

dQant7 Digital Quantitative Analysis Tool

dQant7 - Quantitative Analysis Using both Energy and Wavelength Dispersive X-ray Spectrometers

dQant7, a Microsoft Windows application, performs quantitative electron probe microanalysis using data from both energy (EDS) and wavelength dispersive x-ray (WDS) spectrometers. **dQant7** is an upgrade from our very successful **dQant32** program. **dQant7** controls our **dSspec7** system, which automates the wavelength dispersive spectrometers, the stage motors and the WDS counting electronics for your electron probe microanalyzer.

New features in **dQant7** include:

- Faster serial communications.
- Overlay two WDS spectra with flexible scaling, multiple peak markers and annotations.
- Database files upgraded to Microsoft Access 2003.
- Ability to specify the exact order in which to measure the elements for an analysis.
- Automatic PHA setup or detector bias scan from the element table.
- Entering new elements into the element table automatically selects the optimum crystal, position and PHA settings.
- While viewing analytical results, a "Copy to Excel" button will open Excel and paste the data
- Auto Focus is now faster and more user configurable.

dQant7 along with **dPict7** (our digital imaging program) provides a truly state-of-the-art replacement system for your aging EPMA automation package. In many cases a replacement system is equivalent to the cost of a few yearly service contracts.

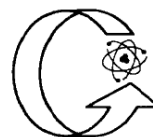
This brochure describes **dQant7** with illustrations from actual screens seen in the course of operating the program. The EDS program, PGT's PC based Avalon, is controlled from within **dQant7** giving you the capability of combined analyses.

The on-line HELP, along with an analysis wizard, will guide you through your first analysis and also serve as a reference for future questions for the novice and expert alike. Help is available by phone, on-site, by e-mail, or from our web site. Software updates are also on our web site.

Take advantage of Geller MicroAnalytical Laboratory, certified to ISO-9001 and Accredited to ISO-17025, a company with years of EPMA experience. We are one of the few companies that know the instrumentation, the applications, and how to make it all work together. We also offer analytical services using **dQant7** on our JXA-8600 and training courses on demand- at your site or ours. We will be happy to supply you with demonstration programs for **dSspec7**, **dQant7**, **dPict7** and Image Pro Plus (for particle size counting). These programs are fully functional (with the exception of data collection or the importing of external data).

System Requirements for dQant7

A standard high end PC (we prefer the Dell Optiplex line) with at least 1GB memory, Microsoft Windows XP or Vista and three serial ports. **dQant7** uses a parallel port "key" which is transparent to other connected devices. Depending on the configuration, PCI slots and USB ports will also be required. Please call for details.



