光谱仪)



Temperature (K) $\pm 10\%$



Absorption (ν_a)

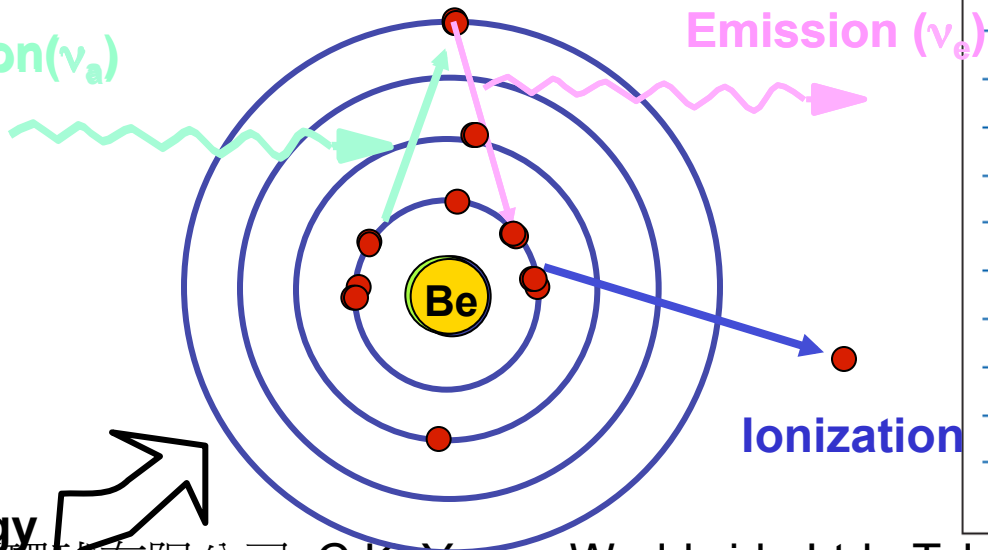


Table 1. Typical Optima 2100 DV detection limits in $\mu\text{g/L}$ (ppb) based on three standard deviations. All values were obtained using axial viewing, a GemCone nebulizer and cyclonic spray chamber, and a 10-second integration.

Element	Wavelength (nm)	D.L.
Al	396.152	0.9
As	193.696	3.6
B	249.772	0.25
Be	313.107	0.017
Cd	214.440	0.07
Co	238.892	0.25
Cr	267.716	0.25
Cu	224.700	0.9
Fe	259.939	0.2
Mn	257.610	0.03
Mo	202.031	2
Ni	231.604	0.4
Pb	220.353	1.4
Sb	206.836	4
Se	196.026	4.5
Tl	190.801	3.5
V	309.310	0.15
Zn	206.200	0.2

Energy

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2007/0523

Optima 5300 DV & Optima 2100DV Outlook



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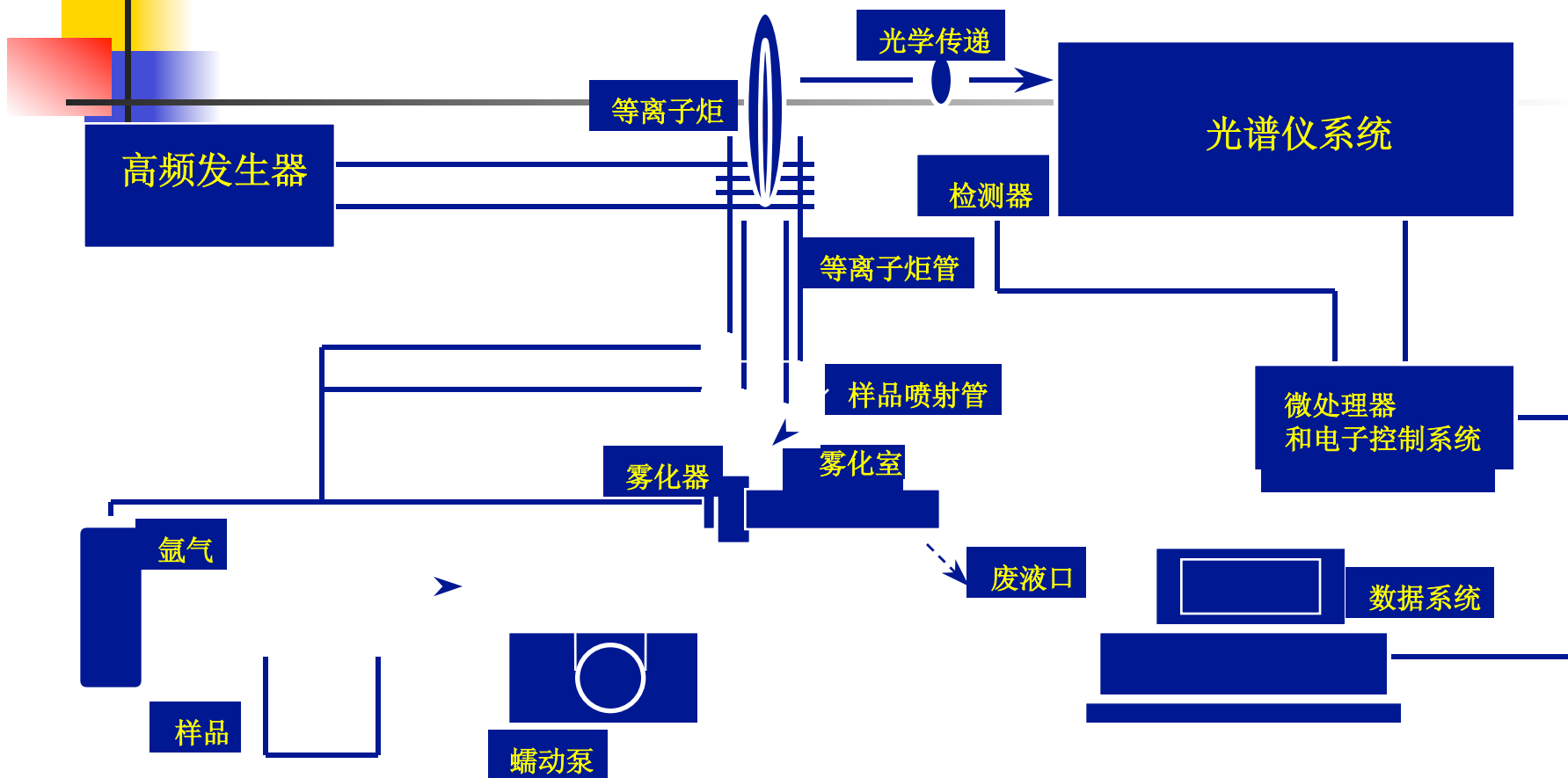
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2007/0523

