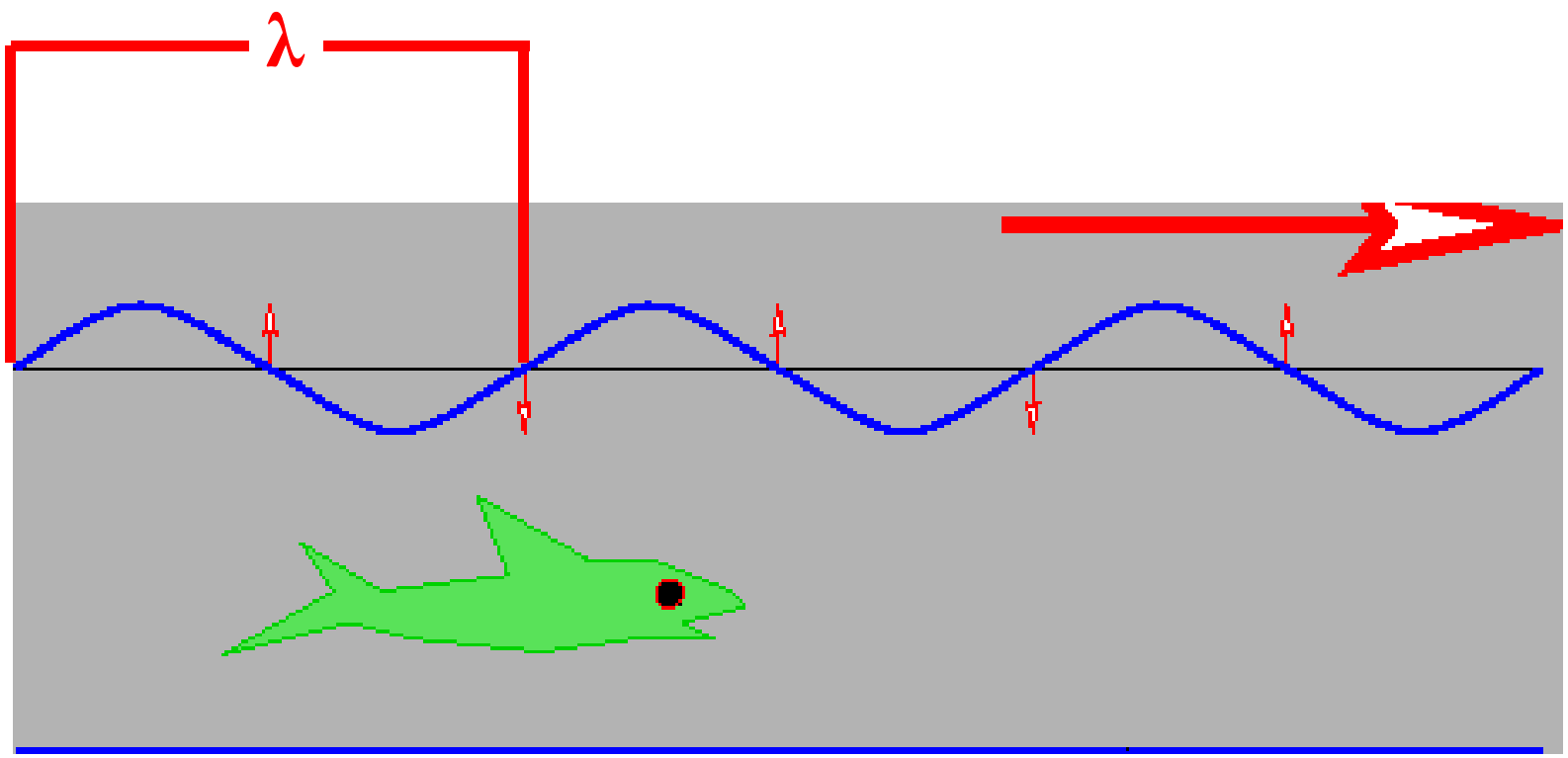
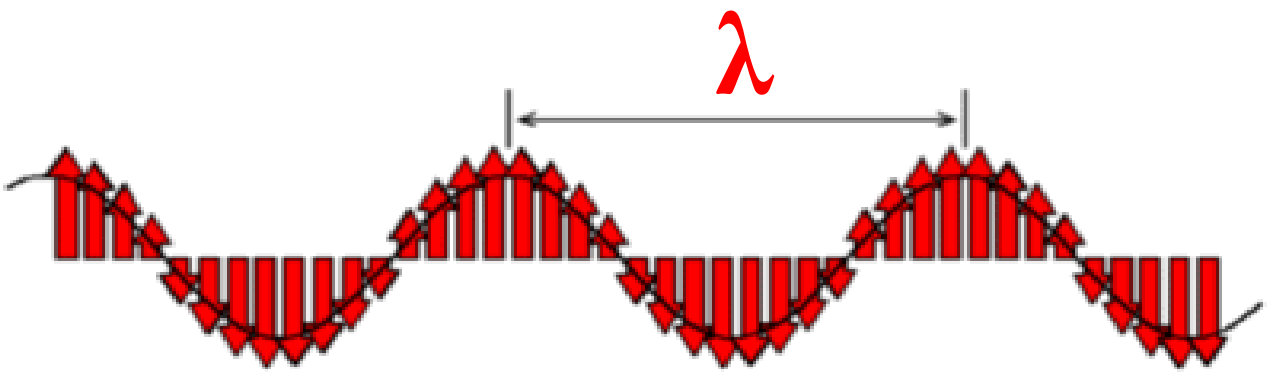
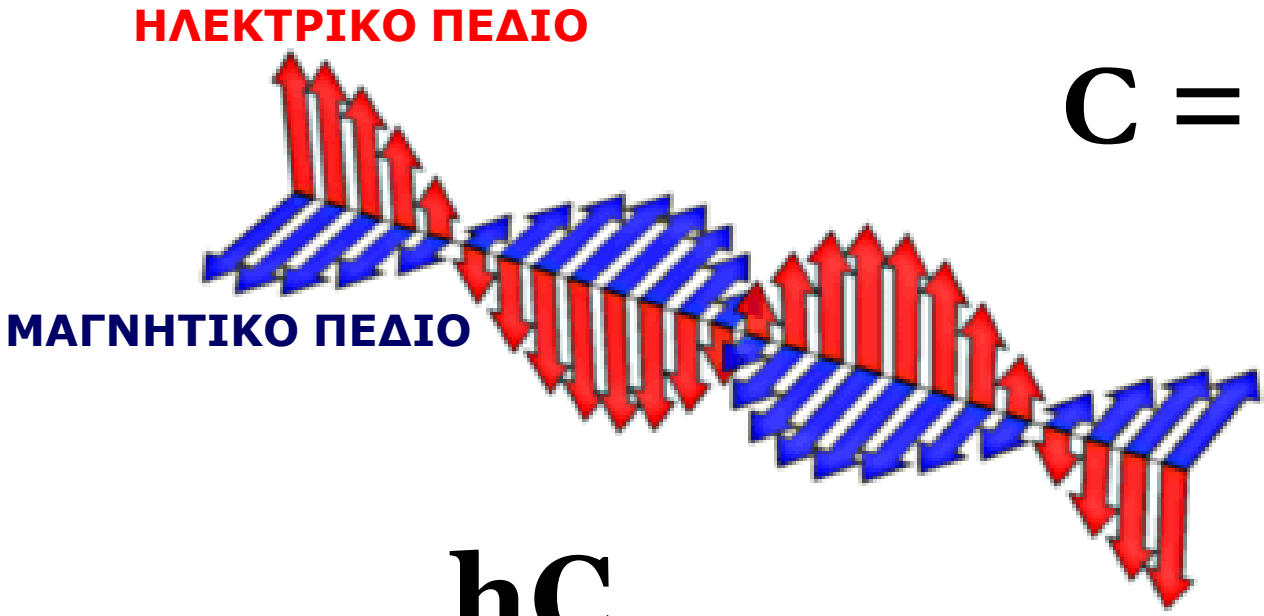
ΑΚΤΙΝΕΣ-Χ

