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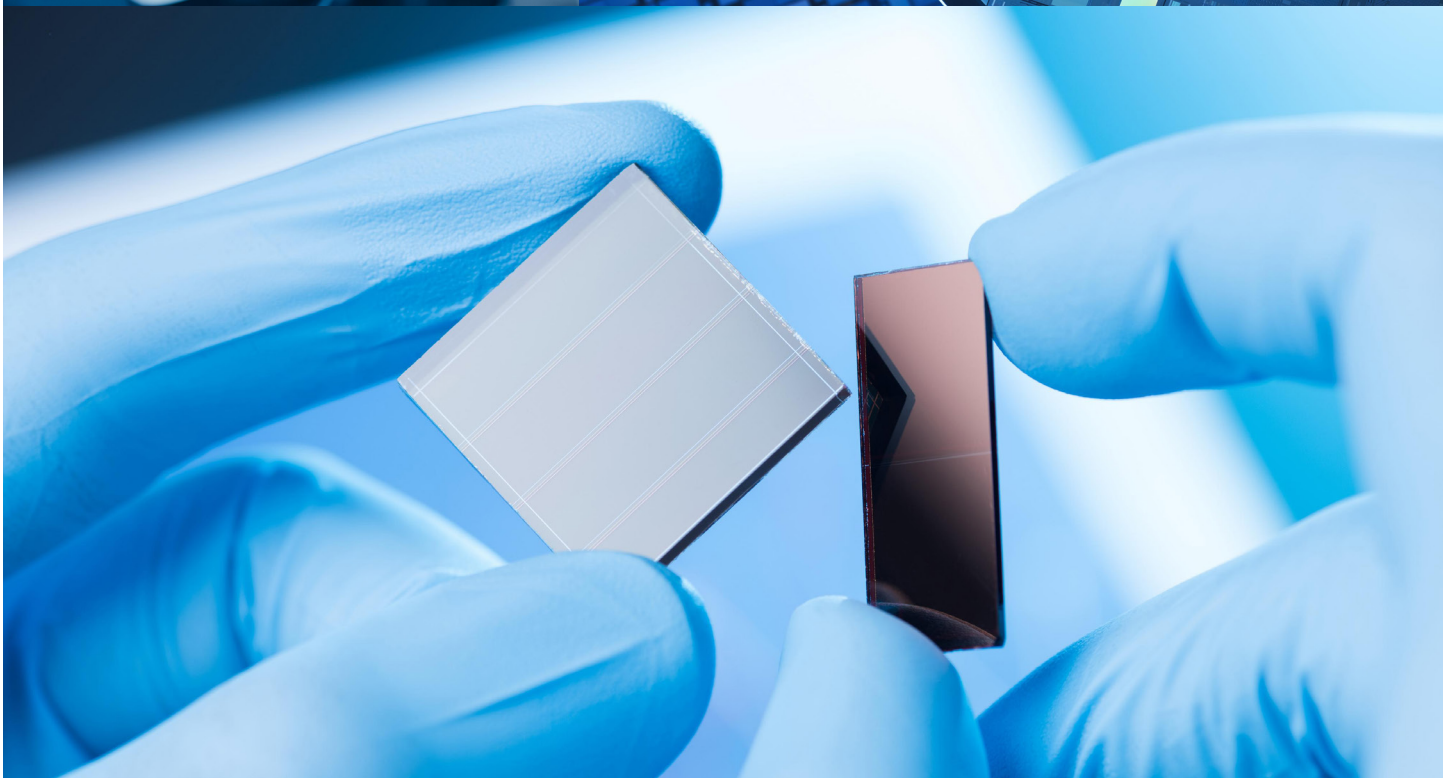