电感耦合等离子体发射光谱仪系统



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Optima ICP-OES, Advantage and Disadvantage

- 灵敏度高, 達 **ppb, 10^{-9}** 数量級
- 分析速度快 (撇開樣品前處理步驟), **ICP-OES**之分析速度遠快於**XRF**.
- 可同時進行最多達**70** 個元素之分析, **Daily throughput, 100-200 samples**
- 標準方法已成熟, 可作為實驗室比對之依據 (**Authorized method in ASTM**)
- 準確性高, **RSD < 5%**
- 與樣品之形狀厚度大小無關, 皆可進行分析
- 受到樣品基質之影響可忽略
- 亦可分析金屬如純銅, 錫鉛球, 鋁合金等
- 樣品需作前處理, 如**ASTM, EPA3050B** 等方法消化時間長
- 固体变为水相
- 儀器操作困難度較高 (需要化学分析背景的操作人员)
- 週邊實驗所需之配備投入量較高, 如需天秤, 純水機, 實驗桌, 抽氣設施, 燒杯及各式酸等

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AAnalyst 400 with MHS-15

- Low cost comparing to Optima ICP-OES
- Easy to use
 - WinLab32 software
 - Computer-controlled gas box (C₂H₂ + Compressed Air)
- Easy to maintain and service
 - Quick-lock Burner Assembly
 - User-replaceable parts...
- Performance
 - Daily sample throughput 25-30 samples



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Email: joseph@ckyeung.com

*a better way to
do AAI*

AAS, 原子吸收 *Advantage and Disadvantage*



- 灵敏度高, 達 10^{-7} 之分析等級, 可符合**ASTM** 或相关分析方法的要求
 - 可对最多達**60** 個元素之分析 (不能同时做多元素之分析)
 - 成本低
 - 標準方法已成熟, 可作為實驗室比對之依據 (**Authorized method in US ASTM**)
 - 樣品之形狀厚度大小無關, 皆可進行分析
 - 受到樣品基質之影響可忽略
-
- 樣品需作前處理, 如**EN 71 Part 3, EPA3050B**等方法消化時間長
 - 固体变为水相, 操作困難度較高 (氢化物发生装置, 笑气燃消头)
 - 儀器分析速度较慢 (相对于**ICP-OES**)
 - 週邊實驗所需之配備投入量較高, 如需天秤, 純水機, 實驗桌, 抽氣設施, 燒杯及各式酸等

Elements Analyzed by ICP-MS (电感耦合等离子体质谱仪)

1A	2A	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A
H	Inductively Coupled Plasma Mass Spectrometry																He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															
Lanthanoid		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
Actinoid		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

D.L. range

< 1 ppt

1 – 100 ppt

0.1 – 1 ppb

Other similar techniques:

得利環球有限公司 Atomic Absorption Spectroscopy (AAS) Tel: 2802-3322 Fax: 2802 8988

Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES)