Ηλεκτρομαγνητική ακτινοβολία πολύ μικρού μήκους κύματος και υψηλής ενέργειας

ΚΥΜΑ



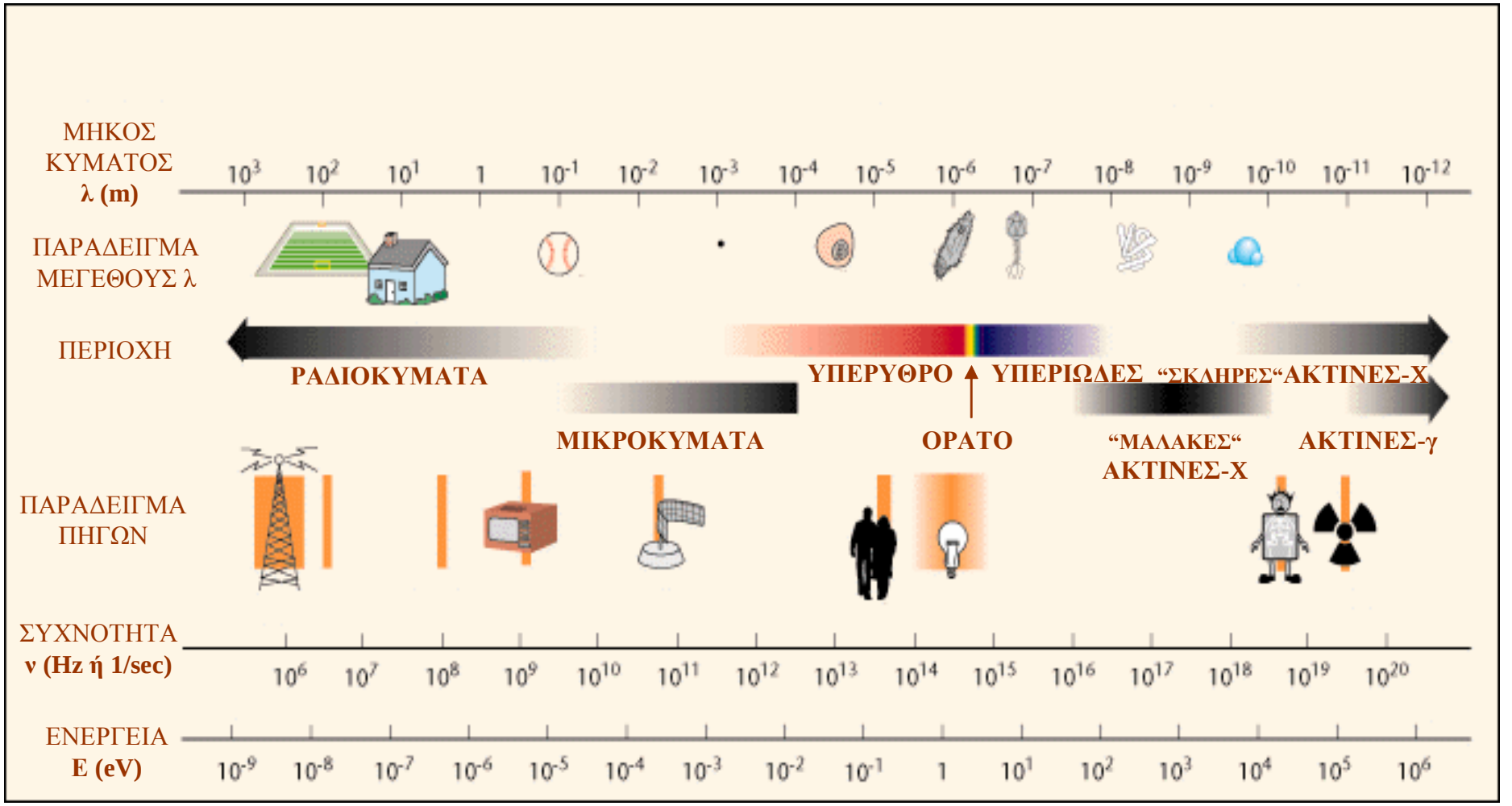


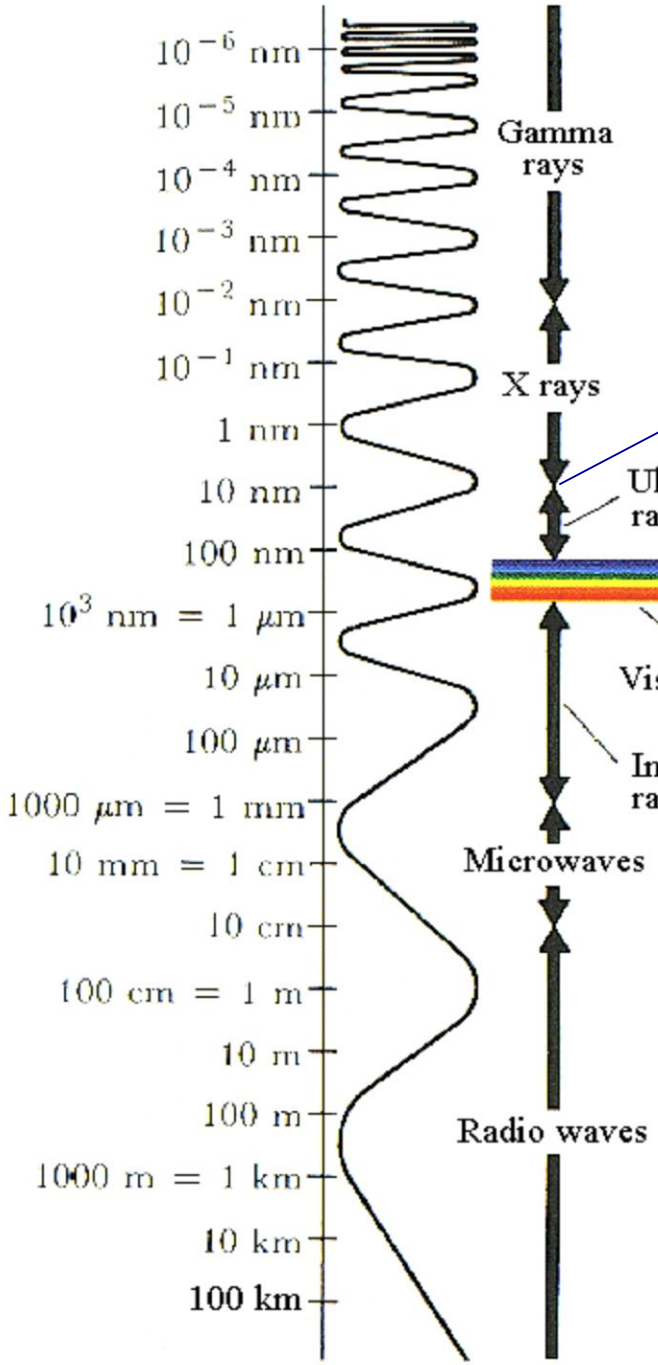


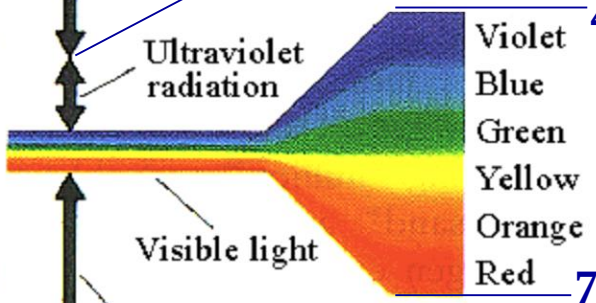
$$C = \nu\lambda$$

$$E = h\nu = \frac{hC}{\lambda}$$

ΑΚΤΙΝΕΣ-Χ


ΜΗΚΟΣ ΚΥΜΑΤΟΣ λ (m)
10^{3} 10^{2} 10^{1} 1 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7} 10^{-8} 10^{-9} 10^{-10} 10^{-11} 10^{-12}
ΠΑΡΑΔΕΙΓΜΑ ΜΕΓΕΘΟΥΣ λ
ΠΕΡΙΟΧΗ
ΡΑΔΙΟΚΥΜΑΤΑ
ΜΙΚΡΟΚΥΜΑΤΑ
ΥΠΕΡΥΘΡΟ
ΟΡΑΤΟ
ΥΠΕΡΙΩΔΕΣ
"ΜΑΛΑΚΕΣ" ΑΚΤΙΝΕΣ-Χ
"ΣΚΛΗΡΕΣ" ΑΚΤΙΝΕΣ-Χ
ΑΚΤΙΝΕΣ-γ
ΠΑΡΑΔΕΙΓΜΑ ΠΗΓΩΝ
ΣΥΧΝΟΤΗΤΑ ν (Hz ή 1/sec)
10^{6} 10^{7} 10^{8} 10^{9} 10^{10} 10^{11} 10^{12} 10^{13} 10^{14} 10^{15} 10^{16} 10^{17} 10^{18} 10^{19} 10^{20}
ΕΝΕΡΓΕΙΑ E (eV)
10^{-9} 10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2} 10^{-1} 1 10^{1} 10^{2} 10^{3} 10^{4} 10^{5} 10^{6}





