

PAC LAB INSTRUMENTS OVERVIEW

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> GAS CHROMATOGRAPHY



Instrument Category	Refinery Gas Analysis	Natural Gas Analysis		Boiling Point Distribution					Multi dimensional Group Type	Detailed Hydrocarbon Analysis	Oxygenates Analysis		Olefins Analysis	Aromatics Analysis		Ethanol Content of Denatured Fuel Ethanol	BioDiesel Analysis		Paraffins, Naphtenes and Aromatics in Jet Fuel Analysis	
Model	AC HiSpeed RGA AC FastRGA	AC NGA	AC Sulfur in LPG/ Natural Gas Analyzer	AC 8612™ Analyzer	AC8634™ Analyzer	AC SIMDIS Analyzers	AC HT SIMDIS	AC CNS SIMDIS	AC PIONA/ Reformulyzer® M4	AC DHA Analyzers	AC Aromatics/Oxygenates Analyzer	AC Oxytracer™	AC Fast Total Olefins (FTO) Analyzer	AC Aromatics Analyzer	AC MDA Analyzer (HPLC)	AC Ethanol Analyzer	AC All- in-One Biodiesel	AC FAME in Aviation Turbine Fuel (AVTUR) Analyzer	AC PNA in Jet Analyzer using GCxGC Technique	
Standard Method	D1946, D2163, D2504, D2598, D3588, EN ISO 7941, IP 405, EN 15984, DIN 51666, UOP 539	D1945 ISO 6974 GPA 2261 Extended NGA: ISO 6975, GPA 2286	D2712, D6159, D6228	ASTM D 86 equivalent for groups 0, 1 and 2	ASTM D 86 equivalent for groups 3 and 4, D2887, EN ISO 3924, IP 406	D7096, D3710, D2887, D6417, D5442 (wax), IP 406, ISO 3924, DIN 51435, D7213	D6352, D5307, D7169, D7500, IP 545 (Crude Oils) IP 480, IP 507, DIN 51581-2 (MOV), EN 15199-1, EN 15199-2, EN 15199-3	Complies to: D7807 Comparable to: D2887, D3710, D7096, ISO3924, IP406 D6352, D7500, D6417, D7213, D7398 D7169, EN15199-3, IP545	EN ISO 22854, D6839, D5443, IP 566, SH/T 0741, GB/T 28768-2012	Fast DHA D6729 D6730 (extended DHA) D6733 DHA Front End combi IP 601 (DHA Front End Merge)	D4815, D5580, EN 13132	D7423* D7754* *on request	D6296	D3606, EN 12177	D6591, EN 12916, IP 391	D5501, EN 15721	EN14103, EN14105, EN14106, EN14110, EN15779 D6584	IP PM EL		
Application	Non-condensable Gases, C1-C5, C5+ hydro carbons	NGA: C1-C6, C6+ hydro carbons, Hydrogen sulfide Extended NGA: C1-C14, C14+ hydrocarbons, Non- condensable gases, nitrogen, carbon dioxide and oxygen, Hydrogen sulfide	Individual volatile sulfur-containing compounds	SIMDIS, Atmospheric Distillation, Gasoline	SIMDIS, Atmospheric Distillation	Simulated Distillation, Atmospheric Distillation, Gasoline, Petrochemical Analysis	Simulated Distillation, Atmospheric Distillation, Crude	Simultaneous Simulated Distillation for Carbon, Nitrogen and Sulfur for crude and crude products. IBP > 151°C (304°F) FBP < 700°C (1292°F)	Hydrocarbon Group Types and Oxygenates	C1 - nC14 ethanol, Butanol, MTBE/ETBE/ TAME, methanol, t-Butanol	D5580 application: aromatic content in gasoline by determining: Benzene, Toluene, Ethylbenzene, Xylenes, C9 (and heavier) aromatics D4815 application: others and alcohols in gasoline, including: MTBE, ETBE, TAME, DIPE, C1-C4 alcohols	Methanol, Ethanol, n-Propanol, i-Propanol, n-Butanol, 2-Butanol, t-Butanol, Acetone, MEK	Olefins, Gasoline	Aromatics, Gasoline	Mono-ring aromatics, Di-ring aromatics, Poly-ring aromatics	Bioethanol Oxygenates	BioDiesel	Aviation Turbine Fuel (AVTUR), Analysis Range C16:0, C18:0, C18:1, C18:2, C18:3	Paraffins, Naphtenes, Aromatics	
Refinery Gas	☑		☑																	
Natural Gas		☑	☑																	
LPG			☑																	
Gas in Petrochemical			☑																	
Straight Run/ Naphtha				☑		☑		☑	☑	☑		☑								
Depentanized Bottom				☑		☑		☑	☑	☑		☑								
Reformate				☑		☑		☑	☑	☑		☑								
FCC-Light				☑		☑		☑	☑	☑		☑								
FCC-Middle				☑		☑		☑	☑	☑		☑								
FCC-Heavy				☑		☑		☑	☑	☑		☑								
Visbreaker				☑		☑		☑	☑	☑		☑								
Alkylate				☑		☑		☑	☑	☑		☑								
Isomerate				☑		☑		☑	☑	☑		☑								
Gasoline Blend				☑		☑		☑	☑	☑		☑		☑	☑					
Gasoline with Oxygenates				☑		☑		☑	☑	☑		☑		☑	☑					
Jet Fuel					☑	☑		☑	☑	☑		☑						☑	☑	
Diesel					☑	☑		☑	☑	☑		☑						☑	☑	
Lubricant (stock base) with and without Oxygenates							☑	☑												
Thermal Crack Feed							☑	☑												
Crude Oil							☑	☑		☑										
Residue							☑	☑												
Biofuels																	☑	☑		
Customized	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑

Due to continuing product development, specifications are subject to change at any time without notice. All products are CE compliant.

PAC LAB INSTRUMENTS OVERVIEW

> PHYSICAL PROPERTIES



Instrument Category	Distillation			Cold Behavior					Vapour Pressure
Description	Atmospheric Pressure Distillation	Atmospheric Distillation (micro-distillation method)	Vacuum Distillation	Automatic Cloud & Pour Point Analyzer (mini method)	Automatic Cloud & Pour Point Analyzer	Automatic Cloud & Pour Point Analyzer	Automatic Cold Filter Plugging Point Analyzer	Automatic Cold Filter Plugging Point Analyzer	Automated Vapor Pressure Analyzer
Model	Herzog Optidist	ISL PMD 110	Herzog HDV 632	ISL MPP 5Gs	Herzog HCP 852	ISL CPP 5Gs	ISL FPP 5Gs	Herzog HCP 842	Herzog HVP 972
Standard Method	D1078, D850, D86, IP 123, IP 195, ISO 3405	D7345 Correlation to: D86, D1160 (FAME)	D1160	D7346, D7689, Correlates to: D97, D2500, ISO 3015, ISO 3016, JIS K2269	D2500, D5853, D6892, D97, IP 15, IP 219, IP 444, ISO 3015, ISO 3016, JIS K2269	D2500, D5771, D5853, D5950, D97, IP 15, IP 219, IP 444, ISO 3015, ISO 3016, JIS K2269	EN 16329, D6371, EN 116, IP 309, JIS K2288	EN 16329, EN 116, D6371, IP 309, JIS K2288	D5191, D6378, EN 13016, IP 394
Applications	Atmospheric Distillation	Atmospheric Distillation	Vacuum Distillation	Cloud Point, Pour Point	Cloud Point, Pour Point	Cloud Point, Pour Point	Cold Filter Plugging Point	Cold Filter Plugging Point	Vapour Pressure



Instrument Category	Flash Point										
Description	Automatic Pensky Martens Closed Cup Flash Point Tester	Automatic Pensky Martens Closed Cup Flash Point Tester	Automatic Pensky Martens Closed Cup Flash Point Tester	Semi-Automatic Pensky Martens Flash Point Tester	Automatic Cleveland Flash Tester	Automatic Abel Closed Cup Flash Point Tester	Semi-Automatic Tag Closed Cup Flash Point Tester	Automatic Abel Closed Cup Flash Point Tester	Automatic TAG Closed Cup Flash Point Tester	Semi-Automatic TAG Closed Cup Flash Point Tester	Automatic TAG Closed Cup Flash Point Tester
Model	Herzog HFP 339	Herzog HFP 360	ISL FP 93 5G2	Herzog HFP 380	ISL FP925G2	Herzog HFP 364	Herzog HFP 384	ISL FP 170 5G2	Herzog HFP 362	ISL HFP 382	ISL FP 56 5G2
Standard Method	D93, EN ISO 2719, IP 34, ISO 2719, JIS K2265	D93, EN ISO 2719, IP 34, ISO 2719, JIS K2265	D93, EN ISO 2719, IP 34, ISO 2719, JIS K2265	D93, EN ISO 2719, IP 34, ISO 2719, JIS K2265	D92, ISO 2592	ISO 13736	ISO 13736		D56	D56	D56
Applications	Flash Point Pensky-Martens	Flash Point Pensky-Martens	Flash Point Pensky-Martens	Flash Point Pensky-Martens	Flash Point Cleveland Open Cup	Flash Point Abel Cup	Flash Point Abel Cup	Flash Point Abel Cup	Flash Point TAG	Flash Point TAG	Flash Point TAG



Instrument Category	Cetane	Density	Others					
Description	Automatic Derived Cetane Number (DCN) Analyzer	Automated Digital Density Meter	Micro Carbon Residue Tester	Noack Evaporation Loss Tester	Automatic Ring and Ball Tester	Ring & Ball Testers	Automated Salt in Crude	Herzog Gum Test
Model	Herzog Cetane ID 510	ISL VIDA	Alcor MCRT 160	ISL NCK 2 5G	ISL RB 36 5G	Herzog HRB 754	Herzog SC-960	Herzog HGT 915, HGT 917
Standard Method	D7668	D4052, D5002, IP 365, ISO 12185, DIN 51757	D189, D4530, DIN 51551, GB/T 17144, IP 398, ISO 10370, ISO 6615, JIS K2270	D5800, CEC L 40 A 93, IP 421	D36, E28, EN 1427, IP 58, ISO 4625	D36, E28, EN 1427, IP 58, ISO 4625	D3230	D381, EN 5, IP 131, IP 540, ISO 6246
Applications	Combustion Cetane	Density	Carbon Residue	Evaporation Loss	Bitumen Ring and Ball	Bitumen Ring and Ball	Salt in Crude Corrosion	Gum Content