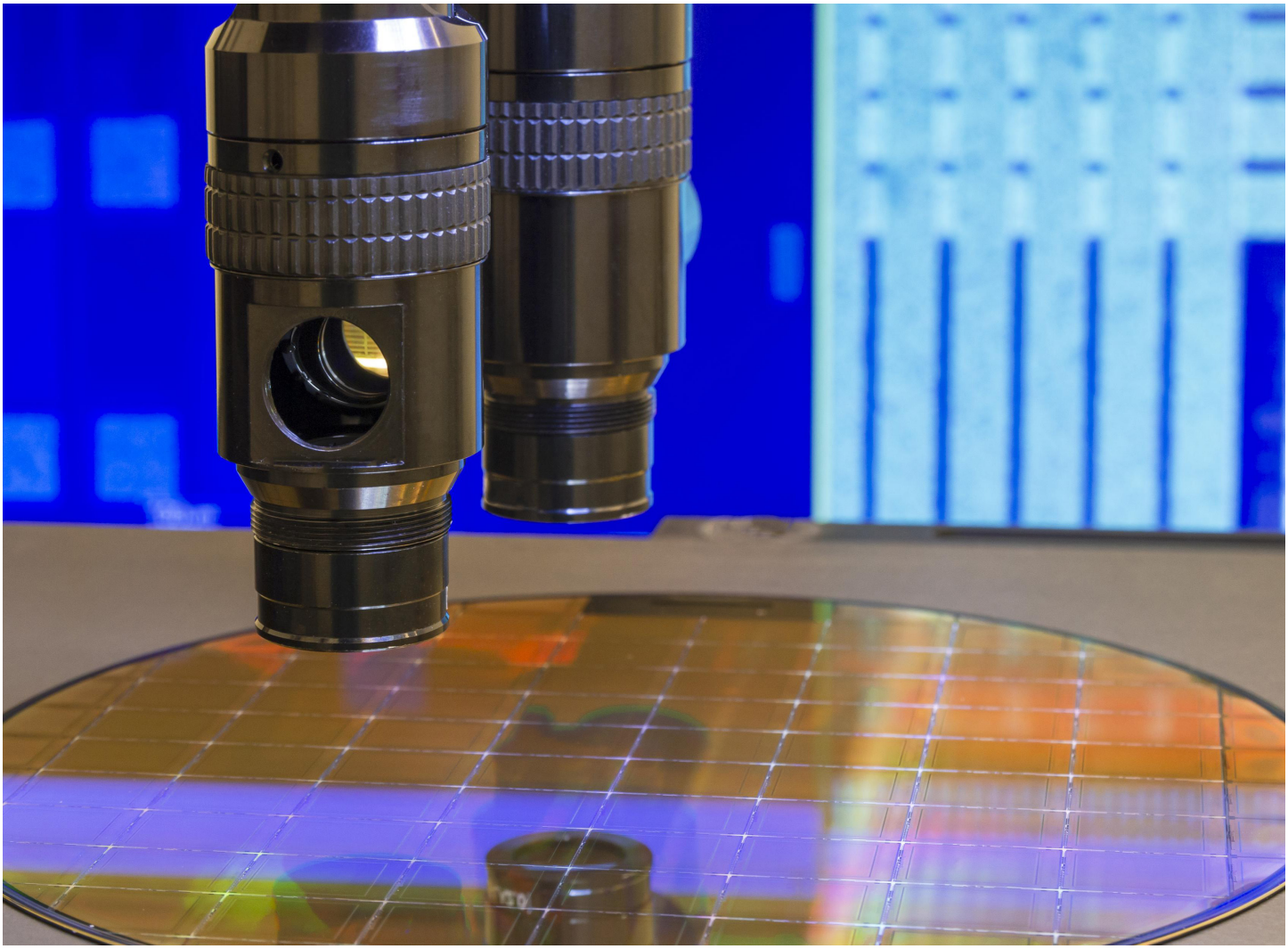
Trusted Answers

