Sample Matrix Selection Guide

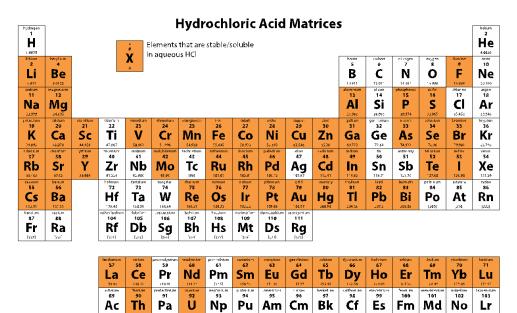
Solution-based ICP analyses require complete dissolution of the sample. Different chemical methods may need to be utilized to dissolve a sample completely. For instance, nitric acid is widely used as a digesting agent and a solvent in ICP analyses because of its oxidizing capabilities and the solubility of nitrate salts. However, platinum group metals require the addition of hydrochloric acid to promote dissolution.

The following tables provide solubility information for various elements in different matrices.

							DI W	ator	Mat	ricad							
hydrogen 1 H					Although	DI wate	r is not a	a comm	on matri	x for ana							^{helium} 2 He
i.co79 Bibliom 3 Li	^{beylkm} 4 Be		x and can promote undesired biological growth, the elements highlighted are soluble in water. B B C N M														4.0026 10 Ne
sedium 11 Na 22.555	2 0122 magnesium 12 Mg 24305											13811 200019000 13 Al 25.982	12.01 sil con 14 Si 28.055	14:007 phosphorus 15 P s0.974	su fur 16 S 52.065	15.998 chlar ne 17 Cl 35.453	20190 #gen 18 Ar 20245
petassium 19 K	20 Ca	21 SC	22 Ti	vanadium 23 V	24 Cr	^{inangalics:} 25 Mn	Fe	27 Co	^{nicke} 28 Ni	29 Cu	³⁰ Zn	pallium 31 Ga	ger sniun 32 Ge	arsenit 33 As	seterikum 34 Se	source Br	8731460 36 Kr
29.095 r ibicium 37	-46.078 strenifium 38	44,956 ytt=lum 39	47,867 Hicenkur 40	50,947 niabium 41	5 .996 malyindenum 42	54,938 techri-tium 43	55.845 ruthenium 44	58.905 ihorium 45	50.593 palladi im 46	63.546 Ulser 47	55.38 radin lum 48	69.773 Indium 49	7>,64 fin 50	74,977 Antim any 51	76.36 tel urkum 52	79.904 Iorfine 53	ہ∂.74% ×endr 54
Rb	Sr 87.62	Y	Zr 91.224	Nb \$1.946	Mo	TC	Ru 101.07	Rh	Pd 105.12	Ag	Cd	In 114.82	Sn 118.7	Sb 121.76	Te	126.90	Xe 1\$1.29
S5 CS	56 Ba		72 Hf	73 Ta	tunsster 74 W	75 Re	76 Os	77	78 Pt	79 Au	so Hg	81	Pb	83 Bi	84 PO	85 At	siden Side
132.91 franklum 87	137.33 racium 88		- 78.40 iuthei faidium 104	180.95 Jubn'ur- 105	183.84 .caborgium 196	186.21 bohium 107	120.23 Hexakum 108	1922 moltror ¹ um 109	195.da darmutadtium 110	196.97 Facilitatium 111	200.50	204.36	£07.2	205.98	[209]	,210,	[222]
	Ra	ļ	Rf	Db Exel	Sg	Bh	Hs	Mt	Ds p/it	Rg]						
			lanthanum 57	serium 58	petsoodymium 59	ncodymiur 69	promothium 61	samarium 62	curepium 63	gasolinium 64	.crbium 65	dycerasium 66	holmium 67	erbium 68	.hulium 69	ytterbium 70	lutetium 71
			La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
			settelum 89	^{-borkum} 90	91	92 U	93	puterk.m 94	95	96	97 Bk	s altionni im 98 C C	elostelotum 99 E.e.	fermi m 100	nendelevium 101 B.A.J	nobelium 102	103
			Ac	Th	Pa	U	Np	Pu	Am	Cm	DK	Cf	Es	Fm	Md	No	Lr

