ICP standard ICP标准溶液

方法简介:

原子光谱法是一种无机物微量分析方法，不同仪器分析的浓度范围也有差异，大致如下:

a. 火焰式原子吸收光谱仪　分析范围　50-5000 g/l (=ppb)

b. 感耦等离子体光谱仪，分析范围　1-100 g/l

c. 石墨炉式原子吸收光谱仪，分析范围　0.1-50 g/l

d. 感耦等离子体光谱—质谱仪ICP—MS，分析范围 0.001-5 g/l 其分析原理乃基于在特定物理条件下，元素会对放射或吸收不同波长的光的特性，如此依照样品对其能量的强度及型态而发展出的分析方法。

原子吸收光谱仪(AAS)

在火焰式原子吸收光谱仪（AAS）光束通过被燃烧的样品，依其元素不同的浓度而有不同程度的光被吸收。再藉由二个光倍增侦测器测量光通过样品前后所侦测的讯号的差异，而计算出样品中要侦测元素的浓度。由此不同元素会吸收特定的波长，所以侦测不同元素要使用不同波长的灯管。在AAS方法中，一次只能测定一种元素，但也有厂商已发展出同时安装多种灯管，一次可同时分析多种元素的机型。

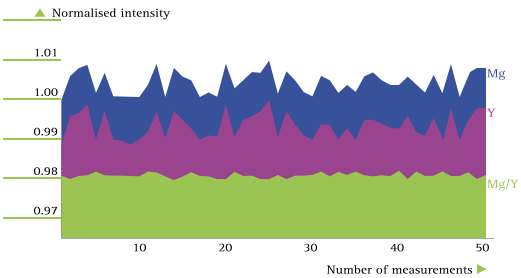
感耦等离子体光谱仪(ICP)

样品吸收高能量[火焰温度在5000~10000（°C）以上]，不同的元素会放射出特定的波长。放射出去的光再一次的被光倍增侦测器吸收，由其吸收的波长种类及其强度而分析出样品中的所含有的元素及其个别的浓度。现代ICP-OES可以一次分析70个元素。

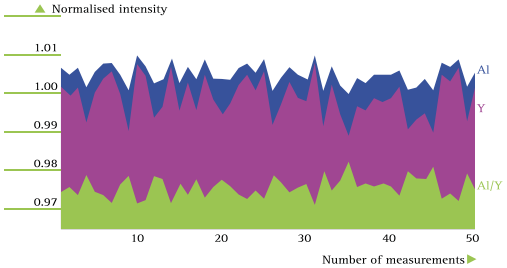
更现代化的原子光谱仪使用感耦等离子体光谱仪（ICP）的放射能，当样品在如此高的温度下，不仅放出光谱而且形成离子态。如此、更可藉由质谱（MS）的帮助来分析。结合以上二种技术则称为ICP—MS; 它可以分析元素周期表中所有的元素并可以得到更低的侦测极限。