Consumable Solutions for Semiconductor Analysis





Consumable Solutions for Semiconductor Analysis

Since the late 1980s, Agilent has been collaborating closely with leading semiconductor manufacturers and chemical suppliers to develop analytical and monitoring technologies for the semiconductor industry chain, addressing the analytical challenges in semiconductor industry, and continuously exploring the forefront of innovation.

The Agilent ICP-MS, ICP-QQQ, GC/MS, and LC/MS systems have proven capability in providing excellent analytical protocols in various areas of the semiconductor industry chain, such as process monitoring, quality control of raw materials, detection of inorganic impurities, nanoparticles, and organic impurities, compliance with environmental health and safety regulations, and vacuum leak detection.

Note: The instruments discussed in this document refer to the Agilent ICP-MS and ICP-QQQ dedicated for semiconductor analysis.

Electronic Wet Chemicals

Learn more

Electronic wet chemicals, also known as process chemicals, refer to chemical reagents with a main component purity greater than 99.99%, impurity ion content below ppm level, and dust particle size below 0.5 μm.

General-purpose electronic wet chemicals, also known as ultraclean and high-purity reagents, are liquid chemicals used in the process of integrated circuits manufacturing. These types of chemicals mainly include various acids, bases, and solvents. Hydrogen peroxide, hydrofluoric acid, and ammonium hydroxide are some of the typical acids and alkali products, and methanol, ethanol, xylene, and ethyl acetate are examples of solvent products.

Functional electronic wet chemicals refer to formula or compound chemicals that are produced with special properties through compounding methods, so as to meet the special process requirements during manufacturing. Functional wet electronic chemicals, represented by photoresist reagents, mainly include developing liquid, cleaning solution, etching solution, and stripping solution.

Table 1. Process chemicals - inorganic aqueous reagent (hydrofluoric acid-free) consumables for ICP-MS and ICP-QQQ.

Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	Peristaltic pump drain tubing	Standard configuration Pharmaprene, yellow/blue 12 pcs/pk	5005-0022	
77/79/88/8900	MicroFlow nebulizer	Standard configuration with an I-AS autosampler PFA, 200 µL/min With I-AS probe	G3139-65102	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration without an I-AS autosampler PFA, 200 µL/min Without I-AS probe	G3139-65100	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration with a SPS 4 autosampler PFA, 200 µL/min With SPS 4 probe	G3139-68000	
77/79/88/8900	PFA-ST MicroFlow nebulizer	PFA, demountable sample capillary, 200 µL/min capillary as standard. Flowrate adjustable from 20 to 400 µL/min by using alternative capillaries. Usable without autosampler and with I-AS or SPS 4 autosampler by adding alternative capillaries. See all available capillaries here.	G3139-68100	
77/8800	Spray chamber	Non-UHMI configuration Quartz	G3280-80008	
79/8900	Spray chamber	Standard configuration with UHMI Quartz double-pass	G8400-67150	
77/79/88/8900	Endcap for spray chamber	Standard configuration	G3280-60008	
79/8900	Connector tube	Non-UHMI configuration Quartz, straight without gas port	G3270-80025	
77/8800	Connector tube	Standard configuration Quartz, with gas port	G3270-80024	
77/79/88/8900	Torch	Standard configuration Quartz, one piece 2.5 mm injector id	G3280-80053	

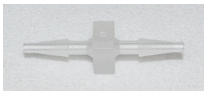
Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	Pt/Cu sampler cone	Standard configuration Platinum tip with copper base	G3280-67036	
77/79/88/8900	Pt/Cu sampler cone (18 mm)	Optional Large platinum tip (18 mm diameter) with copper base Recommended for high viscosity and high boiling acids (for example, phosphoric) and very aggressive matrices	G3280-67056	
77/78/79/88/8900	Pt/Ni-plated sampler cone	Optional Platinum tip with nickel-plated base for higher corrosion resistance Recommended for analysis of aggressive acids (especially HCl, HF, and HClO4) and for higher-matrix samples	G3280-67142	
77/79/8800	Pt/Cu skimmer cone	Standard configuration For 77/79/8800 with s-lens Platinum tip with copper base	G3280-67064	
77/79/8800	Pt/Ni skimmer cone	Optional, recommended for use with Ni-plated sampler cone (G3280-67142)	G3280-67065	
8900	Pt/Cu skimmer cone	Standard configuration For 8900 with s-lens Platinum tip with copper base	G3666-67401	
8900	Pt/Ni skimmer cone	Optional, recommended for use with Ni-plated sampler cone (G3280-67142)	G3666-67411	
7900	Extraction-Omega lens assembly	Standard configuration S-lens for 7900	G8400-67002	
8900	Extraction-Omega lens assembly	Standard configuration S-lens for 8900	G3666-67400	
77/8800	Extraction-Omega lens assembly	Standard configuration S-lens for 77/8800	G3280-67035	
77/79/88/8900	Tuning solution	2 x 500 mL Contains 1 µg/L of Li, Mg, Y, Ce, Tl, Co	5185-5959	