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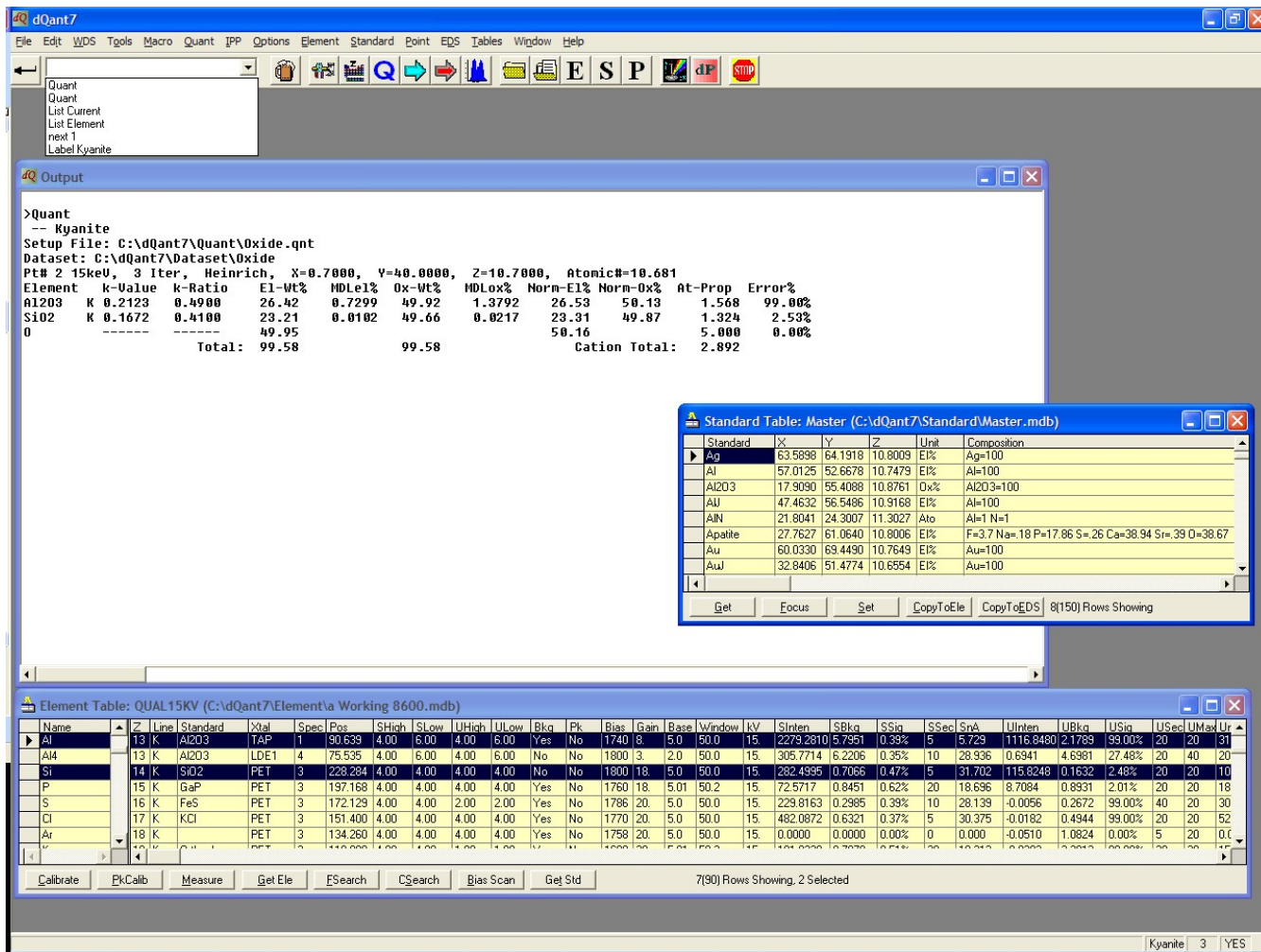
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DEMO DISKS AVAILABLE!

dQant7 starts at \$15K (with customer supplied computer). User installed.

We are certified to ISO-9001 and 17025



The dQant7 main window shows a menu, a combo box in which to type commands (it also stores all commands for future instant recall), a tool bar for frequently used operations and it contains all other windows.

The Element Table is the heart of dQant7. It stores spectrometer parameters and x-ray intensities from both the standard and the unknowns and provides the control for collecting x-ray intensities. The Standard Table stores stage positions and concentrations of your standards. Commands for getting, setting and refocusing are in the Standard menu or on the buttons in the bottom of the table.

All of the tables are Microsoft Access 2003 database files, which can be imported into many applications or worked on within Access. They can be sorted and queried on any column.

The Output window simulates printer output. Command responses and error messages are written here. The output can be copied to the clipboard, printed, saved or automatically saved to a selected file as the text is written. Files are written in ASCII format.

All program errors are trapped and identified so that the program will never crash. A log file is created that pin-points exactly what the error is and where it occurred within the program.

