TOFWERK icpTOF Specifications

icpTOF and icpTOF 2R

Sample Introduction

Parameter	unit	value icpTOF	value icpTOF 2R
Access	-	Bench height, torch axis parallel to bench, minimized distances	
Peristaltic pump	-	Software controlled 12 roller, 4 channel mini-pump, inert rollers, low pulsation	
Peristaltic pump tubing	-	Three stop flared PVC pump tubing as standard	
Nebulizer	-	Concentric borosilicate glass with 400 µL/min flow rate; PFA and high TDS optional	
Spray chamber	-	Baffled cyclonic, high purity quartz; PFA optional	
Spray chamber compatibility	-	Compatibility with all 6 mm OD nebulizers	
Peltier Cooling	-	Software control in range –10 °C to +20 °C	
Injector	-	Screw-in, self-aligning	
Injector sealing	-	No O-rings required	
Injector size	-	Wide 2.5 mm internal diameter as standard. Optional diameters available.	
Injector material	-	Quartz as standard. Optional materials available.	

Plasma Ion Source

Parameter	unit	value icpTOF	value icpTOF 2R
Torch	-	Push-in, single piece, quartz	
RF generator	-	Digital, solid state RF generator	
RF generator	-	Dynamic swing frequency matching	
RF generator	-	No plasma shield required	
RF generator power range	W	400-1600 (default 1550)	
Load coil	-	Water-cooled, silver coated, copper load coil	
Ar gas flow controllers	-	Coolant, auxiliary, nebulizer (Ar)	
Additional gas flow controllers	-	Two further MFCs for gas dilution, oxigen addition, laser ablation etc.	
Plasma TV	-	HD camera for remote monitoring of plasma status	

Interface

Parameter	unit	value icpTOF	value icpTOF 2R
Interface access	-	Drop-down door	
Sample cone	-	Solid Ni, 1.1 mm diameter (Pt tipped optional)	
Skimmer cone	-	Ni, 0.5 mm diameter (Pt tipped optional)	
Skimmer inserts	-	High sensitiv as standard (High matrix and robust as options)	
Interface pump	-	External, high performance rotary pump	
Extraction lens	-	Single, low voltage, conical	
Slide valve	-	PC controlled	

Primary Ion Beam Optics

Parameter	unit	value icpTOF	value icpTOF 2R
RAPID lens	-	90° ion lens operating at a single fixed voltage	
Electrical connections to primary ion beam	-	Cable free, fixed position, spring mounted gold contacts	
Collision / Reaction Cell (Qcell)	-	Qcell flatapole design	
Qcell MFCs	-	2 MFCs for pure He and reaction gas mixtures: O2, NH3/He, H2/He	
ion blanking	-	notch filter	

TOF Mass Analyzer

Parameter	unit	value icpTOF	value icpTOF 2R
Extractions per s	#	33000	21700
Mass Res Power ^{238}U	Th/Th	> 3000	> 6000
Abund Sens ^{238}U +1Th	#	3.0E-04	3.0E-05
Abund Sens ^{238}U -1Th	#	4.0E-04	3.0E-04
Mass Range	Th	7-280	7-280

TOFMS Ion Detection System

Parameter	unit	value icpTOF	value icpTOF 2R
Detector type	-	MCP	
Integration time minimum	ms	0.03	0.046
sampling rate	GS/s	1.6	1.6
Linear Dynamic Signal Range	cps	1 - > 1.0E+06	1 - > 1.0E+06

Performance

Parameter	unit	value icpTOF	value icpTOF 2R
Sensitivity in liquid ^{59}Co	cps/ppb	10000	5000
Sensitivity in liquid ^{115}In	cps/ppb	20000	15000
Sensitivity in liquid ^{238}U	cps/ppb	50000	30000
Oxides from liq sample $^{140}Ce^{16}O/^{140}Ce$	%	< 2.5	< 2.5
Doubly chared $^{137}Ba^{++}/^{137}Ba^{+}$	%	< 5	< 5
Short term stability 10min ^{238}U, max	%	2	2
Long term stability 6h ^{238}U, max	%	5	5
Bkg at 220Th	cps	< 10	< 10
Mass accuracy ^{238}U, max	ppm	< 5	< 5

Vacuum System

Parameter	unit	value icpTOF	value icpTOF 2R
Configuration	-	Three stage, differential pumping	Four stage differential pumping
Turbo pump for primary ion beam	-	Split flow turbo molecular pump	
Second turbo pump	-	no	yes
Fore Vacuum	-	External backing rotary pump (common to interface)	
Venting	-	Vent valve operated with Ar for fast pumpdown	
MS switch for service	-	30 min to switch between TOF and Q operation plus overnight pumpdown	

QMS mode (e.g. for service)

Quadrupole Mass Analyzer

Parameter	unit	value
Field	-	Virtual hyperbolic
Frequency	MHz	2
Mass range	Th	2-290
Scan speed (Li to U with 40 interval masses)	Th/s	> 3700
Mass stability	Th/day	< +/- 0.025
Abundance sensitivity at m-1 (m= 238U)	ppm	< 0.5
Resolution	-	User definable

QMS Ion Detection System

Parameter	unit	value
Detector		Dual mode discrete dynode electron multiplier
Minimum dwell time, in pulse and analog	µs	100
Dynamic range	cps	1 - > 1.0E+09

Comment

Th = Thomson, unit for mass to charge ratio

1 Th = 1 u/e = 1 Da/e = 1.036426 x 10e-8 C^{-1}