Table 2. Process chemicals - hydrofluoric acid compatible consumables for ICP-MS and ICP-QQQ.

Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	Peristaltic pump drain tubing	Standard configuration Pharmaprene, yellow/blue 12 pcs/pk	5005-0022	
77/79/88/8900	MicroFlow nebulizer with I-AS probe	Standard configuration with an I-AS autosampler PFA, 200 µL/min With I-AS probe	G3139-65102	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration without an I-AS autosampler PFA, 200 µL/min Without I-AS probe	G3139-65100	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration with a SPS 4 autosampler PFA, 200 µL/min With SPS 4 probe	G3139-68000	
77/79/88/8900	PFA-ST MicroFlow nebulizer	PFA, demountable sample capillary, 200 µL/min capillary as standard. Flowrate adjustable from 20 to 400 µL/min by using alternative capillaries. Usable without autosampler and with I-AS or SPS 4 autosampler by adding alternative capillaries. See all available capillaries here.	G3139-68100	
77/79/88/8900	PFA inert sample introduction kit supplies	Required configuration for running HF Inert sample introduction system includes: PFA spray chamber (G3285-80021) PFA endcap (G3285-80020) Drain assembly (G4912-80014) PFA joining tube, straight (G3285-80024) 2.5 mm platinum injector (G3285-80035) Demountable quartz torch (G4912-80012)	G4912-68001	
77/79/88/8900	Pt/Cu sampler cone	Standard configuration Platinum tip with copper base	G3280-67036	
77/78/79/88/8900	Pt/Ni-plated sampler cone	Optional Platinum tip with nickel-plated base for higher corrosion resistance Recommended for analysis of aggressive acids (especially HCl, HF, and HClO4) and for higher-matrix samples	G3280-67142	
77/79/8800	Pt/Cu skimmer cone	Standard configuration For 77/79/8800 with s-lens Platinum tip with copper base	G3280-67064	
8900	Pt/Cu skimmer cone	Standard configuration For 8900 with s-lens Platinum tip with copper base	G3666-67401	
7900	Extraction-Omega lens assembly	Standard configuration S-lens for 7900	G8400-67002	
8900	Extraction-Omega lens assembly	Standard configuration S-lens for 8900	G3666-67400	
77/8800	Extraction-Omega lens assembly	Standard configuration S-lens for 77/8800	G3280-67035	
77/79/88/8900	Tuning solution	2 x 500 mL Contains 1 µg/L of Li, Mg, Y, Ce, Tl, Co	5185-5959	

Table 3. Process chemicals - organic reagent consumables for ICP-MS and ICP-QQQ.

Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	Peristaltic pump drain tubing	Standard configuration Pharmaprene, yellow/blue 12 pcs/pk	5005-0022	
77/79/88/8900	Peristaltic pump drain tubing	Optional Fluran, yellow/blue Recommended for NMP, xylene, and others	5042-4799	
77/79/88/8900	MicroFlow nebulizer with I-AS probe	Standard configuration with an I-AS autosampler PFA, 200 µL/min With I-AS probe	G3139-65102	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration without an I-AS autosampler PFA, 200 µL/min Without I-AS probe	G3139-65100	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration with a SPS 4 autosampler PFA, 200 µL/min With SPS 4 probe	G3139-68000	
77/79/88/8900	PFA-ST MicroFlow nebulizer	PFA, demountable sample capillary, 200 µL/min capillary as standard. Flowrate adjustable from 20 to 400 µL/min by using alternative capillaries. Usable without autosampler and with I-AS or SPS 4 autosampler by adding alternative capillaries. See all available capillaries here.	G3139-68100	
77/79/88/8900	Spray chamber	Non-UHMI configuration Quartz double-pass	G3280-80008	
77/79/88/8900	Endcap for spray chamber	Endcap for Scott spray chamber	G3280-60008	
77/79/88/8900	Connector tube	Required configuration for organic solvents for Option Gas (Ar/O_2) addition.	G3270-80024	
77/79/88/8900	Torch, 1.5 mm injector	Required configuration for organic solvents Quartz, one piece 1.5 mm injector id For testing organic solvents, excluding pure methanol and acetone solvents	G3280-80080	
77/79/88/8900	Torch, 1.0 mm injector	Required configuration for volatile organic solvents Quartz, one piece 1.0 mm injector id For testing pure methanol and acetone solvents	G3280-80081	
77/79/88/8900	Pt/Cu sampler cone	Standard configuration Platinum tip with copper base	G3280-67036	
77/78/79/88/8900	Pt/Ni-plated sampler cone	Optional Platinum tip with nickel-plated base for higher corrosion resistance Recommended for analysis of aggressive acids (especially HCl, HF, and HClO4) and for higher-matrix samples	G3280-67142	

Instrument	Description	Long Description	Part Number	Photo
77/79/8800	Pt/Cu skimmer cone	Required configuration For 77/79/8800 with s-lens Platinum tip with nickel base	G3280-67065	
8900	Pt/Cu skimmer cone	Required configuration For 8900 with s-lens Platinum tip with nickel base	G3666-67411	
7900	Extraction-Omega lens assembly	Standard configuration S-lens for 7900	G8400-67002	
8900	Extraction-Omega lens assembly	Standard configuration S-lens for 8900	G3666-67400	
77/8800	Extraction-Omega lens assembly	Standard configuration S-lens for 77/8800	G3280-67035	
77/79/88/8900	Tuning solution	100 mL Contains 10 mg/L of Li, Y, Ce, Tl, Co	5188-6564	
77/79/88/8900	Fitting	Connecting the peristaltic pump tube for the waste to the drain tubing	1610093000	
77/79/88/8900	Drain tubing	Drain tubing between peristaltic pump tubing and drain tank Marprene, recommended for ketone-based organic samples Priced in meters (more than 2 m is recommended)	3710035700	
77/79/88/8900	Spectroscopy waste container kit	Waste container, HDPE, 10 L with S60 Stay Safe Cap and fittings for connecting multiple solution lines, and charcoal filter with time strip (5043-1193)	5005-0437	
77/79/88/8900	Charcoal filter	For use with InfinityLab Stay Safe waste can Safety cap with time strip	5043-1193	
77/79/88/8900	Venting (one way) valve	Venting valve with six-month time strip	5043-1190	

Measurement of Trace Contaminants on Silicon Wafer Surfaces

Learn more

Contamination currently accounts for over 50% of the yield losses in semiconductor integrated circuit (IC) device manufacturing, leading to the increasingly greater emphasis on measuring trace metal contaminants on the surface of silicon wafers.

Table 4. Consumables for silicon wafer VPD.

Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	Peristaltic pump drain tubing	Standard configuration Pharmaprene, yellow/blue 12 pcs/pk	5005-0022	
77/79/88/8900	MicroFlow nebulizer	Standard configuration with an I-AS autosampler PFA, 200 µL/min With I-AS probe	G3139-65102	
77/79/88/8900	MicroFlow nebulizer	Recommended configuration without an I-AS autosampler PFA, 200 µL/min Without I-AS probe	G3139-65100	
77/79/88/8900	MicroFlow nebulizer	Optional configuration with an I-AS autosampler PFA, 20 to 50 µL/min With I-AS probe Recommended for high matrix or low volume samples	G3139-65106	
77/79/88/8900	MicroFlow nebulizer	Optional configuration without an I-AS autosampler PFA, 20 to 50 µL/min Without I-AS probe Recommended for high matrix or low volume samples	G3139-65108	
77/79/88/8900	PFA-ST MicroFlow nebulizer	PFA, demountable sample capillary, 200 µL/min capillary as standard. Flowrate adjustable from 20 to 400 µL/min by using alternative capillaries. Usable without autosampler and with I-AS or SPS 4 autosampler by adding alternative capillaries. See all available capillaries here.	G3139-68100	
77/79/88/8900	PFA inert sample introduction kit supplies	Required configuration for running HF Inert sample introduction system includes: PFA spray chamber (G3285-80021) PFA endcap (G3285-80020) Drain assembly (G4912-80014) PFA joining tube, straight (G3285-80024) 2.5 mm platinum injector (G3285-80035) Demountable quartz torch (G4912-80012)	G4912-68001	

Instrument	Description	Long Description	Part Number	Photo
77/78/79/88/8900	Pt/Cu sampler cone	Standard configuration Platinum tip with copper base	G3280-67036	
77/78/79/88/8900	Pt/Ni-plated sampler cone	Optional Platinum tip with nickel-plated base for higher corrosion resistance Recommended for analysis of aggressive acids (especially HCl, HF, and HClO4) and for higher-matrix samples	G3280-67142	
77/79/8800	Pt/Cu skimmer cone	Standard configuration For 77/79/8800 with s-lens Platinum tip with copper base	G3280-67064	
8900	Pt/Cu skimmer cone	Standard configuration For 8900 with s-lens Platinum tip with copper base	G3666-67401	
7900	Pt/Ni skimmer cone	Optional Platinum tip/nickel base For 7900 with m-lens Recommended for high matrix samples	G3666-67501	
8900	Pt/Ni skimmer cone	Optional Platinum tip/nickel base For 8900 with m-lens Recommended for high matrix samples	G3666-67501	
7900	Extraction-Omega lens assembly	Standard configuration S-lens for 7900 Recommended for native silicon oxide wafers	G8400-67002	
8900	Extraction-Omega lens assembly	Standard configuration S-lens for 8900 Recommended for native silicon oxide wafers	G3666-67400	
77/8800	Extraction-Omega lens assembly	Standard configuration S-lens for 77/8800 Recommended for native silicon oxide wafers	G3280-67035	
7900	Extraction-Omega lens assembly	Optional M-lens for 7900 Recommended for thermally oxidized silicon wafers	G8400-67047	
8900	Extraction-Omega lens assembly	Optional M-lens for 8900 Recommended for thermally oxidized silicon wafers	G3666-67500	
77/79/88/8900	Tuning solution	2 x 500 mL Contains 1 µg/L of Li, Mg, Y, Ce, Tl, Co	5185-5959	

General Supplies and Consumables

Below is a summary of the general supplies and consumables for ICP-MS and ICP-QQQ to ensure the normal use of the instruments to reduce downtime.

Table 5. General supplies and consumables.

Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	Torch shield plate, long-life		G1833-65419	
	Torch shield bonnet		G1833-65421	
	Graphite gasket for sampler cone	3 pcs/pk	G3280-67009	
	Cotton cleaning swab	Ultrafine cone bud shape. Ideal for cleaning the narrow and delicate orifices of the sample and skimmer cones 100 pcs/pk	9300-2574	
	Magnifier tool	For checking the condition of the ICP-MS cone orifice 10x magnification With LED lighting	5190-9614	
	Polishing abrasive sheet set	Waterproof polishing paper numbered 400 and 1,200 for wet polishing the ion lens to remove deposits 5 pcs each	G1833-65404	
	Cooling fluid	Agilent Cool Clear coolant fluid 7.6 L/pk Pack of two 1 gal (3.8 L) bottles	5799-0037	
77/79/88/8900	Argon humidifier with PFA bottle	Dual channel inert argon humidifier for high Total Dissolved Solids semiconductor applications. With bracket for installation on Agilent ICP-MS systems	G8412-68000	
77/79/8800	Argon gas filter	High purity argon supply filter recommended for lowest background with semiconductor applications	5064-8092	