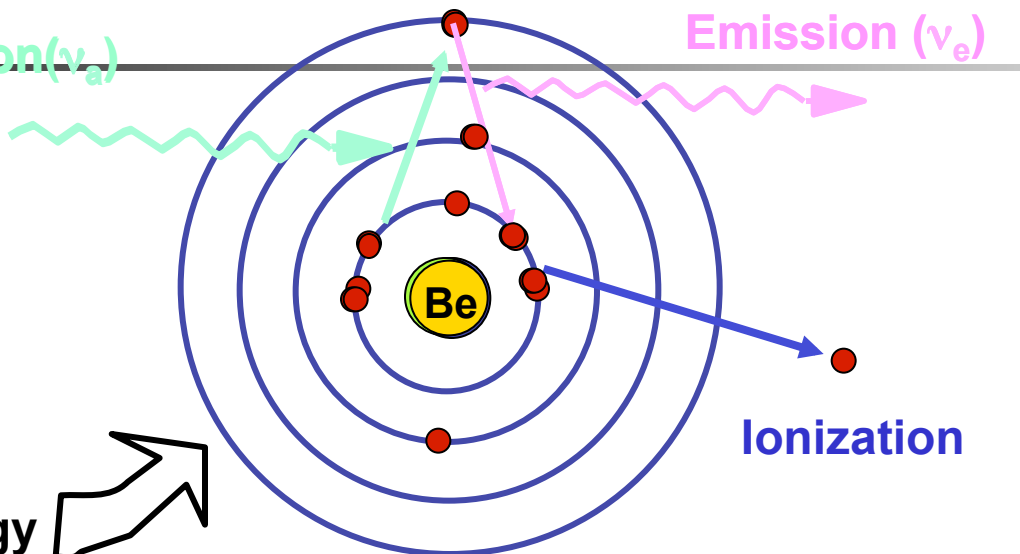
Principle of Atomic Spectroscopy

ELAN 9000

Absorption (ν_a)

Emission (ν_e)

Energy



V: Ionisation potential

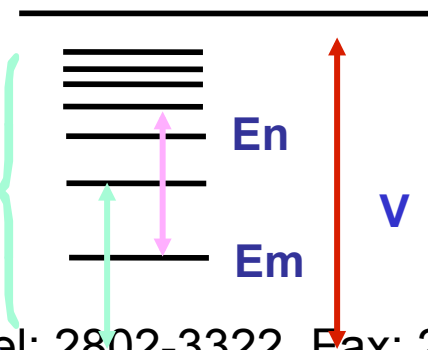
E_n, E_m : Excitation potential

$$\Delta E = E_n - E_m = h\nu = hc/\lambda$$

Ionization

n

Excitation level





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ICP-MS 技術

Advantages

- Exceptional detection limits
10⁻¹² 数量级
- Multiple element technique
多元素分析
- Excellent dynamic range
动态范围宽
- High productivity
速度快
- Integration of alternate sampling

Limitations

- Expensive to purchase
价格贵
- Training time to gain skill
仪器操作相对复杂

顧客的需要...

- The Optima 2100DV
 - Typically less than 100 samples a day (每天分析100个样品)
 - 1 to 10 elements per sample (10个元素/样品)
 - Best analytical performance
- The Optima 5300DV
 - Challenging analytical problems (多元素/样品, 复杂基体)
 - Demands sample throughput (每天分析150个以上样品)
 - Ultimate analytical performance
- The AAnalyst 400
 - 30 samples per day (每天分析大约30个样品)

Installation Requirement: Lab Space and Bench

Heavy duty (over 200kg) and anti-corrosive bench for Optima ICP-OES & AAS

(重负载和防腐蚀实验台)

- Optima ICP-OES or AAS Room Space : > 150 square feet
Optima ICP-OES 或AAS 仪器室面积: 大于15 平方米
- Temp. control : 15-30 °C, hourly variation less than 2.8 °C



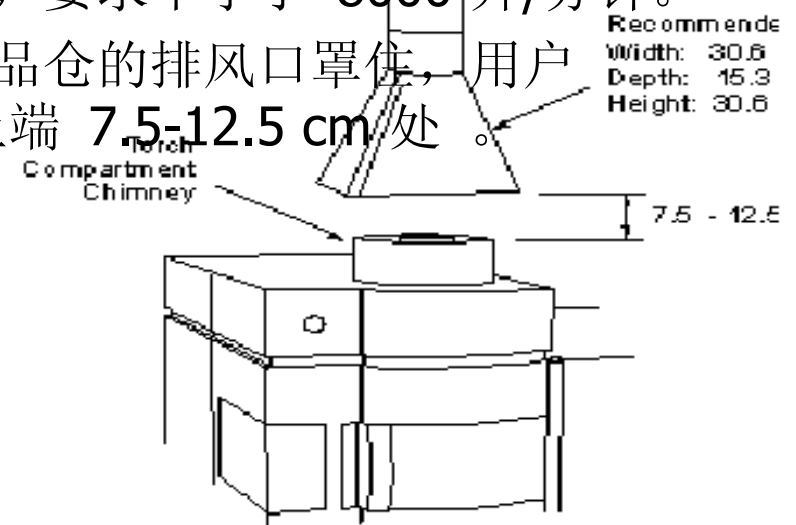
Photo: The Hong Kong University of Science and Technology

