



MAN-TECH
Load. Start. Done.

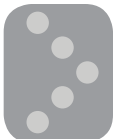


PC-Titrate System with 2 buret drives and AutoMax122 Sampler
47 x 125 mL rack, TAN&TBN analysis in the same batch run



QC-Titrate with AutoMax73 Sampler
32 x 125 mL rack, TAN or TBN dedicated batch runs

PetroMulti™ Analyzers



Man-Tech PetroMulti Analyzers are designed to effectively and safely automate the analysis of Petrochemical methods for TAN and TBN in new and used oils. PetroMulti analyzers are proven systems, and are currently being used by the largest oil laboratory network in the world.

With PetroMulti Analyzers, Man-Tech delivers:

- **Rugged, durable technology**
- **Low cost of ownership**
- **Complete automation of a difficult methods**
- **Safe, green automation in non-aqueous matrices**

What is important to Petrochemical analysis?

Following ASTM methods for TAN/TBN, the entire analysis for 1 sample or 100's of samples is completely automated, requiring no operator intervention. In addition, there is no need to pause the system and manually wipe the electrode. Simply load the samples with weights automatically downloaded from the balance, click start and walk away.

The Man-Tech PetroMulti Analyzer will:

- Actively and effectively rinse utilizing either a 3 or 5 stage rinse (depending on method conformity) utilizing a minimum amount of organic solvent
 - Contributes to a greener solution in the laboratory
- Automatically add titration solvent to the sample and effectively dissolve the sample in the organic solvent
 - Eliminates handling of solvent by the analyst
- Automatically titrate the sample
- Use Smart Man-Tech endpoint detection, correctly providing the answers following ASTM methods even for difficult samples with no apparent endpoints
- Automatically extract the analyzed sample and organic solvent to waste
 - Ensures a safer working environment
- Deliver results that stand the test of time



Proven Quality Performance

A Chemist's quote:

"The helicopter lands in Kentucky and the gear oil is checked. The helicopter takes off and lands safely in Pensacola. We know we can count on the Man-Tech PetroMulti Analyzer to deliver quality results that allow us to make correct, safe, operational decisions regarding our helicopter."

AutoMax Samplers in the PetroMulti Analyzers

The heart of the automation system is the Man-Tech AutoMax Samplers. The rugged, durable AutoMax samplers are true X,Y and Z autosamplers. The probe arm moves direct to the samples without traveling over unanalyzed samples. The samples themselves do not move which is very important with non-aqueous methods.

In addition, it is a simple matter to effectively assign rinse positions and utilize Man-Tech's IntelliRinse, thereby ensuring an effective rinse, while still minimizing organic solvent usage.

AutoMax Sampler Capacities

The capacity of AutoMax Sampler depends upon the total sample and solvent volume required, the sample cup used (diameter and height) and the number of rinse stations allocated. The following capacities utilize 3 rinse positions which include an electrode re-hydration station.

Sample cup	AutoMax 73	AutoMax 122	AutoMax 197
120ml	40	62	97
125ml	32	50	77
50ml (TBN only)	73	122	197
Dixie Cups	32	50	77

Additional samples cups and custom racks are available.

Rinse stations are included in the capacities



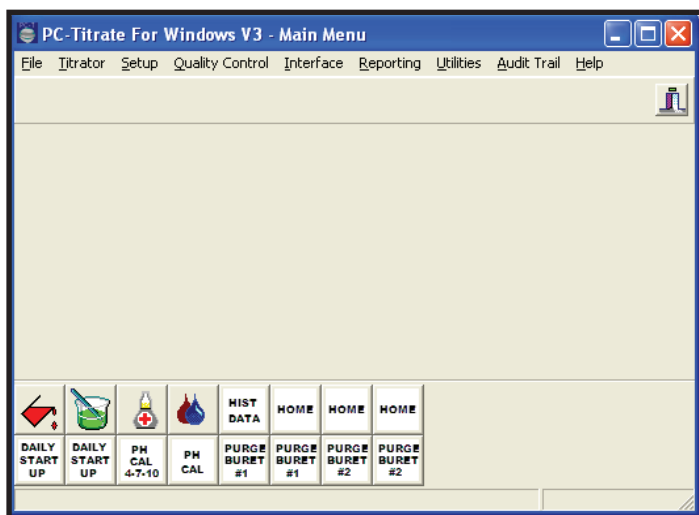
AutoMax 197 with 77x125ml sample cup rack.

The largest capacity sampler for 125ml sample cups for TAN/TBN analyses.