Instrument	Description	Long Description	Part Number	Photo
79/8900	Big universal trap	Argon gas filter. Removes oxygen, moisture, and hydrocarbons to deliver faster stabilization times for increased ICP-MS productivity	RMSA-2	
	Gas Clean carrier gas purifier	A single, integrated gas filter to remove moisture, oxygen, and organic compounds, gas outlet impurity concentration at 1 to 10 L/min flow rate: Oxygen < 50 ppb Moisture < 0.1 ppm Organics < 0.1 ppm Recommended for He and H_2 reagent gases	CP17973	
	Gas Clean connecting unit	1 port, 1/8 in	CP7988	

Sample Containment and Supplies

Below is a summary of the sample containment for ICP-MS and ICP-QQQ compatible with semiconductor workflows.

Table 6. Sample containment and supplies.

Instrument	Description	Long Description	Part Number	Photo
77/79/88/8900	PFA lab bottle	20 mL with 33 mm closure, 31.5 mm od, for SPS 4 autosampler with rack G8410-68001	G8410-68011	
	PFA lab bottle	50 mL with 33 mm closure, 38 mm od, for SPS 4 autosampler with rack G8410-68002	G8410-68012	
	PFA lab bottle	100 mL with GL45 closure, 57.5 mm od, for SPS 4 autosampler with rack G8410-68003	G8410-68013	
	PFA lab bottle	250 mL with GL45 closure, 72 mm od, for SPS 4 autosampler with rack G8410-68004	G8410-68014	
	PFA lab bottle	500 mL with GL45 closure, 87 mm od, for SPS 4 autosampler with rack G8410-68005	G8410-68015	
77/79/88/8900	SPS sample rack, 21 positions	SPS autosampler rack with 21 positions for bottles up to 31.5 mm od, use for PFA bottle G8410-68011	G8410-68001	
	SPS sample rack, 8 positions	SPS autosampler rack with 8 positions for bottles up to 38 mm od, use for PFA bottle G8410-68012	G8410-68002	
	SPS sample rack, 4 positions	SPS autosampler rack with 4 positions for bottles up to 57.5 mm od, use for PFA bottle G8410-68013	G8410-68003	
	SPS sample rack, 2 positions	SPS autosampler rack with 2 positions for bottles up to 72 mm od, use for PFA bottle G8410-68014	G8410-68004	
	SPS sample rack, 2 positions	SPS autosampler rack with 2 positions for bottles up to 87 mm od, use for PFA bottle G8410-68015	G8410-68005	
77/79/88/8900	1.5 mL PFA Vial withclosure, 10/pk	Compatible with I-AS autosampler Tray D	G3160-68004	
	4 mL PFA Vial with closure, 5/pk	Compatible with I-AS autosampler Tray A and E	G3160-68005	
	10 mL PFA Vial with closure, 5/pk	Compatible with I-AS autosampler Tray B, D and E	G3160-68006	
	20 mL PFA Vial with closure, 5/pk	Compatible with I-AS autosampler Tray G	G3160-68007	
	80 mL PFA Rinse Jar with closure, 1/pk	Compatible with I-AS autosampler rinse station positions	G3160-68008	
	Closure with 15 mm hole for PFA Rinse Jar	Use with G3160-68009 to enable direct sampling in the rinse jar by the I-AS autosampler probe	G3160-68009	

Need further guidance?

For more details on Agilent's solutions for the semiconductor manufacturing industry that support the analysis of high-purity and high performance materials, consult the following additional resources:

Brochure: Agilent Semiconductor Industry Solutions
White Paper: Technical Overview and Performance Capability of the Agilent 7900s ICP-MS for Semiconductor Applications
Application Compendium: Measuring Inorganic Impurities in Semiconductor Manufacturing

Additional resources to ensure optimal ICP-MS performance:

ICP-MS Resource Hub

ICP-MS Supplies for Semiconductor Applications

Smart Self-Health Checks for ICP-MS Instrument

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