Average Reference Al

Element Table	Standard	Pos(mm)	Net Peak	Bkg	1-Sig	Sec	nA	Date	Time
PtAl Coating	Al	90.691	2989.92	5.53	0.34	5	5.892	05/25/...	08:01:29
PtAl Coating	Al	90.691	2988.12	5.53	0.34	5	5.884	05/25/...	08:01:52
PtAl Coating	Al	90.691	2986.31	3.40	0.34	5	5.886	05/25/...	08:02:22
QUAL20KV	Al	90.691	3075.25	3.44	0.32	5	6.270	05/30/...	10:06:09
Topa	Al	90.686	3083.21	2.99	0.31	5	6.821	05/31/...	09:10:40
PtAl Coating	Al	90.699	2959.33	3.54	0.34	5	5.769	06/04/...	12:30:15
Topa	Al	90.694	3049.95	3.28	0.31	5	6.955	06/06/...	13:28:56
Borosilicate	Al2O3	90.641	967.46	1.61	0.31	5	21.100	06/13/...	10:40:25
Borosilicate	Al2O3	90.649	987.68	2.24	0.31	5	20.911	06/13/...	10:48:49
PtAl Coating	Al	90.691	2905.38	3.54	0.34	5	5.880	06/14/...	13:50:28

Averages: 3039.26 3.32 0.32

Minimum Detection Limit

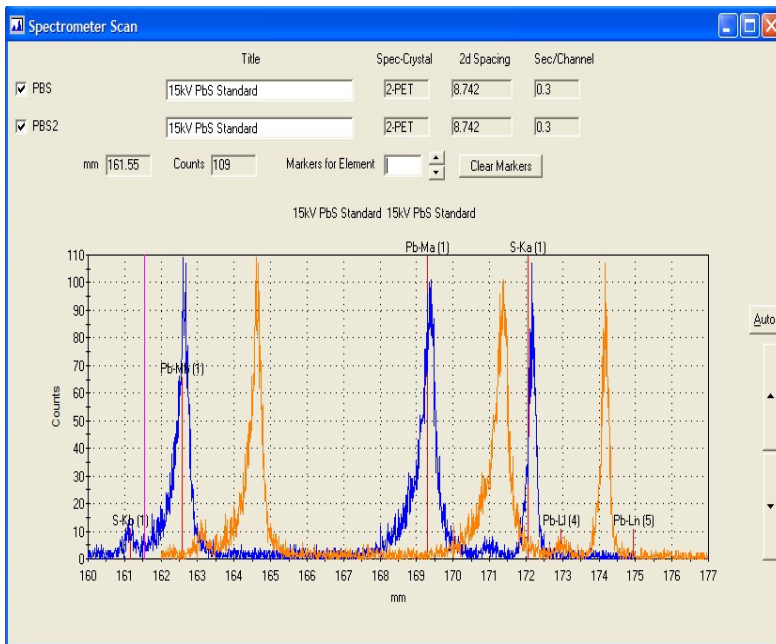
Counting Time (seconds) Print to Output Window

Beam Current (nA)

Reference	Element	Std EL%	MDL(ppm)
Al	Al	52.93	127
Si	Si	46.74	264

Standard calibration data can be accumulated into Average files. From there you can select which standardizations are to be included in the average. Averages are then written to the Element Table.

Using standard intensities from the Element Table, Minimum Detectability Limits can be calculated. By varying the counting time and beam current conditions, it is easy to determine what data collection conditions are necessary to achieve the desired detection level.



The WDS Spectrum display provides live viewing during data acquisition for all your spectrometers simultaneously. Functions are available for a cursor, x-ray marker lines, labels and plotting in units of mm, angstroms or keV. There are macro commands, which allow you to collect and save spectra in an unattended mode. Two spectra can be overlaid for comparison.