$E = h\nu = hc/\lambda$

10 nm — 124 eV

400 nm — 3.10 eV

700 nm — 1.77 eV

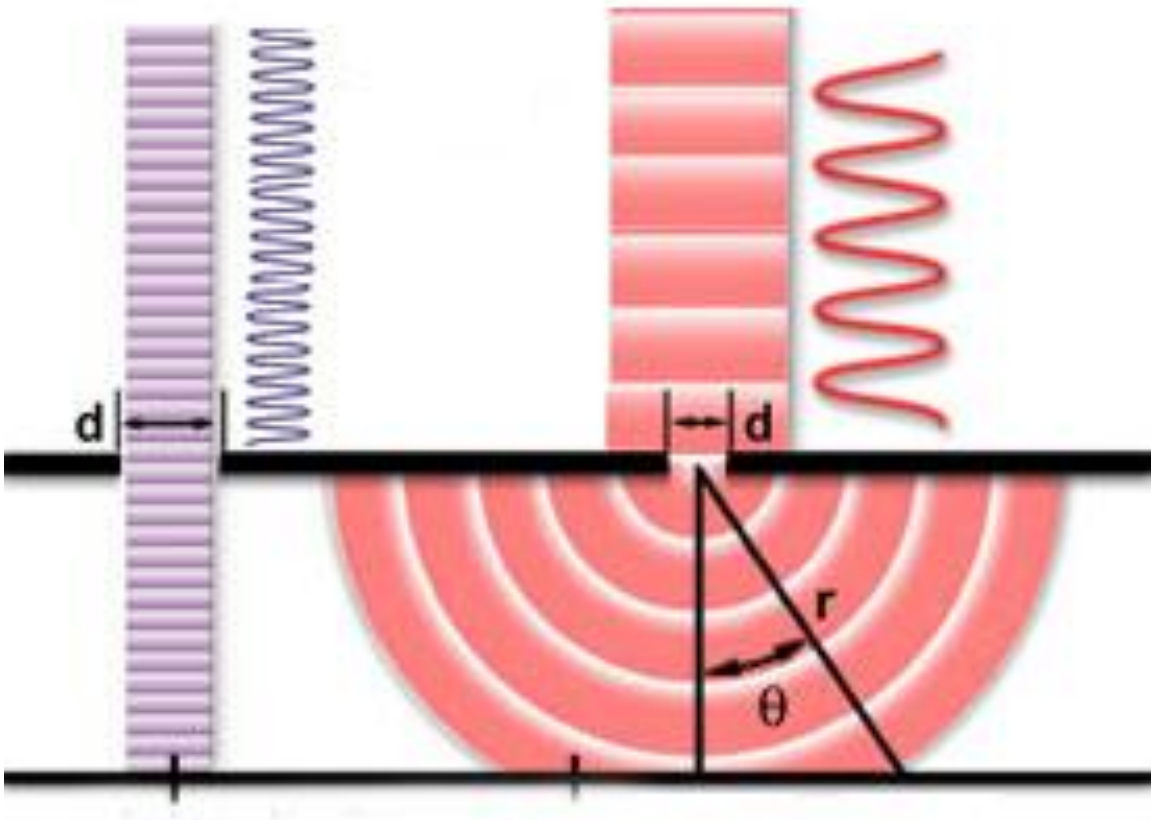
$h = 6.626\times10^{-34}$ Js =

$= 4.135\times10^{-15}$ eVs

$c = 3\times10^{8}$ m/s =

$= 3\times10^{17}$ nm/s

ΠΕΡΙΘΛΑΣΗ

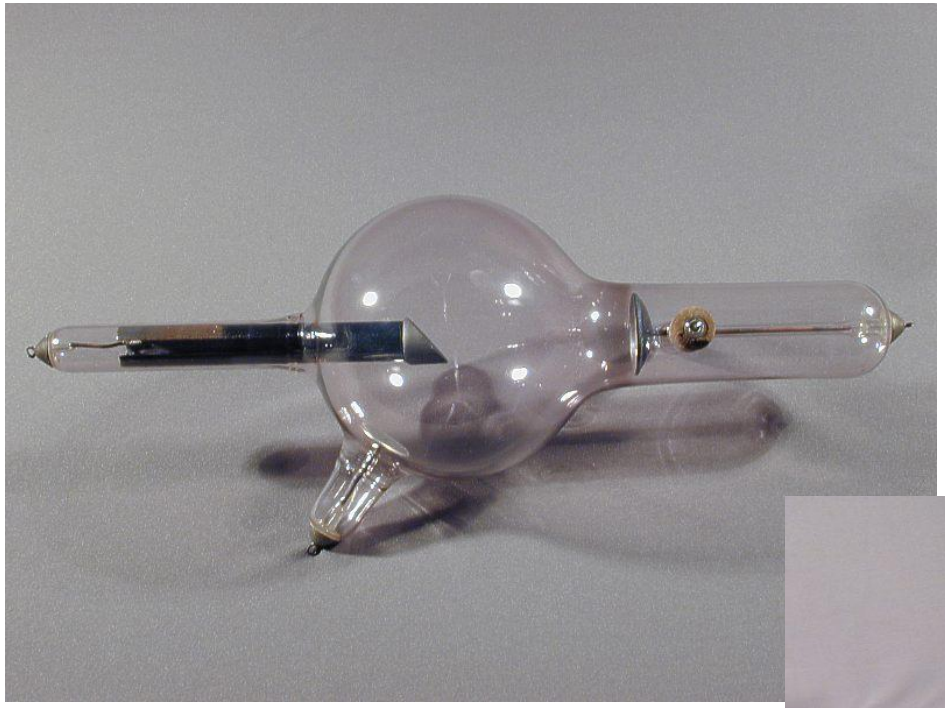


W.C. Röntgen (1845-1923)

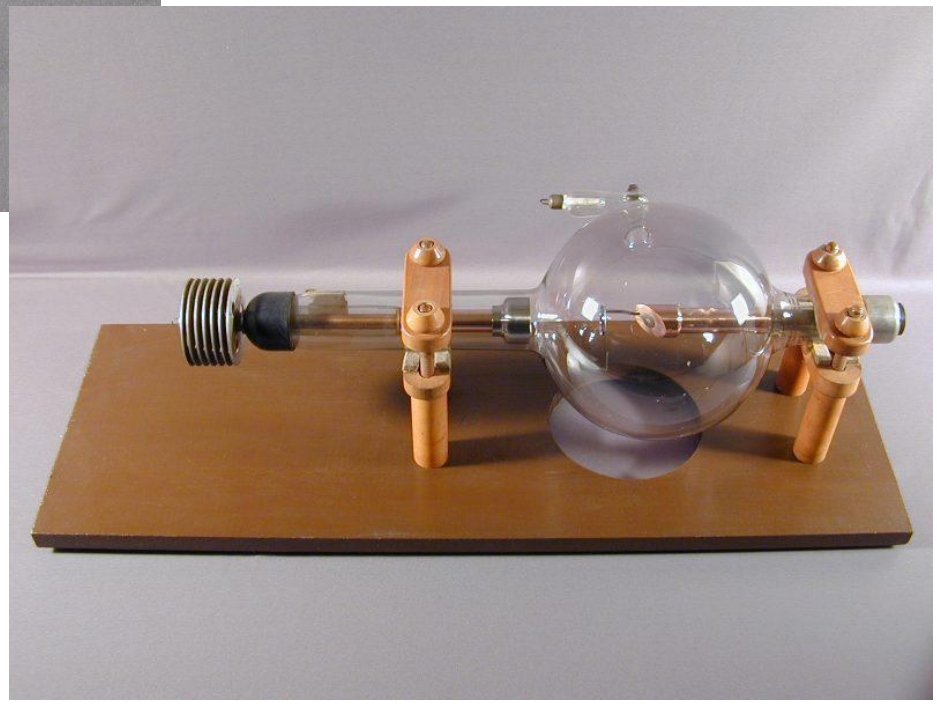
ΑΚΤΙΝΕΣ-Χ (RÖNTGEN)