Installation Requirement: Ventilation

- Ventilation fan with flow rate : 8000 liter per minute
- Stainless steel duct for longer life time
- Optima 5000 及 Optima 2100 系列仪器所要求的抽风系统可能会承受的最高温度为 200 °C。因此建议用户采用不锈钢的通风管道。

抽风系统在通风管道末端通风罩处的流速, 要求不小于 8000 升/分钟。

抽风系统的通风罩, 应完全能够将仪器样品仓的排风口罩住, 用户的通风罩应安装在仪器样品仓排风口上端 7.5-12.5 cm 处。

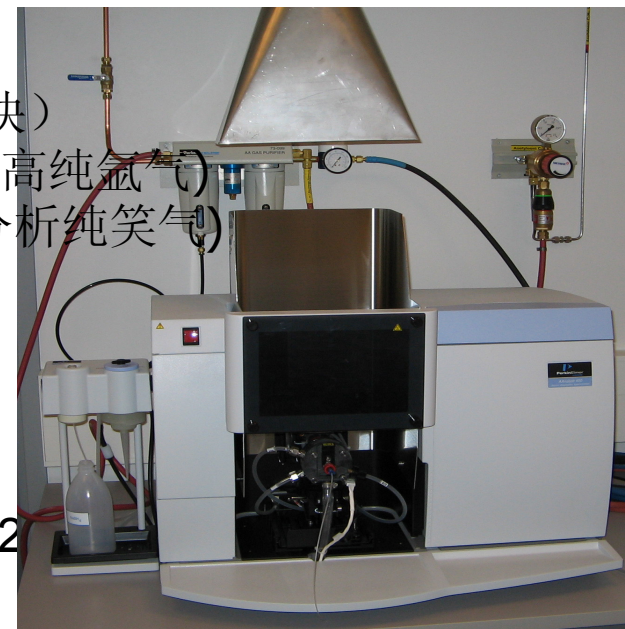


Installation Requirement: Electricity

- 20 Amp Single Phase Power supply for main unit, 13 Amp for Chiller (Optima ICP-OES 主机: 20安培单相电源, 内循环水装置: 13安培单相电源)
- An 6.0KVA UPS (稳压电源) Optional for ICP-OES 主机
- True grounding line for main unit (真地线) Optima ICP-OES
仪器自带电源线长度为2.4 米。仪器要求的供电电源为 200-240 伏间的稳定电源, 20 A, 50Hz, 单相, 具备独立地线。应配备一单独控制仪器的断路器 (建议使用空气开关)。如果用户电网电压变化过大, 则用户应配置 6 KVA 以上的稳压电源。
- AAnalyst 400 AAS: 13安培单相电源

Installation Requirement: Gas (高纯氩气)

- Optima ICP-OES: High purity Argon gas: > 99.95%, store 2-3 cylinders for weekly operation
- 仪器需要使用较大量的氩气, 工作状态下氩气流量一般为 16-20 升/分钟, 一钢瓶氩气大约使用 5 小时左右, 仪器调试大约会使用5瓶左右的氩气。用户应准备至少一个氩气减压阀及足够的氩气, 减压阀的低压表显示的最大刻度值应为 2-4 MPa。氩气的纯度要求为 99.95%, 对于大多数用户, 一般使用普通氩气即可。
- AAnalyst 400 AAS: One cylinder acetylene (分析纯乙炔)
One cylinder high purity argon (高纯氩气)
One cylinder nitrous oxide (分析纯笑气)
AAS 气体消耗量不大
- Gas regulators (减压阀) 需要向气体供应商购买



中国海关报关手续

- VAT (资本增值税, in RMB) : 17% Contract Price,
- optional: 2% handling charge for import fees, custom clearance and etc.
- Tariff (海关关税): ZERO
- Custom Code: 9027 3000
- IPPC (木质包装认证) : provided by PerkinElmer (Hong Kong) Limited



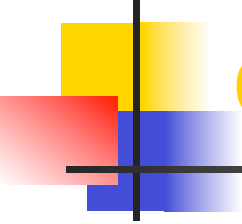
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2007/0523



Optima ICP-OES and AAnalyst 400 AAS

Thank you for your attention!

Questions?

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