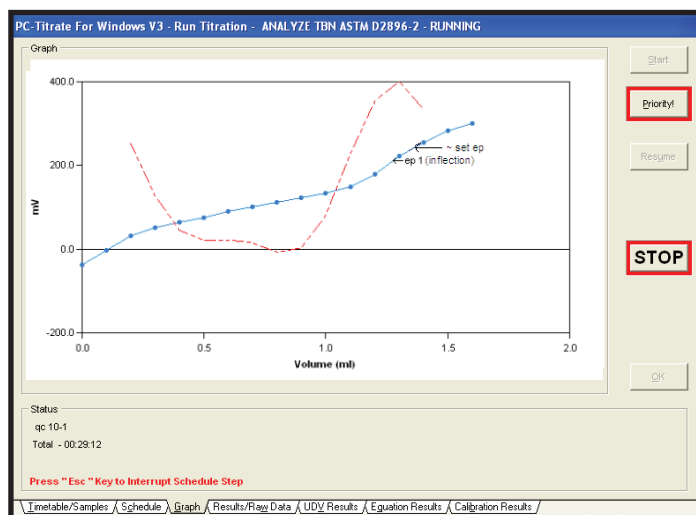
PetroMulti Analyzers Product Selection Guide

	PC-Titrate	QC-Titrate
General Capabilities		
Titration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Endpoint Selection		
<ul style="list-style-type: none"> • Inflection • Set mV/pH • Both simultaneous • Real time decision making for both 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
pH/ISE Measurements	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Pump Connections		
# of Buret Drives	4	1
48000 step buret drive	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TitraValve – increases on-demand titrant availability to 8 titrants per buret	<input checked="" type="checkbox"/>	-
Reagent addition/extraction pumps (eg. Solvent addition/extraction, pH adjustment, etc.)	40	4
Use of non-aqueous pumps for solvent addition/extraction, designed for safety with organic solvents	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Probe Connections		
# of electrodes (pH, silver/sulfide, redox, photometric, etc.)	4	2
Electrodes Galvanically separated	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AutoMax Samplers		
AutoMax 73	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AutoMax 122	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AutoMax 197	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
# of rinse positions	1 – 20	1 – 20
IntelliRinse	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Applications		
TAN	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TBN	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
TAN/TBN in the same run	<input checked="" type="checkbox"/>	-
Additional Petrochemical Applications	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<ul style="list-style-type: none"> • H₂S/Mercaptan, MEA, chloride, Bromine Number • In the same run where applicable 	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input checked="" type="checkbox"/>	-

System Screen Shots



Auto Run Buttons

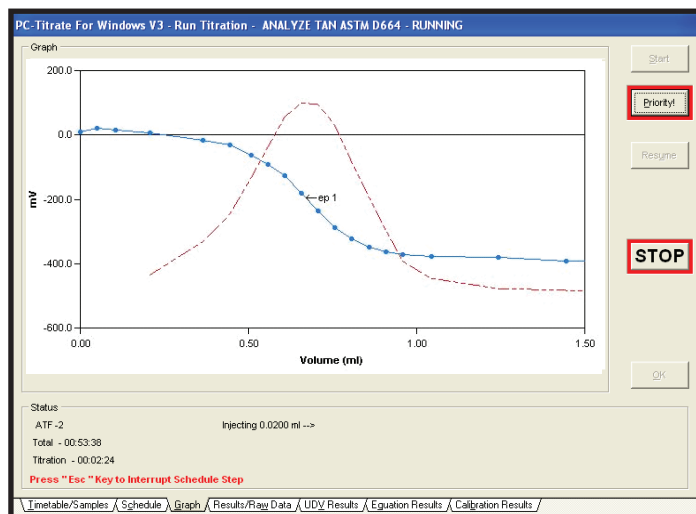


TBN Titration Curves

Sample ID	pH11	TANin	TANsp	EPVin	INFvw	EPVsp
ATF-1	-305.170	0.590	-0.233	0.430	-237.836	0.000
ATF-2	-305.170	0.300	-0.227	0.266	-123.979	0.000
ATF-3	-305.170	0.594	-0.229	0.443	-237.978	0.000
ATF-4	-305.170	0.601	-0.230	0.446	-239.622	0.000
ATF-5	-305.170	0.240	-0.225	0.255	-115.507	0.000
ATF-6	-305.170	0.594	-0.231	0.440	-237.980	0.000
ATF-7	-305.170	0.606	-0.231	0.447	-240.038	0.000
ATF-8	-305.170	0.594	-0.235	0.435	-237.798	0.000
ATF-9	-305.170	0.268	-0.230	0.267	-122.761	0.000
ATF-10	-305.170	0.303	-0.231	0.285	-127.413	0.000
QC Low-1	-305.170	0.344	-0.237	0.302	-146.494	0.000
QC High-1	-305.170	2.283	-0.456	0.740	-210.683	0.000
ATF-11	-305.170	0.590	-0.231	0.438	-235.237	0.000
ATF-12	-305.170	0.297	-0.230	0.283	-131.105	0.000