ΒΡΑΒΕΙΟ Nobel ΦΥΣΙΚΗΣ 1901

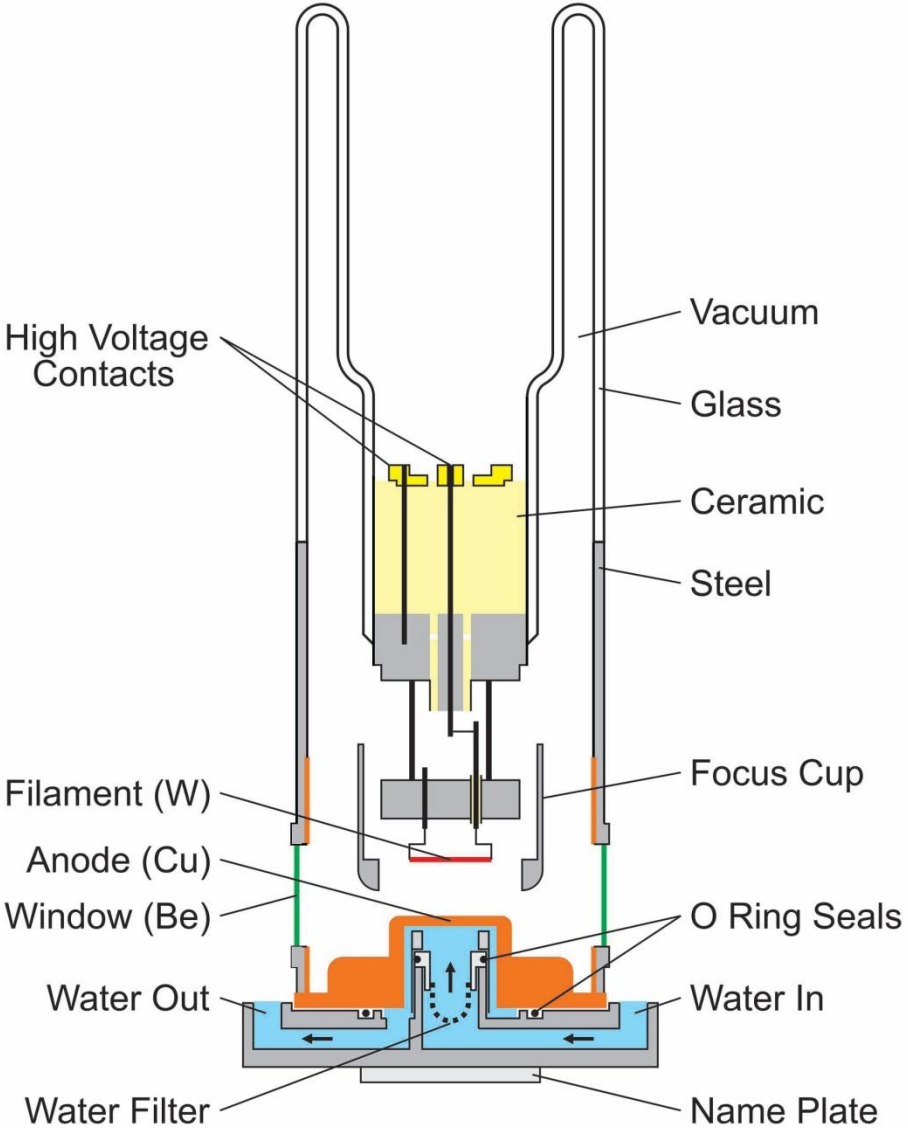
1896



1926



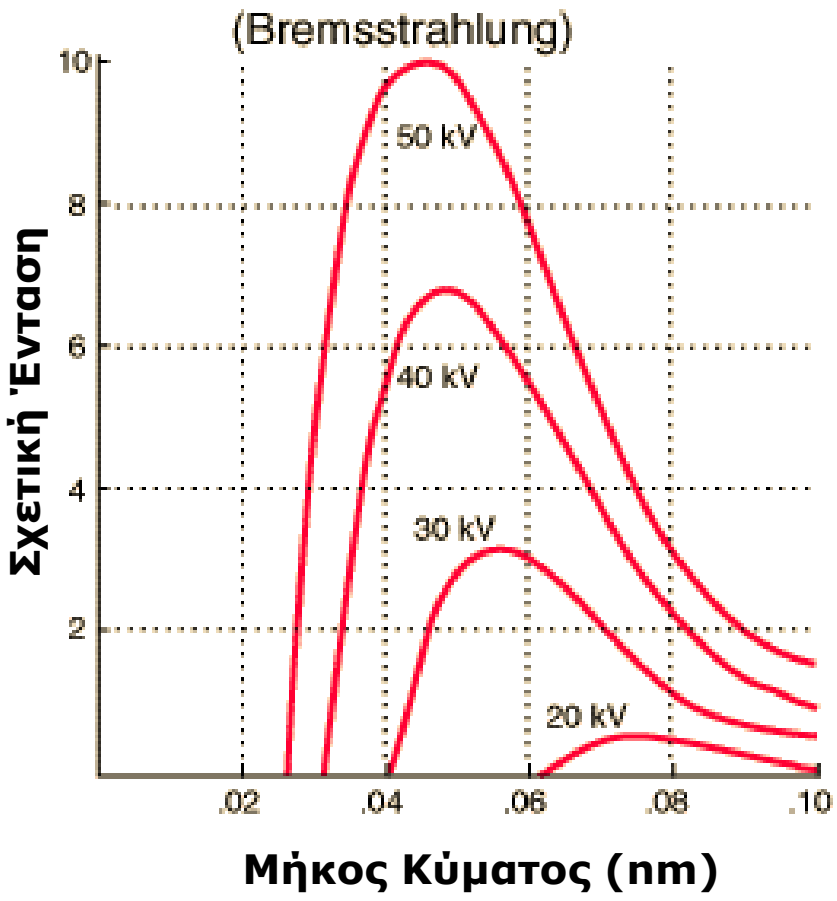
ΚΛΑΣΙΚΟΣ ΓΥΑΛΙΝΟΣ ΣΩΛΗΝΑΣ (ΛΥΧΝΙΑ) ΑΚΤΙΝΩΝ-Χ ΓΙΑ ΠΕΡΙΘΛΑΣΗ (XRD)