浓度换算表

浓度单位	相当于	分析领域
10 g/l	1%	一般分析
1mg/l	1ppm	一般分析
1µg/l	1ppb	微量分析
1ng/l	1ppt	超微量分析



Determination of Mg – Y is suitable as internal standard



Determination of Al – Y is unsuitable as internal standard

ICP 单元素标准液

ICP标准液可以直接溯源到NIST提供的标准物质。每个包装中都附有分析报告。报告中有精确含量，痕量元素杂质，成份，溯源性，出厂日期和最短保存期。

名称	元素	组成	浓度1000 mg/l 订货号. [100 ml]	浓度10000 mg/l 订货号. [100 ml]	浓度100 mg/l 订货号. [100 ml]
铝	Al	$Al(NO_3)_3$ in HNO_3 2-3%	1.70301.0100	1.70371.0100	
锑	Sb	Sb_2O_3 in HCl 7 %	1.70302.0100		
砷	As	H_3AsO_4 in HNO_3 2-3%	1.70303.0100		
钡	Ba	$Ba(NO_3)_2$ in HNO_3 2-3%	1.70304.0100		
铍	Be	$Be4O(C2H3O_2)_6$ in HNO_3 2-3%	1.70305.0100		
铋	Bi	$Bi(NO_3)_3$ in HNO_3 2-3%	1.70306.0100		
硼	B	H_3BO_3 in water	1.70307.0100		
镉	Cd	$Cd(NO_3)_2$ in HNO_3 2-3%	1.70309.0100		
钙	Ca	$Ca(NO_3)_2$ in HNO_3 2-3%	1.70308.0100	1.70373.0100	
铈	Ce	$Ce(NO_3)_3$ in HNO_3 2-3%	1.70311.0100		
铯	Cs	$CsNO_3$ in HNO_3 2-3%	1.70310.0100		
铬	Cr	$Cr(NO_3)_3$ in HNO_3 2-3%	1.70312.0100	1.70374.0100	
钴	Co	$Co(NO_3)_2$ in HNO_3 2-3%	1.70313.0100	1.70375.0100	
铜	Cu	$Cu(NO_3)_2$ in HNO_3 2-3%	1.70314.0100	1.70378.0100	
镝	Dy	Dy_2O_3 in HNO_3 2-3%	1.70315.0100		
铒	Er	Er_2O_3 in HNO_3 2-3%	1.70316.0100		
铕	Eu	Eu_2O_3 in HNO_3 2-3%	1.70317.0100		
钆	Gd	Gd_2O_3 in HNO_3 2-3%	1.70318.0100		
镓	Ga	$Ga(NO_3)_3$ in HNO_3 2-3%	1.70319.0100		
锗	Ge	$(NH_4)_2GeF_6$ in water	1.70320.0100		
金	Au	$H(AuCl_4)$ in HCl 7 %	1.70321.0100		
铪	Hf	$HfOCl_2$ in HCl 7 %	1.70322.0100		
钬	Ho	Ho_2O_3 in HNO_3 2-3%	1.70323.0100		
铟	In	$In(NO_3)_3$ in HNO_3 2-3%	1.70324.0100		
铱	Ir	$IrCl_3$ in HCl 7%	1.70325.0100		
铁	Fe	$Fe(NO_3)_3$ in HNO_3	1.70326.0100	1.70376.0100	
镧	La	$La(NO_3)_3$ in HNO_3 2-3%	1.70327.0100		
铅	Pb	$Pb(NO_3)_2$ in HNO_3 2-3%	1.70328.0100	1.70372.0100	
锂	Li	$LiNO_3$ in HNO_3 2-3%	1.70329.0100		
镥	Lu	Lu_2O_3 in HNO_3 2-3%	1.70330.0100		
镁	Mg	$Mg(NO_3)_2$ in HNO_3 2- 3%	1.70331.0100	1.70379.0100	
锰	Mn	$Mn(NO_3)_2$ in HNO_3 2-3%	1.70332.0100	1.70380.0100	
汞	Hg	$Hg(NO_3)_2$ in HNO_3 10%	1.70333.0100	1.70384.0100	
钼	Mo	$(NH_4)_6Mo_7O_{24}$ in water	1.70334.0100		
钕	Nd	Nd_2O_3 in HNO_3 2-3%	1.70335.0100		
镍	Ni	$Ni(NO_3)_2$ in HNO_3 2-3%	1.70336.0100	1.70382.0100	
铌	Nb	NH_4NbF_6 in water	1.70337.0100		
锇	Os	$(NH_4)_2OsCl_6$ in HCl 7 %	1.70338.0100		
钯	Pd	$Pd(NO_3)_2$ in HNO3 2-3%	1.70339.0100		
铂	Pt	H_2PtCl_6 in HCl 7 %	1.70341.0100		
钾	K	KNO_3 in HNO_3 2-3%	1.70342.0100	1.70377.0100	
磷	P	H_3PO_4 in water	1.70340.0100	1.70383.0100	