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> ELEMENTAL ANALYSIS

The MultiTek Application Testing Program is additional application testing performed at the factory on the instrument to be delivered. The MultiTek Standard and Premium Application Testing are performed with a sample of known (reference) or accepted reference value (ASTM PTP program sample) of PAC's choice using one calibration range and one sample. A QC sample (~5 ml or ~5 g) will be provided. The MultiTek Custom Application Testing is performed to custom requirements. For all, a report will be prepared stating the method parameters, sample value, and testing results. In addition, the application will be validated on-site.



Instrument Category	Antek MultiTek Standard Application Testing	Antek MultiTek Premium Application Testing	Antek MultiTek Custom Application Testing
Model	Multitek S, Multitek N, MultiTek S-N, MultiTek LLS	Multitek S, Multitek N, MultiTek S-N, MultiTek LLS MultiTek IC, MultiTek N-C, MultiTek S-IC, MultiTek N-S-C	MultiTek
Standard Method	Sulfur: D5453, Nitrogen: D5176	Sulfur: D5453, Nitrogen: D4629, Halides: D7359	
Applications	<ul style="list-style-type: none"> Sulfur D5453 Gasoline within 0 – 100 mg/kg S Sulfur D5453 Diesel within 0 – 20 mg/kg Nitrogen D5176 water within 0 – 1000 mg/kg Nitrogen D5762 Heavy Oil within 0 – 10,000 mg/kg 	<ul style="list-style-type: none"> Sulfur D6667 LPG within 1 - 100 mg/kg in C3/C4 Sulfur D5453 Jet Fuel within 0 - 3000 mg/kg Sulfur D5453 Biodiesel within 0 - 25 mg/kg Sulfur D7183 Aromatics within 0.5 - 100 mg/kg in toluene or xylene Nitrogen LPG within 1-300 mg/kg in C3/C4 Nitrogen in Polymers within 0 - 500 mg/kg Nitrogen D4629 Aromatics within 0.5-100 mg/kg in toluene or xylene Halides LPG within 1-300 mg/kg F/Cl in C3/C4 Halides D7359 Aromatics within 0.5 - 50 mg/kg F/Cl in toluene or xylene 	<p>Examples of Customized Elemental Applications are:</p> <ul style="list-style-type: none"> Nitrogen in Food Halides in Coal Fluoride in Aluminum Oxide <p>Please contact PAC for information on your specific requirements</p>

> JET FUEL ANALYSIS



Instrument Category	Thermal Stability	
Description	Jet Fuel Thermal Oxidation Tester for Fast, Simple and Accurate Jet Fuel Analysis	Automate Freezing Point Analyzer
Model	Alcor JFTOT IV	ISL FZP 5G2s
Standard Method	D3241, IP 323, ISO 6249	D7153, MIL-DTL-5624V Correlates to: D2386, IP 16, IP 529 (DEF STAND 91-91), ISO 3013, JIS K2276
Applications	Thermal Oxidation JFTOT	Freezing Point

> SPECTROSCOPY



Instrument Category	Spectroscopy			
Description	Ethanol Purity/ Ethanol in Gasoline	Complete Portable Gasoline Analysis	Complete, Portable Diesel and Jet Fuel Analyzer	Diesel Fuel Dye Marker & ASTM Color
Model	PetroSpec QuickSpec™	PetroSpec GS PPA	PetroSpec TDPPA	PetroSpec DT 100
Standard Method	D4806	D5845, D6277		
Applications	Ethanol Purity	Gasoline Characterization	Diesel and Jet Fuel	Color and Haze

> VISCOSITY MEASUREMENT



Instrument Category	Viscosity							
Description	Small Sample Viscometer	Temperature Controlled Viscometer	Micro Sample Viscometer	High Pressure Viscometer	Multirange Viscometer	HVU Series Automated Viscometers	Viscometer Houillon	Manual Viscometer Bath
Model	CVI VISCOlab 4000	CVI VISCOlab 3000	CVI VISCOlab5000	CVI VISCOlab PVT	Herzog HVM 472	Herzog HVU 481, HVU482	ISL VH1, VH2	ISL TVB 445
Standard Method	D7483	D7483	D7483	D7483	D445, D446, IP 71, ISO 3104, ISO 3105	D445, D446, DIN 51562, IP 71, ISO 3104, ISO 3105	D7279	D445, D446, DIN 51562, IP 71, ISO 3104, ISO 3105
Applications	Absolute Viscosity	Absolute Viscosity	Absolute Viscosity	Absolute Viscosity	Viscosity	Viscosity	Viscosity	Viscosity

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