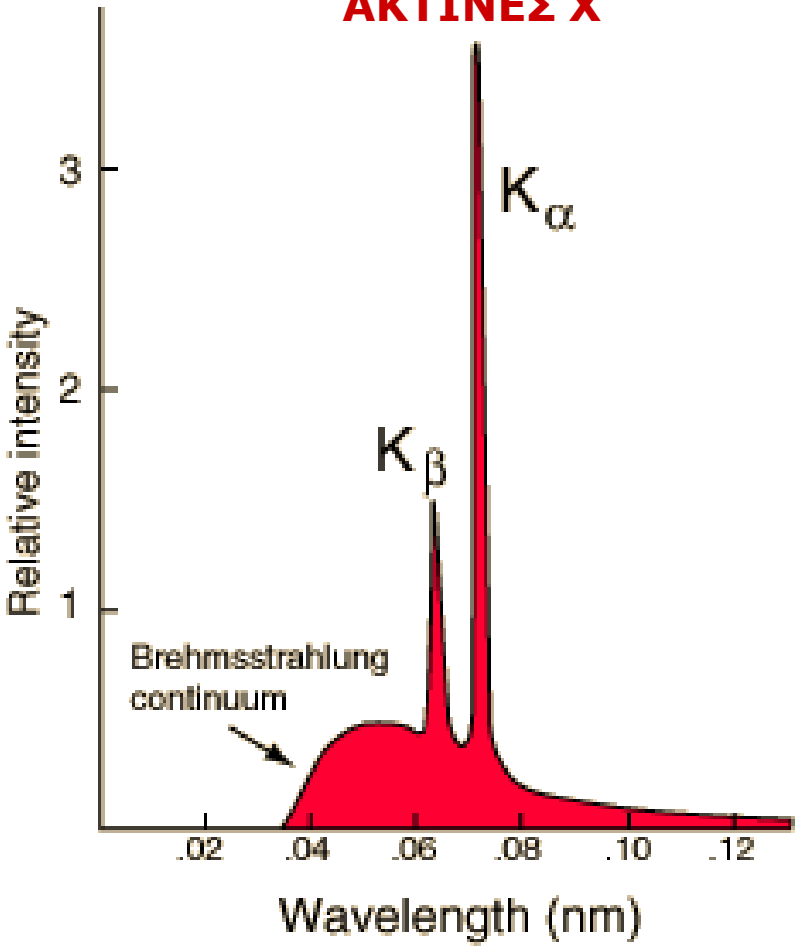
ΣΥΓΧΡΟΝΟΙ ΣΩΛΗΝΕΣ (ΛΥΧΝΙΕΣ) ΑΚΤΙΝΩΝ-Χ ΓΙΑ ΠΕΡΙΘΛΑΣΗ (XRD) ΚΑΙ ΦΘΟΡΙΣΜΟ (XRF)

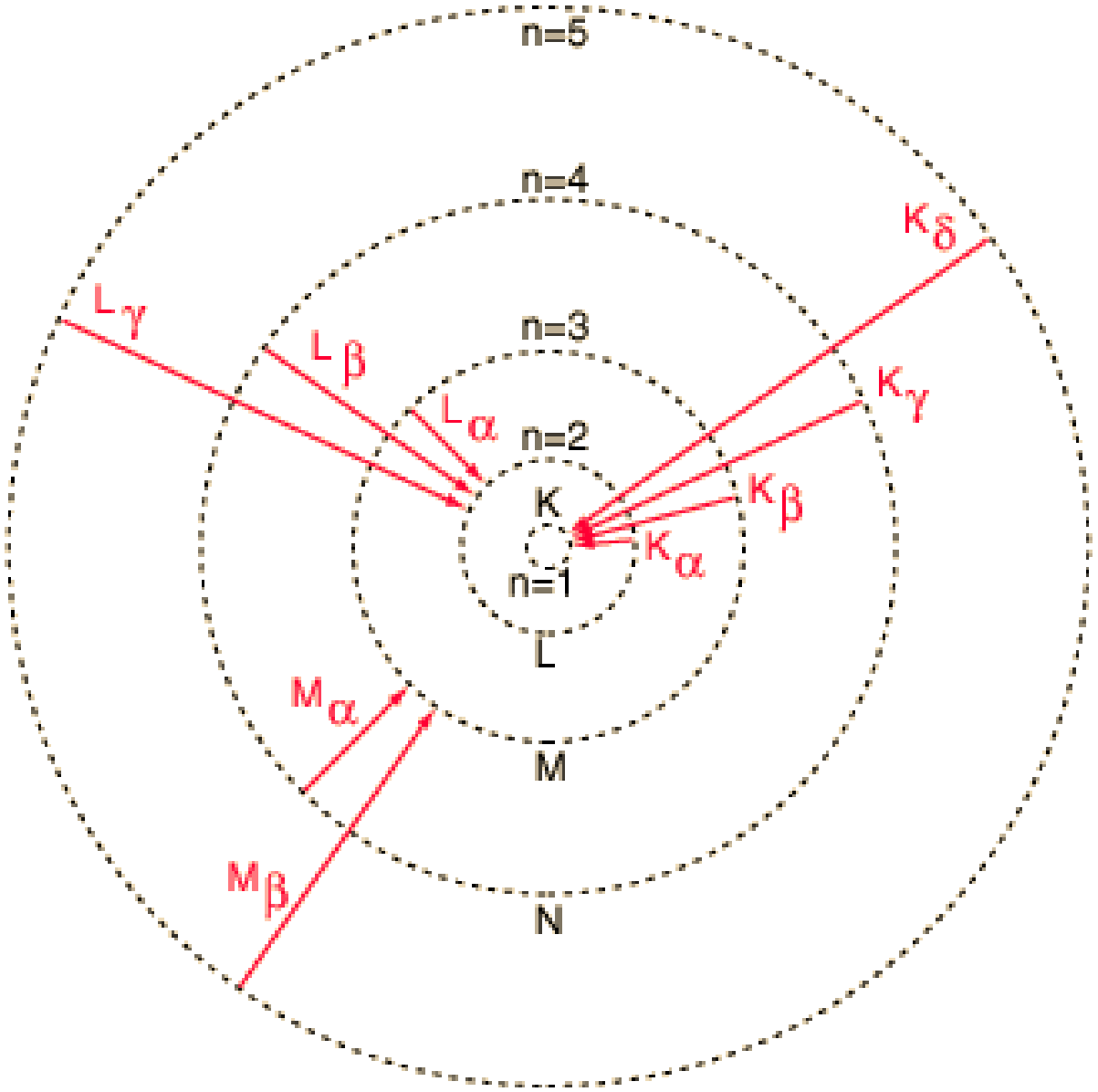
PANalytical

ΣΥΝΕΧΗΣ ΑΚΤΙΝΟΒΟΛΙΑ Χ



ΧΑΡΑΚΤΗΡΙΣΤΙΚΕΣ ΑΚΤΙΝΕΣ Χ




n=5
n=4
n=3
n=2
n=1
K
L
M
N
K_δ
K_γ
K_β
K_α
L_γ
L_β
L_α
M_α
M_β

Max von Laue (1879-1959)

ΒΡΑΒΕΙΟ Nobel ΦΥΣΙΚΗΣ 1914

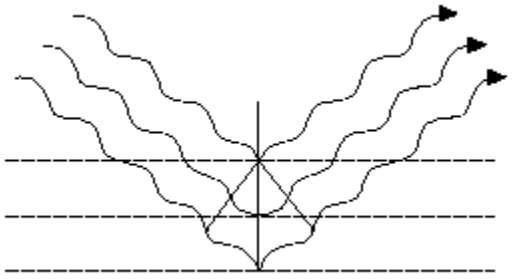


Fig. 1.

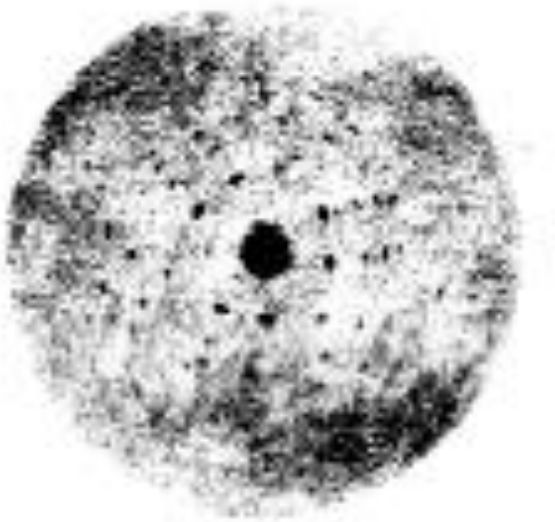


Fig. 2.