Switches and Variables

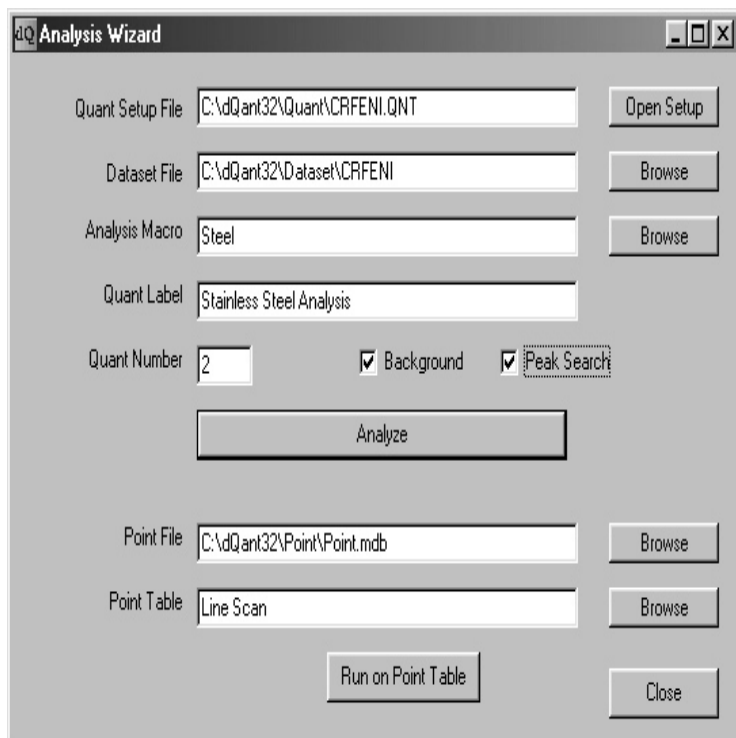
Switches

- Global
- Background
- Auto Background
- Reposition
- Stage Standard
- Focus Standard
- Jog
- Auto Focus
- Measure Beam
- Blank
- Record Absorbed
- Scan
- Average
- Counts
- Results
- Printout File

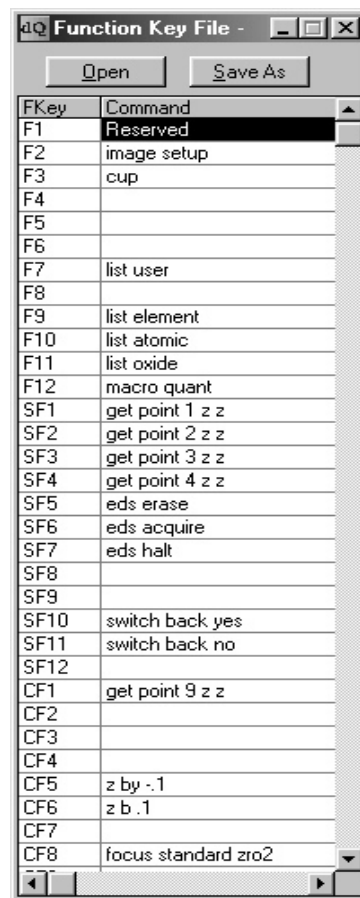
Variables

Minimum Counting Time (sec)	<input type="text" value="5"/>	Fine Search Increment	<input type="text" value="5"/>
Standard Maximum Time (sec)	<input type="text" value="20"/>	Fine Search Maximum (sec)	<input type="text" value="1"/>
Unknown Maximum Time (sec)	<input type="text" value="20"/>	Coarse Search Increment	<input type="text" value="20"/>
% Standard Deviation	<input type="text" value="0.5"/>	Coarse Search Maximum (sec)	<input type="text" value="0.3"/>
% Unknown Deviation	<input type="text" value="1"/>	# Points in Peak Search	<input type="text" value="30"/>
Bkg Counting Time Ratio	<input type="text" value="0.5"/>	Max Counts in Peak Search	<input type="text" value="100"/>
Beam Channel	<input type="text" value="Cup"/>	Min Counts in Peak Search	<input type="text" value="20"/>
% Accuracy Error of Standard	<input type="text" value="1"/>	Peak Fraction (%)	<input type="text" value="90"/>
# Days for Calibration	<input type="text" value="3"/>	# of peak search attempts	<input type="text" value="2"/>
% Abs Change for Bkg On	<input type="text" value="4"/>		
Beam Measure Interval	<input type="text" value="10"/>		

The Options form is used to view and modify the states of system switches and variables, which are used to tailor operation of the EPMA to specific applications. The settings can also be changed from a macro command and are stored in user configuration files.