CertiPUR® ICP 单元素标准液

名称	元素	组成	浓度1000 mg/l 订货号. [100 ml]	浓度10000 mg/l 订货号. [100 ml]	浓度100 mg/l 订货号. [100 ml]
镨	Pr	Pr_2O_3 in HNO_3 2-3%	1.70343.0100		
铼	Re	NH_4ReO_4 in water	1.70344.0100		
铑	Rh	$Rh(NO_3)_3$ in HNO_3 2-3%	1.70345.0100		
铷	Rb	$RbNO_3$ in HNO_3 2-3%	1.70346.0100		
钌	Ru	$RuCl_3$ in HCl 7%	1.70347.0100		
钐	Sm	Sm_2O_3 in HNO_3 2-3%	1.70348.0100		
钪	Sc	Sc_2O_3 in HNO_3 7%	1.70349.0100		
硒	Se	SeO_2 in HNO_3 2-3%	1.70350.0100		
硅	Si	SiO_2 in NaOH	1.70365.0100	1.70386.0100	
银	Ag	$AgNO_3$ in HNO_3 2-3%	1.70352.0100		
钠	Na	$NaNO_3$ in HNO_3 2-3%	1.70353.0100	1.70381.0100	
硫	S	H_2SO_4 in water	1.70355.0100	1.70385.0100	
锶	Sr	$Sr(NO_3)_2$ in HNO_3 2-3%	1.70354.0100		
钽	Ta	$(NH_4)_2TaF_7$ in water	1.70356.0100		
碲	Te	H_6TeO_6 in HNO_3 2-3%	1.70357.0100		
铽	Tb	$Tb(NO_3)_3$ in HNO_3 2-3%	1.70358.0100		
铊	Tl	$TlNO_3$ in HNO_3 2Ö3%	1.70359.0100		
铥	Tm	$Tm(NO_3)_3$ in HNO_3 2-3%	1.70361.0100		
锡	Sn	$SnCl_4$ in HCl 7%	1.70362.0100		
钛	Ti	$(NH_4)_2TiF_6$ in water (trace HF)	1.70363.0100	1.70387.0100	
钨	W	$(NH_4)_2WO_4$ in water	1.70364.0100		
钒	V	NH_4VO_3 in HNO_3	1.70366.0100	1.70388.0100	
镱	Yb	Yb_2O_3 in HNO_3 2-3%	1.70367.0100		
钇	Y	$Y(NO_3)_3$ in HNO_3 2-3%	1.70368.0100		
锌	Zn	$Zn(NO_3)_2$ in HNO_3 2-3%	1.70369.0100	1.70389.0100	
锆	Zr	$ZrOCl_2$ in HCl	1.70370.0100	1.70390.0100	
铑	Rh	10mg/l $Rh(NO_3)_3$ in HNO_3 2-3%	1.08525.0100		
汞	Hg	10 mg/l $Hg(NO_3)_2$ in HNO_3 2-3%	1.08623.0100		
钍	Th	10 mg/l $Th(No_3)_4$ in HNO_3 2-3%			1.70391.0100
铀	U	10 mg/l $UO_2(No_3)_2$ in HNO_3 2-3%			1.70360.0100

ICP多元素混标

多元素标准液可以直接从NIST标准物质(SRM)溯源。
每个包装中都有分析报告说明书(COA)。它包括精确的含量，成份，溯源性，出厂日期和最短保存期。

Multi element standard I 19 elements,	
Order No.	1.15474.0100
Ag	50 mg/l
Al	100 mg/l
B	15 mg/l
Ba	5 mg/l
Be	1 mg/l
Bi	200 mg/l
Cd	20 mg/l
Co	20 mg/l
Cr	25 mg/l
Cu	20 mg/l
Fe	15 mg/l
Ga	150 mg/l
In	200 mg/l
Mn	5 mg/l
Ni	50 mg/l
Pb	200 mg/l
Sr	1mg/l
Tl	400 mg/l
Zn	20 mg/l
Matrix	1 mol/l HNO_3

Multi element standard III Earth alkali elements	
Order No.	1.15626.0100
Ba	1000 mg/l
Ca	1000 mg/l
Mg	1000 mg/l
Sr	1000 mg/l
Matrix	1 mol/l HNO_3

Multi element standard IV 23 elements	
Order No.	1.11355.0100
Ag	1000 mg/l
Al	1000 mg/l
B	1000 mg/l
Ba	1000 mg/l
Bi	1000 mg/l
Ca	1000 mg/l
Cd	1000 mg/l
Co	1000 mg/l
Cr	1000 mg/l
Cu	1000 mg/l
Fe	1000 mg/l
Ga	1000 mg/l
In	1000 mg/l
K	1000 mg/l
Li	1000 mg/l
Mg	1000 mg/l
Mn	1000 mg/l
Na	1000 mg/l
Ni	1000 mg/l
Pb	1000 mg/l
Sr	1000 mg/l
Tl	1000 mg/l
Zn	1000 mg/l
Matrix	1 mol/l HNO_3

Multi element standard VIII 24 elements	
Order No.	1.09492.0100
Al	100 mg/l
B	100 mg/l
Ba	100 mg/l
Be	100 mg/l
Bi	100 mg/l
Ca	100 mg/l
Cd	100 mg/l
Co	100 mg/l
Cr	100 mg/l
Cu	100 mg/l
Fe	100 mg/l
Ga	100 mg/l
K	100 mg/l
Li	100 mg/l
Mg	100 mg/l
Mn	100 mg/l
Na	100 mg/l
Ni	100 mg/l
Pb	100 mg/l
Se	100 mg/l
Sr	100 mg/l
Te	100 mg/l
Tl	100 mg/l
Zn	100 mg/l
Matrix	1 mol/l HNO_3