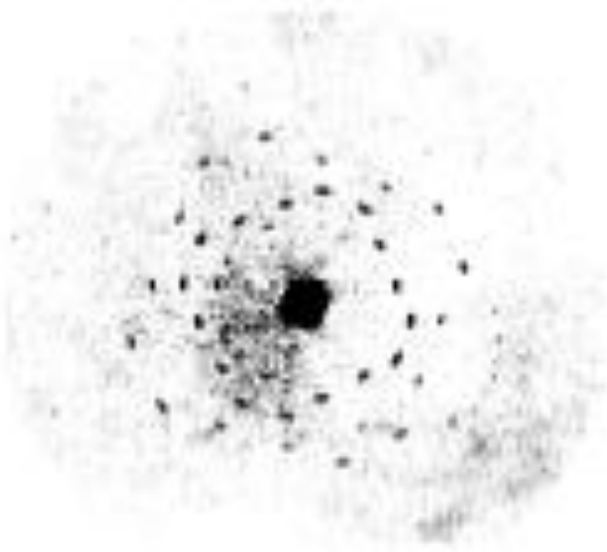
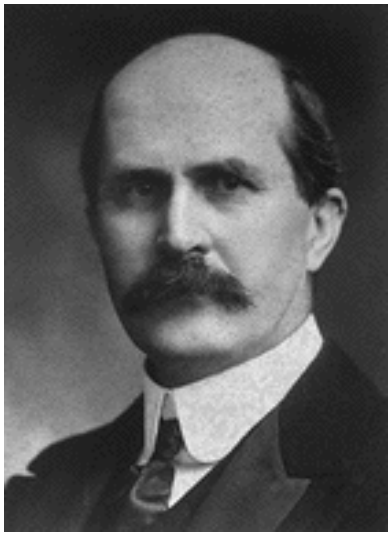
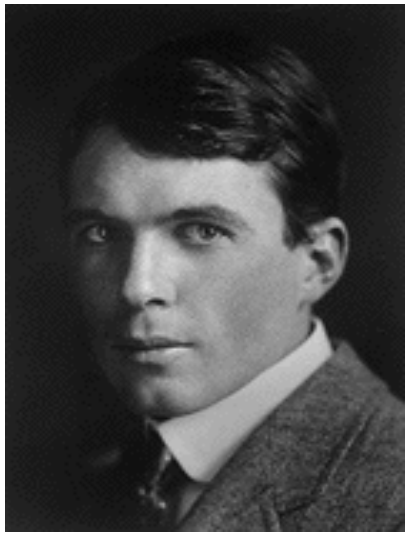


Fig. 3.





William Henry Bragg (1862-1942)
William Lawrence Bragg (1890-1971)

ΒΡΑΒΕΙΟ Nobel ΦΥΣΙΚΗΣ 1915

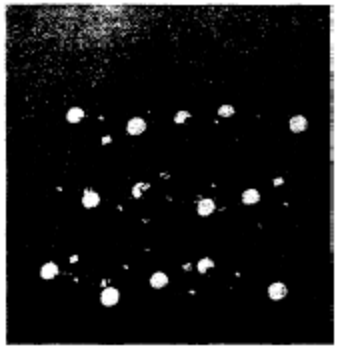


Fig. 6.

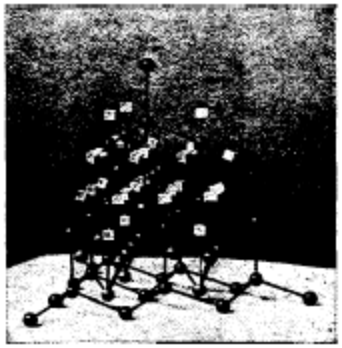
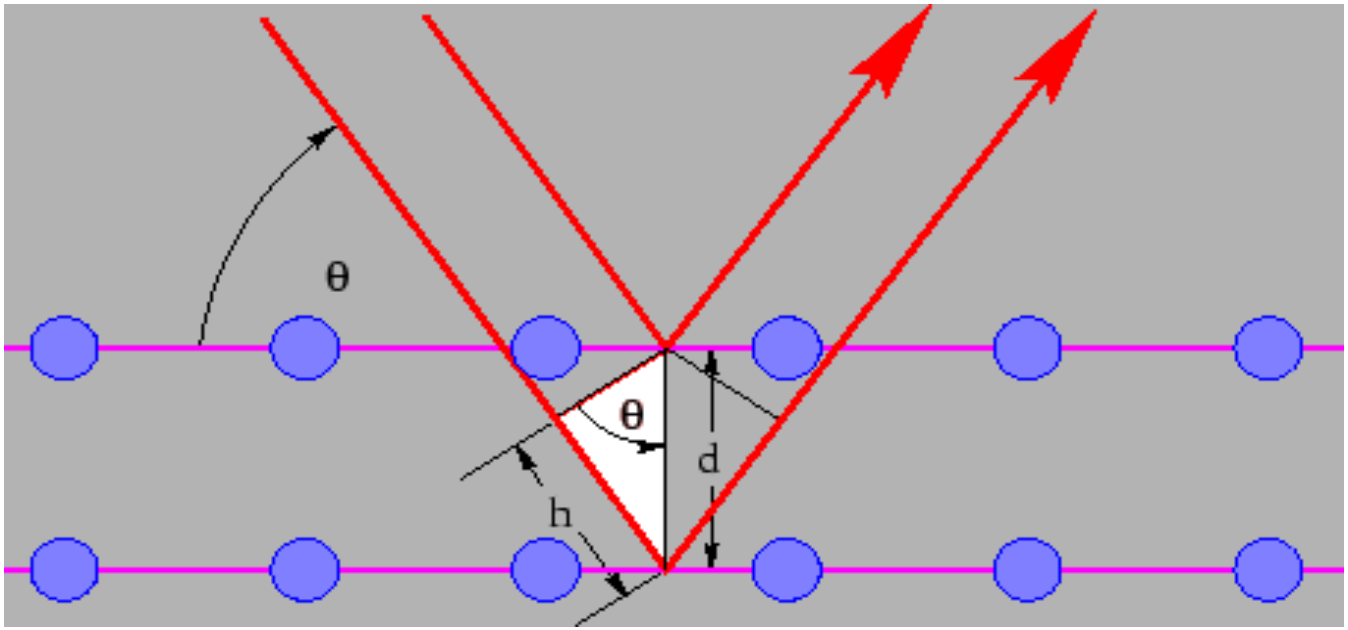


Fig. 7.

Fig. 6. *Calcite (CaCO)*. The *white balls* represent calcium; the *black balls*, carbon; and the *cubes*, oxygen.