Final Results Screen

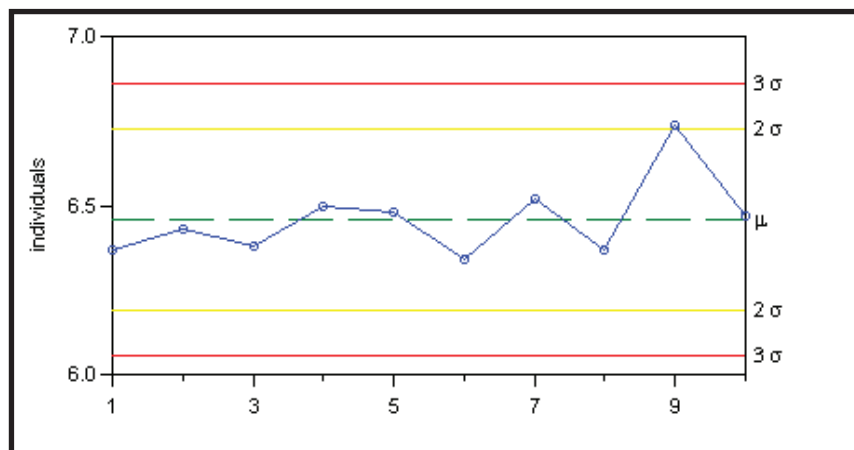
pH 11 = set mV at pH 11 determined for the batch
TANin = TAN result based on inflection endpoint.



TAN Titration Curves

QC Chart

Mean = 6.46mg KOH/g sample , RSD = 2.07%



Applications and TAN/TBN Standards Available:

Applications	
Method	ASTM
TAN	D664, D3339, D974
TBN	D4739, D2896

TAN /TBN Standards	
PGS-1000-177	TAN Reference Standard, 0.10mg KOH/g, 125g bottle, package of 3 bottles
PGS-1000-171	TAN Reference Standard, 0.50mg KOH/g, 125g bottle, package of 3 bottles
PGS-1000-175	TAN Reference Standard, 1.0mg KOH/g, 125g bottle, package of 3 bottles
PGS-1000-172	TAN Reference Standard, 2.0mg KOH/g, 125g bottle, package of 3 bottles
PGS-1000-178	TAN Reference Standard, 2.50mg KOH/g, 125g bottle, package of 3 bottles
PGS-1000-176	TAN Reference Standard, 3.0mg KOH/g, 125g bottle, package of 3 bottles
PGS-1000-174	TBN Reference Standard, 10.0mg KOH/g, 50g bottle, package of 3 bottles
PGS-1000-179	TBN Reference Standard, 15.0mg KOH/g, 50g bottle, package of 3 bottles
PGS-1000-180	TBN Reference Standard, 30.0mg KOH/g, 50g bottle, package of 3 bottles
PGS-1000-181	TBN Reference Standard, 40.0mg KOH/g, 50g bottle, package of 3 bottles
PGS-1000-173	TBN Reference Standard, 6.0mg KOH/g, 50g bottle, package of 3 bottles
PGS-1000-182	TBN Reference Standard, 70.0mg KOH/g, 50g bottle, package of 3 bottles



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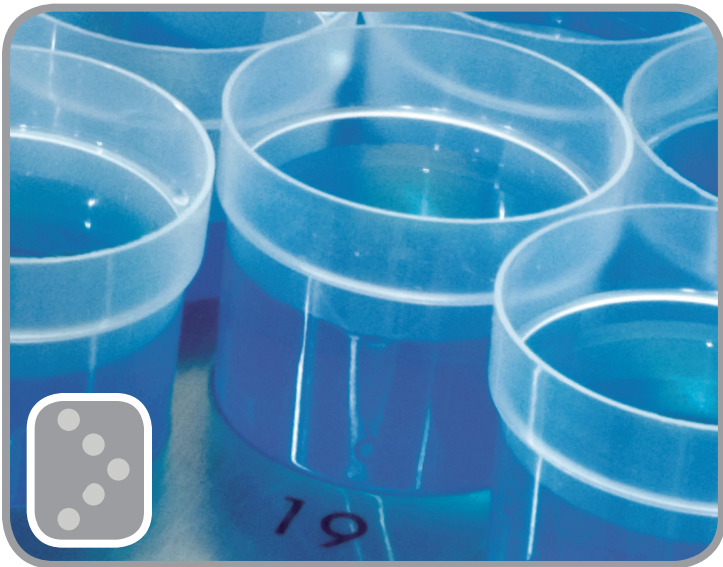
Application notes for most of these are available from Man-Tech.

Please visit www.mantech-inc.com to request the application notes.

Additional Petrochemical Applications include:

- H₂S/Mercaptan
- Bromine Number
- MEA
- MDEA
- % Caustic
- Chloride

The PetroMulti Analyzers are used in a variety of environments around the world. These include laboratories, refineries, military bases, desert locations, mobile units and more. Some systems have been in operation for more than 10 years, running hundreds of samples per day in these difficult matrices.



The Man-Tech PetroMulti Analyzers are proven, safe instruments generating TAN/TBN results that stand the test of time.



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