Multi element standard IX 9 elements	
Order No.	1.09494.0100
As	100 mg/l
Be	100 mg/l
Cd	100 mg/l
Cr (VI)	100 mg/l
Hg	100 mg/l
Ni	100 mg/l
Pb	100 mg/l
Se	100 mg/l
Tl	100 mg/l
Matrix	1 mol/l HNO_3

Multi element standard X For surface water testing, 23 elements	
Order No.	1.09493.0100
As	50 µg/l
B	100 µg/l
Ba	50 µg/l
Be	20 µg/l
Bi	10 µg/l
Ca	35000 µg/l
Cd	20 µg/l
Co	25 µg/l
Cr	20 µg/l
Cu	20 µg/l
Fe	100 µg/l
K	3000 µg/l
Mg	15000 µg/l
Mn	30 µg/l
Mo	100 µg/l
Na	8000 µg/l
Ni	50 µg/l
Pb	25 µg/l
Se	10 µg/l
Sr	100 µg/l
Tl	10 µg/l
V	50 µg/l
Zn	50 µg/l
Matrix	1 mol/l HNO_3

Multi element standard XI For sludge testing, 7 elements	
Order No.	1.09491.0100
Cd	10 mg/l
Cr	900 mg/l
Cu	800 mg/l
Hg	8 mg/l
Ni	200 mg/l
Pb	900 mg/l
Zn	2500 mg/l
Matrix	1 mol/l HNO_3

Multi element standard XIII 15 elements	
Order No.	1.09480.0100
Al	500 mg/l
As	100 mg/l
Be	100 mg/l
Cd	25 mg/l
Co	100 mg/l
Cr	100 mg/l
Cu	100 mg/l
Fe	100 mg/l
Hg	5 mg/l
Mn	100 mg/l
Ni	100 mg/l
Pb	100 mg/l
Se	25 mg/l
V	250 mg/l
Zn	100 mg/l
Matrix	5 % HNO_3

Multi element standard XVII 7 elements	
Order No.	1.09495.0100
Hf	100 mg/l
Ir	100 mg/l
Sb	100 mg/l
Sn	100 mg/l
Ta	100 mg/l
Ti	100 mg/l
Zr	100 mg/l
Matrix	15 % HCl

Multi element standard XVI 21 elements	
Order No.	1.09487.0100
As	100 mg/l
Be	100 mg/l
Ca	100 mg/l
Cd	100 mg/l
Co	100 mg/l
Cr	100 mg/l
Cu	100 mg/l
Fe	100 mg/l
Li	100 mg/l
Mg	100 mg/l
Mn	100 mg/l
Mo	100 mg/l
Ni	100 mg/l
Pb	100 mg/l
Sb	100 mg/l
Se	100 mg/l
Sr	100 mg/l
Ti	100 mg/l
Tl	100 mg/l
V	100 mg/l
Zn	100 mg/l
Matrix	5 % HNO_3

Multi element standard VI for ICP-MS, 30 elements	
Order No.	1.10580.0100
Ag	10 mg/l
Al	10 mg/l
As	100 mg/l
B	100 mg/l
Ba	10 mg/l
Be	100 mg/l
Bi	10 mg/l
Ca	1000 mg/l
Cd	10 mg/l
Co	10 mg/l
Cr	10 mg/l
Cu	10 mg/l
Fe	100 mg/l
Ga	10 mg/l
K	10 mg/l
Li	10 mg/l
Mg	10 mg/l
Mn	10 mg/l
Mo	10 mg/l
Na	10 mg/l
Ni	10 mg/l
Pb	10 mg/l
Rb	10 mg/l
Se	100 mg/l
Sr	10 mg/l
Te	10 mg/l
Tl	10 mg/l
U	10 mg/l
V	10 mg/l
Zn	100 mg/l
Matrix	1 mol/l HNO_3

Multi element standard XXI for MS, 30 elements	
Order No.	1.09498.0001
Ag	10 mg/l
Al	10 mg/l
As	10 mg/l
Ba	10 mg/l
Be	10 mg/l
Bi	10 mg/l
Ca	10 mg/l
Cd	10 mg/l
Co	10 mg/l
Cr	10 mg/l
Cs	10 mg/l
Cu	10 mg/l
Fe	10 mg/l
Ga	10 mg/l
Hg	10 mg/l
In	10 mg/l
K	10 mg/l
Li	10 mg/l
Mg	10 mg/l
Mn	10 mg/l
Na	10 mg/l
Ni	10 mg/l
Pb	10 mg/l
Rb	10 mg/l
Se	10 mg/l
Sr	10 mg/l
Tl	10 mg/l
U	10 mg/l
V	10 mg/l
Zn	10 mg/l
Matrix	5 % HNO_3 (Hg in separate bottle) 1.08623.0100