ΝΟΜΟΣ Bragg

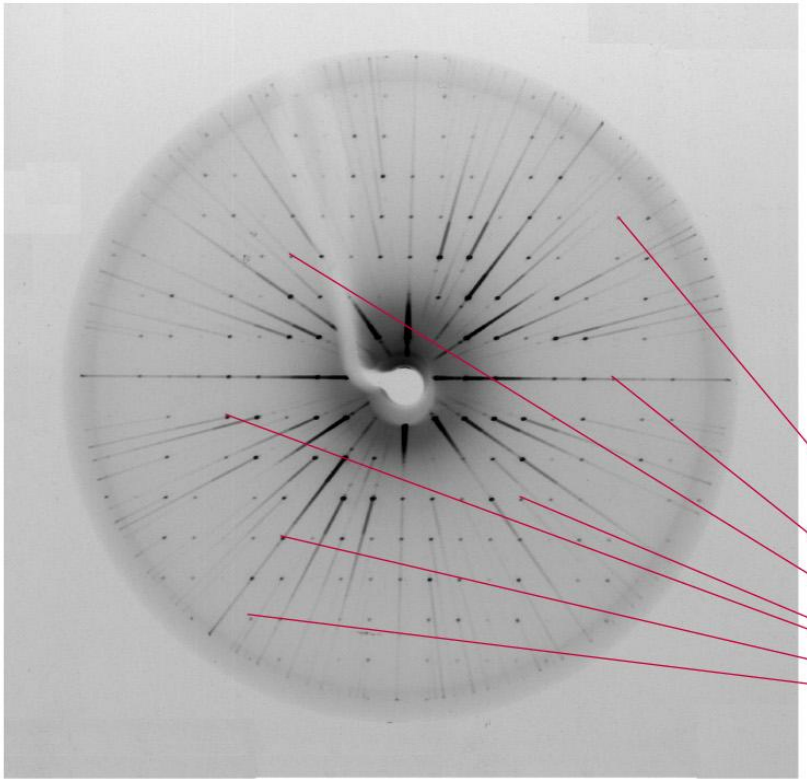


$$n\lambda = 2d\eta\mu\theta$$

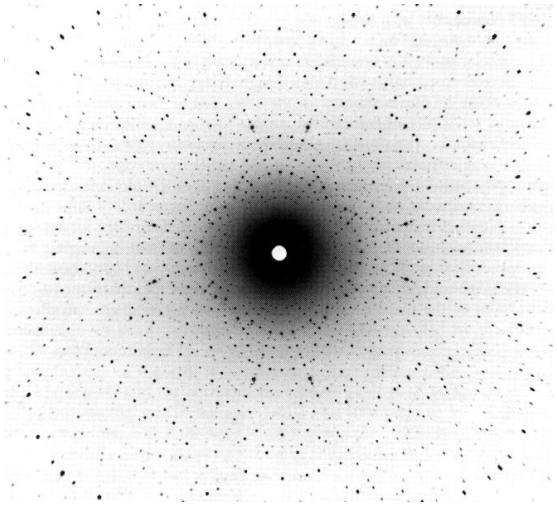
ΠΕΡΙΘΛΑΣΗ ΑΚΤΙΝΩΝ-Χ

ΣΕ ΜΟΝΟΚΡΥΣΤΑΛΛΟ

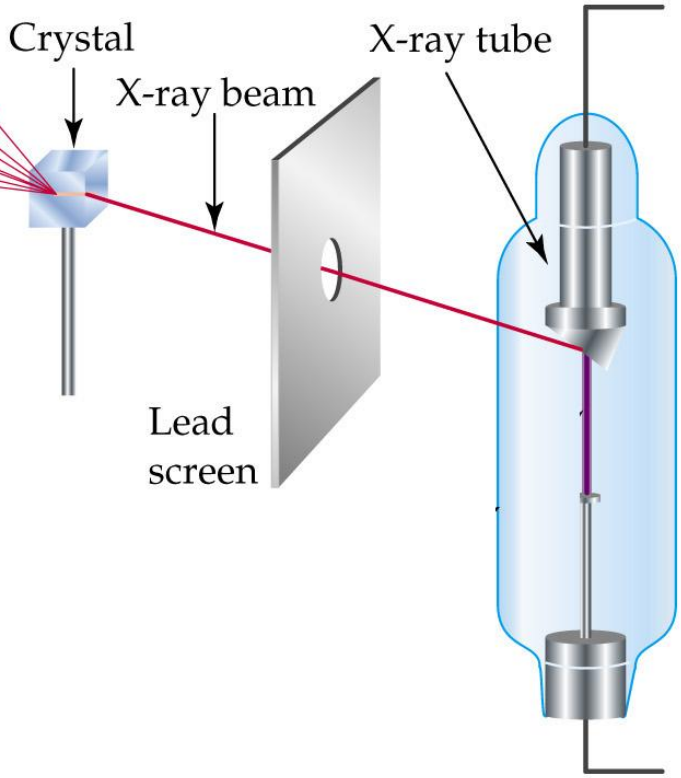
(single-crystal XRD)



Photographic film



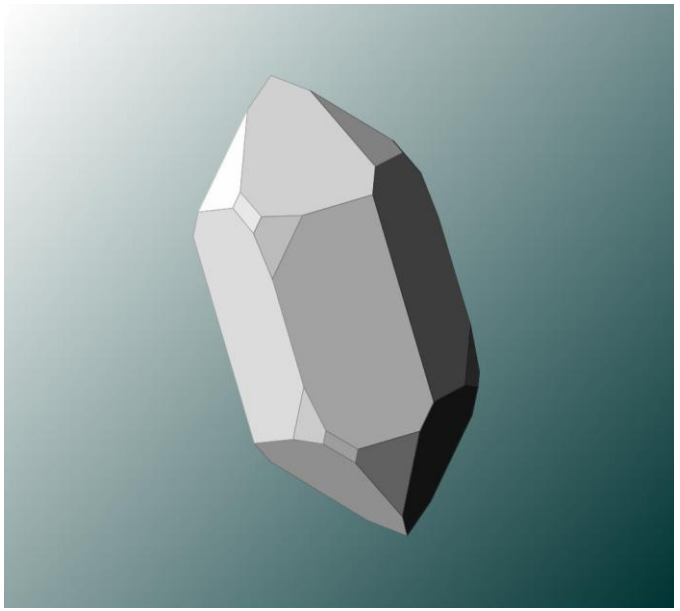
$ZrSiO_4$



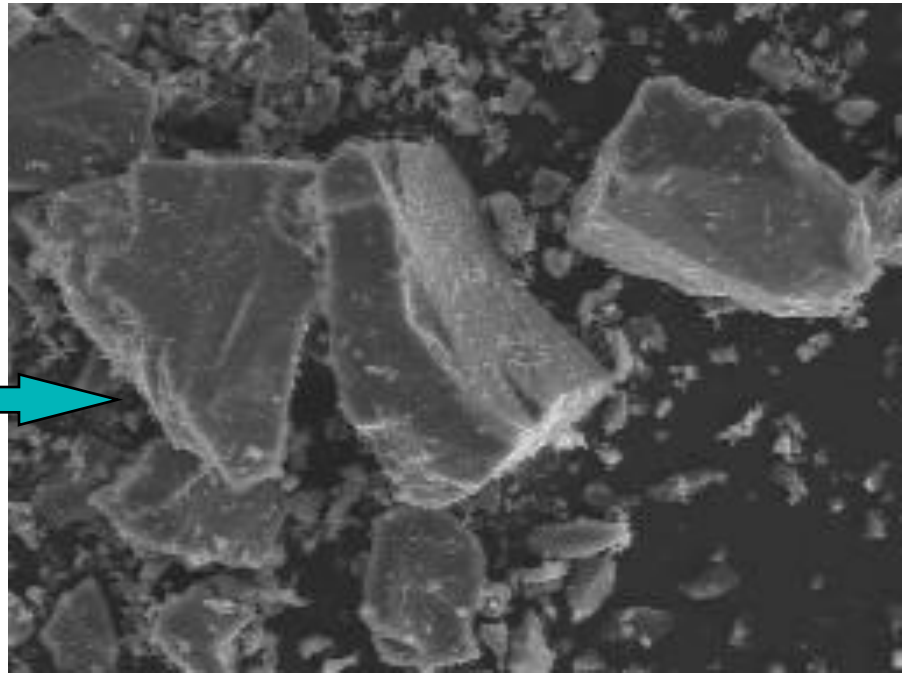
ΠΕΡΙΘΛΑΣΗ ΑΚΤΙΝΩΝ-Χ

ΣΕ ΣΚΟΝΗ

(powder XRD / PXRD)



ΧΑΛΑΖΙΑΣ (SiO_2)