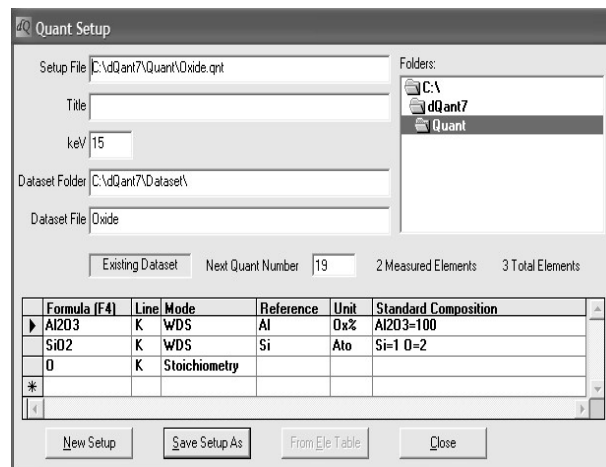
The Analysis Wizard provides total control and flexibility of your analyses. Define setup and data files, labels, key switches and analyses modes.



Element	Z	Line	keV	NI	Intensity	N-Lambda	LIF	PET	TAP	STE	LDE1	LDEC	LDEB
Be	4	Ka	0.1087368	1	100	114							
B	5	Ka	0.1833728	1	100	67.6				188.53		193.14	128.76
C	6	Ka	0.2773154	1	100	44.7				124.66	208.60	127.71	85.14
N	7	Ka	0.3922785	1	100	31.6				88.13	147.47	90.29	60.19
O	8	Ka	0.5248095	1	100	23.62			256.77	65.87	110.23	67.49	
F	9	Ka	0.6766375	1	100	18.32				199.15		85.49	
Ne	10	Ka	0.84846	1	100	14.61				158.82		68.18	
Na	11	Ka	1.040797	1	100	11.9101				129.47			
Mg	12	Ka	1.253387	1	100	9.89				107.51			
Al	13	Ka	1.486449	1	100	8.33934				90.66			
Si	14	Ka	1.739687	1	100	7.12542		228.22	77.46				
P	15	Ka	2.013318	1	100	6.157		197.20	66.93				
S	16	Ka	2.307452	1	100	5.37216			172.07				
Cl	17	Ka	2.621938	1	100	4.7278			151.43				
Ar	18	Ka	2.957202	1	100	4.1918			134.26				
K	19	Ka	3.313198	1	100	3.7414			119.83				
Ca	20	Ka	3.691054	1	100	3.35839	233.53	107.57					
Ca	20	La	0.3412056	1	100	36.33				101.32	169.54	103.80	69.20
Sc	21	Ka	4.089874	1	100	3.0309	210.76	97.08					
Sc	21	La	0.3954067	1	100	31.35				87.43	146.30	89.57	59.71
Ti	22	Ka	4.51008	1	100	2.74851	191.12	88.03					
Ti	22	La	0.4520788	1	100	27.42				76.47	127.96	78.34	52.23
V	23	Ka	4.951349	1	100	2.50356	174.09	80.19					
V	23	La	0.5111753	1	100	24.25				67.63	113.17	69.29	
Cr	24	Ka	5.41381	1	100	2.2897	159.22	73.34					
Cr	24	La	0.5728281	1	100	21.64				235.24	60.35	100.99	61.83
Mn	25	Ka	5.897746	1	100	2.10182	146.15	67.32					

An X-ray Wavelength Database contains wavelengths for all the major x-ray lines and displays spectrometer positions for x-ray lines up to 7th order. It can be used to determine crystal positions for specific elements. Possible peak overlaps can be verified by noting multiple order reflections present at a particular crystal position. The data can be sorted in any way or easily searched. Being a Microsoft Access 2003 database file, the data can be easily modified or supplemented. **How about showing a graph with the peaks identified (truncate the λ database)? I think it would be a good idea to have a comparison sheet with dQuant32 showing the differences.**

dQuant7 commands can be assigned to 48 function keys for immediate operation of frequently used commands or macros. Macros are dQuant7 command programs providing powerful flexibility and control of automated functions.



The Quant Setup form makes it easy to create and edit setup files, which define the quantitative analysis. Since correction factors of the standards can be quickly calculated for each analysis, the standard compositions and all elements in the unknown as well as the standards must be included. dQuant7 will search the elements in the standards and automatically include them in the list along with oxygen if oxide formulas are entered.