实验室分析试剂 Laboratory Analytical Reagents

Multi element standard V for Wavelength calibration	
Order No.	1.10714.0500
Al	20 mg/l
As	20 mg/l
B	2 mg/l
Ba	2 mg/l
Be	1 mg/l
Ca	10 mg/l
Cd	2 mg/l
Cr	2 mg/l
Cu	2 mg/l
Fe	2 mg/l
Hg	5 mg/l
K	100 mg/l
Li	2 mg/l
Mg	1 mg/l
Mn	1 mg/l
Na	20 mg/l
Ni	5 mg/l
P	10 mg/l
Pb	20 mg/l
Sc	1 mg/l
Se	20 mg/l
Sr	1 mg/l
Te	20 mg/l
Ti	2 mg/l
Y	1 mg/l
Zn	2 mg/l
Matrix	5 % HCl

Multi element standard XIV in HCl, 11 elements	
Order No.	1.09481.0500
As	20 mg/l
K	100 mg/l
La	20 mg/l
Li	20 mg/l
Mn	20 mg/l
Mo	20 mg/l
Na	20 mg/l
Ni	20 mg/l
P	100 mg/l
S	100 mg/l
Sc	20 mg/l
Matrix	2 % HCl

Multi element standard XX for MS to setup the plasma	
Order No.	1.09497.1000
Ba	10 µg/l
Ce	10 µg/l
Cd	10 µg/l
Cu	10 µg/l
Ge	10 µg/l
Mg	10 µg/l
Pb	10 µg/l
Rh	10 µg/l
Sc	10 µg/l
Tb	10 µg/l
Tl	10 µg/l
Matrix	1 % HNO_3

ICP Multi element standard XXIII for mass calibration	
Order No.	1.09410.0500
Ba (barium)	0.5 – 2.0 ng/ml
B (boron)	0.5 – 2.0 ng/ml
Co (cobalt)	0.5 – 2.0 ng/ml
Fe (iron)	0.5 – 2.0 ng/ml
Ga (Gallium)	0.5 – 2.0 ng/ml
In (Indium)	0.5 – 2.0 ng/ml
K (potassium)	0.5 – 2.0 ng/ml
Li (Lithium)	0.5 – 2.0 ng/ml
Lu (Lutetium)	0.5 – 2.0 ng/ml
Na (sodium)	0.5 – 2.0 ng/ml
Rh (Rhodium)	0.5 – 2.0 ng/ml
Sc (Scandium)	0.5 – 2.0 ng/ml
Tl (Thallium)	0.5 – 2.0 ng/ml
U (Uranium)	0.5 – 2.0 ng/ml
y (Yttrium)	0.5 – 2.0 ng/ml

Multi element standard XIX for MS	
Order No.	1.09496.0100
Be	10 µg/l
Co	10 µg/l
In	10 µg/l
Tl	10 µg/l
U	10 µg/l
Matrix	1 % HNO_3

GF AAS Multi element standard XVIII for calibration	
Order No.	1.09500.0100
Ag	10 mg/l
Al	100 mg/l
As	100 mg/l
Ba	50 mg/l
Be	5 mg/l
Cd	5 mg/l
Co	50 mg/l
Cr	20 mg/l
Cu	50 mg/l
Fe	20 mg/l
Mn	20 mg/l
Ni	50 mg/l
Pb	100 mg/l
Sb	100 mg/l
Se	100 mg/l
Tl	100 mg/l
Matrix	5 % HNO_3

Multi element standard VII for cationic chromatography	
Order No.	1.10322.0100
Ba	100 mg/l
Ca	100 mg/l
K	100 mg/l
Li	100 mg/l
Mg	100 mg/l
Mn	100 mg/l
Na	100 mg/l
NH_4	100 mg/l
Sr	100 mg/l
Matrix	0.001 mol/l HNO_3

ICP Multi element standard XXIV tuning solution 700 ES	
Order No.	1.09411.0500
As (arsenic)	50 mg/l
Cd (cadmium)	50 mg/l
Co (cobalt)	50 mg/l
Mo (Molydenium)	50 mg/l
Ni (Nickel)	50 mg/l
Sr (Strontium)	50 mg/l
K (potassium)	500 mg/l
Al (Aluminium)	50 mg/l
Ba (barium)	50 mg/l
Cu (Copper)	50 mg/l
Zn (Zinc)	50 mg/l
Cr (chromium)	50 mg/l
Pb (lead)	50 mg/l