hearagen	1					N	litrio	: Aci	d Ma	trice	S						htium
1 H 1.3975	Elements that are stable/soluble in aqueous HNO ₃															2 He 4.0026	
Ithlum 3	beryllium 4			~	laqueor	15111103						201000 5	carbon 6	ri //gen 7	00535en 8	fluor ne 9	neon 10
Li	Be			0								B	C	N	ο	F	N€
6.941	9.0122				lements							10.811	12.011	14:007	15.999	18.958	20180
socium 11	magnes'u= 12			Х 🕛	comple	xed with	i CI (e.g	. aqua re	igia)			a u≕inium 13	s'licen 14	phosphorua 15	sultur 16	thiorine 17	21907 18
Na	Mg			0				Â	Ŝi	P	Ŝ	ĊΓ	Â				
22.990	24,305											26.982	28,085	30.974	32,065	35.453	39,948
olassium 1 9	calçaum 20	stand um 21	lilanium 22	vananium 23	chuomkum 24	mançanese 25	iron 26	cehalt 27	nickel 28	copper 29	2ind 30	qalium 31	germanium 32	arsenik 33	selenum 34	binmine 35	keypte 36
Κ	Ca	Sc	Ti	V	Cr	Mn	Fe	Со	Ni	Cu	Zn	Ga	Ge	As	Se	Br	K
39.098	10.078	44.956	47.802	50.942	a1.990	54.938	55.845	58.933	58,683	63.548	65.38	69./25	12.54	/1.922	76.95	/9.991	83.79
ubidium 37	strontium 38	yttru." 39	zi-conium 40	niobiu~ 41	molybdenum 42	technetium 43	rothenium 44	rhodium 45	palladit, m 46	silver 47	cadmiu~ 48	indium 49	50	antimory 51	təllar'ur 52	iodine 53	xeno 54
Rb	Sr	Y	Zr	Nb	Мо	Тс	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te		Xe
85.468	87.92	82.906	91.224	92.936	95.96	[98]	101.07	102.91	106.42	107.87	112.4′	114.82	118.71	121.76	127.69	126.90	191.2
cassium 55	barium 56		hafsium 72	tantakun 73	tunysten 74	rt eniu 75	osmium 76	irkfur- 77	platinum 78	ijald 79	monory 80	Unation 81	lead 82	bismoth 83	polonium 84	asauline 85	rador 86
Cs	Ba		Hf	Та	W	Re	Os	Ir	Pt	Au	Hg	TI	Pb	Bi	Po	At	Rr
132,91 franck.m	137.13		17K49 ruthe docture	180.95	183,84	186.21 bohos m	190.23	192.22	155.08 damstadtum	196,97	200 59	704/3/1	707,2	208.98	[504]	,210]	[222]
87	radium 88		104	di.bnium 105	seaborgium 106	107	hassium 108	nie trietrum 109	110	roentgenk.m 111							
Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							
[223]	[226]	J	[261]	262	12661	[264]	12//1	[268]	2/1	12/21							

	lanthan um		praseocymlum		promethium	samailum	wurop u.m	qadol num	terhare	dysprosium	holmium	erbium	thu lum	ytterblum	utetium
	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	1.58.91	1467.2	140.91	14124	[145]	150.36	151.96	15/.25	158.92	162.50	167.93	167.26	168.93	173.05	174.97
[actinium	therium	protectinium	uranium	nept.mium	olutonium	a mer cium	curium	be kelium	czlitomium	einsteinium	fer-ium	mandeleviu **	nobelium	lawrencium
	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Ac	Th	Pa	11	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	Nο	Lr
				U										110	
l	[227]	232.04	231.04	238.03	[237]	[244]	,243,	[247]	,247]	(251)	[252]	,257,	[258]	,259]	[262]



hydrogen 1	1						Sulf	uric l	Matr	ices							helium
H		Elements that benefit or tolerate H ₂ SO ₄															4.0926
Li opti sedium 11 Na	Be 9 0122 Magnesium 12 Mg		X Elements that can be dissolved in H ₂ SO ₄ if complexed with Cl ² C C C C C C C C C C C C C C C C C C													F there there 17 CI	10 Ne 20190 Argen 18 Ar
22.500 potastium 19	24.305 calcium 20	sta Mium 21	titan'u n 22	vanadium 23	chromium 24	manganes: 25	i∺x 26	cobalt 27	nicke 28	1001-0-1 29	2ine 30	25.082 gallium 31	28.055 ger "Snivin 32	s0.974 arsenit 33	32.065 selenium 34	45.45s k-romine 35	23.248 krypton 36
K	Ca	5C	Ti 47,967	V 59.942	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As 74.922	Se	Br	Kr
r ibicium	strent'um	ytt=kim 39	Hicenkim 40	niabium 41	mal;hdenum 42	techriettum 43	ruthenium 44	that Nm 45	palladi im 46	41ser 47	radmium 48	Indium 49	10.34 10 50	Antimany 51	tel urium	lodina 53	xenar 54
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Âg	Cd	11482	Sn	Sb	Te	126.90	Xe
cseatum 55	barium 56		Pamium 72	tantalum 73	tungstei 74	rhenium 75	comrum 76	iridium 77	platinum 78	2111 79	mercury 80	trallium 81	lead 82	biam uth 83	pole num 84	stature 85	rsdon 86
Cs 132.01	Ba		Hf	Ta	W	Re	Os	lr 11242	Pt	Au	Hg	TI 29436	Pb	Bi	Po	At	R n
fiancium 87	13-33 Iacium 88		ruther/sidium	105	.catorgium 196	bohium 107	hassium 108	melther'um 109	darmstadtium 110	iachtgenium 111	200.55	209.35	207.2	243.38	(297)	210,	[622]
Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							
L		,									,						
			La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm 18935	63 Eu	Gd 54 Gd	65 Tb	66 Dy 142,50	67 Ho	68 Er 167.58	69 Tm	70 70 70 70	lutetium 71 Lu
			38.91 actinium 89	T40 17 Thorkim 90	protactinium 91	144.27 Utanium 92	11751 nepturium 93	p uter k.m	Jmeric'u-1 95	\$7.7% / 12'Um 96	berkell im 97	californi im 98	einstein'um 99	fermi am 100	mendel+vkim 101	nobelium 102	laurencium 103
			Ac	232.04	Pa 231.04	U 235.03	Np	Pu 245	Am	Cm	Bk	Cf	Es	Fm	Md	No	