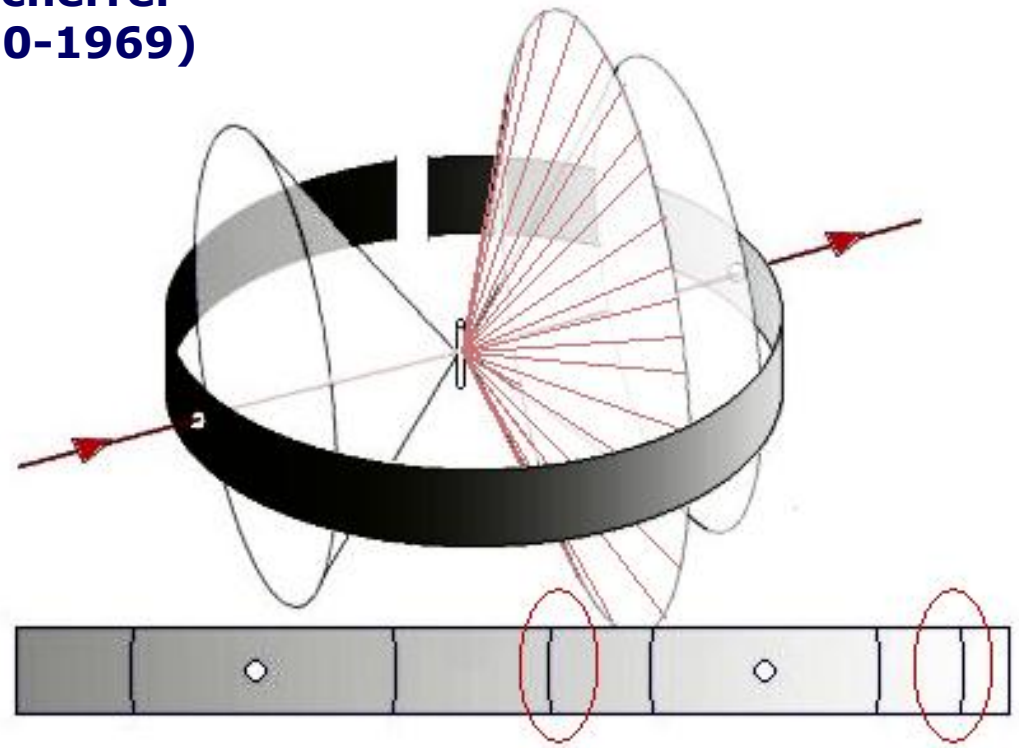


Μέθοδος **Debye-Scherrer**

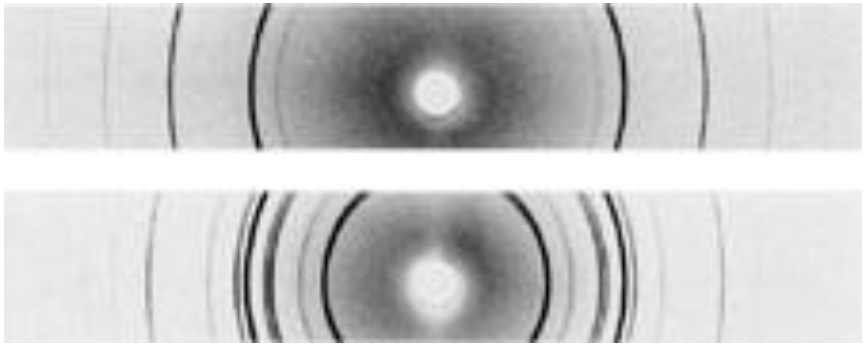
P.W. Debye (1884-1966)

ΒΡΑΒΕΙΟ Nobel ΧΗΜΕΙΑΣ 1936

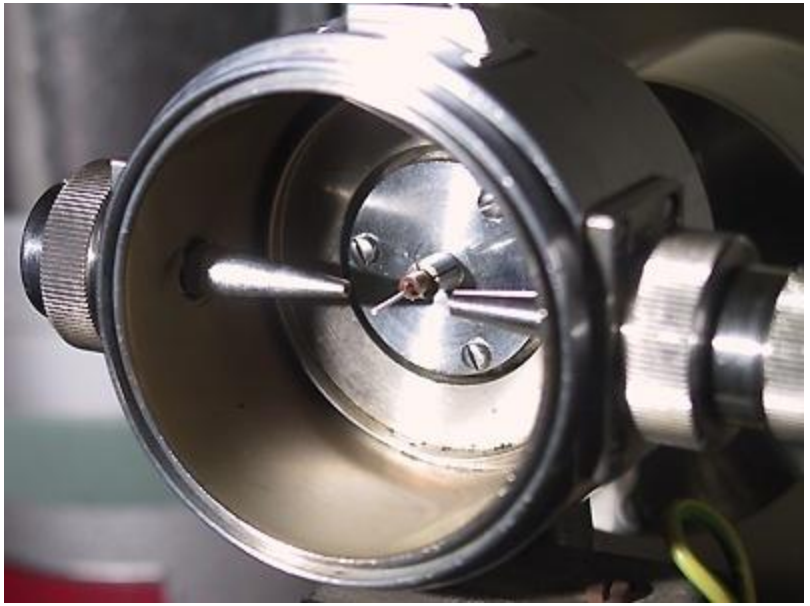
P. Scherrer (1890-1969)

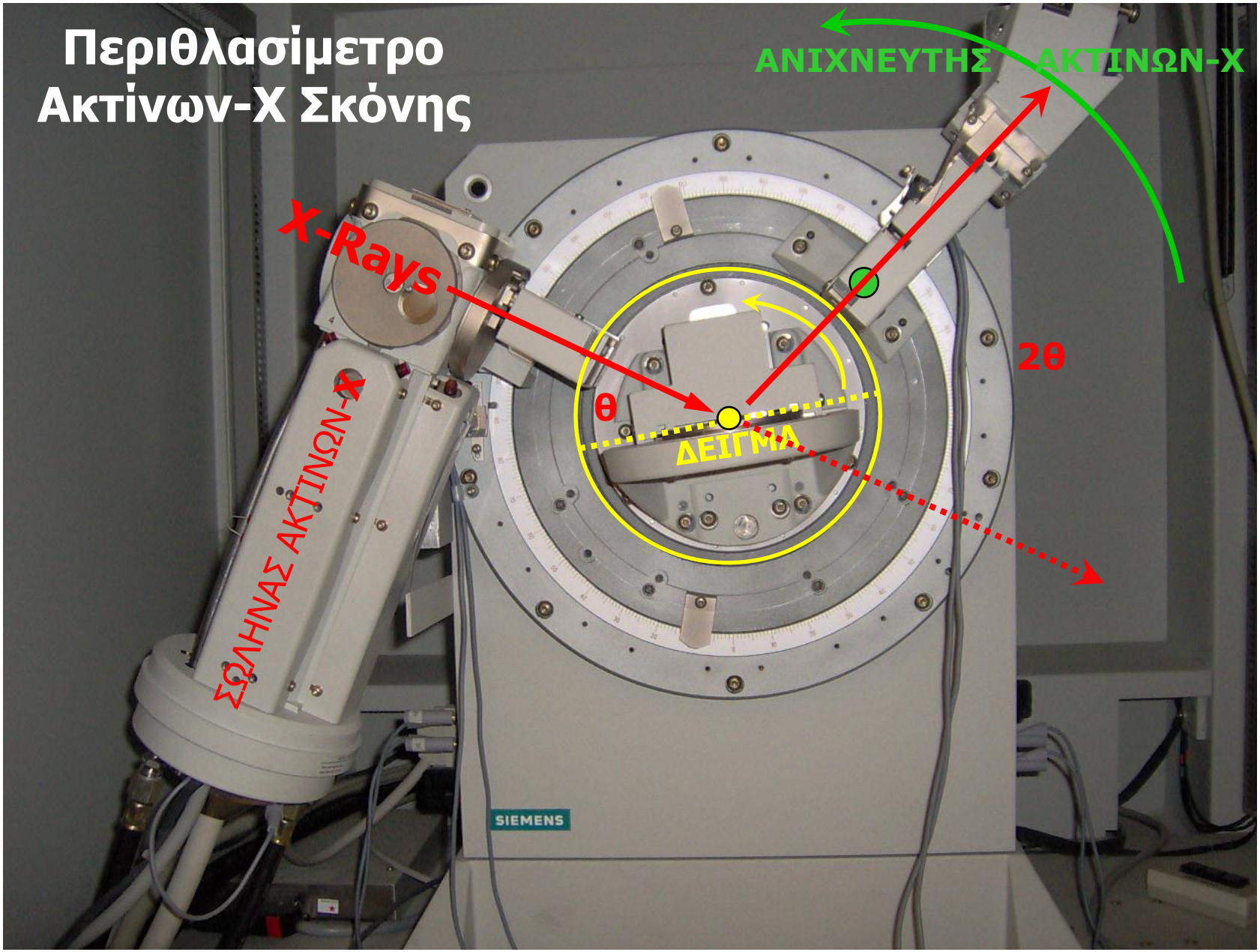


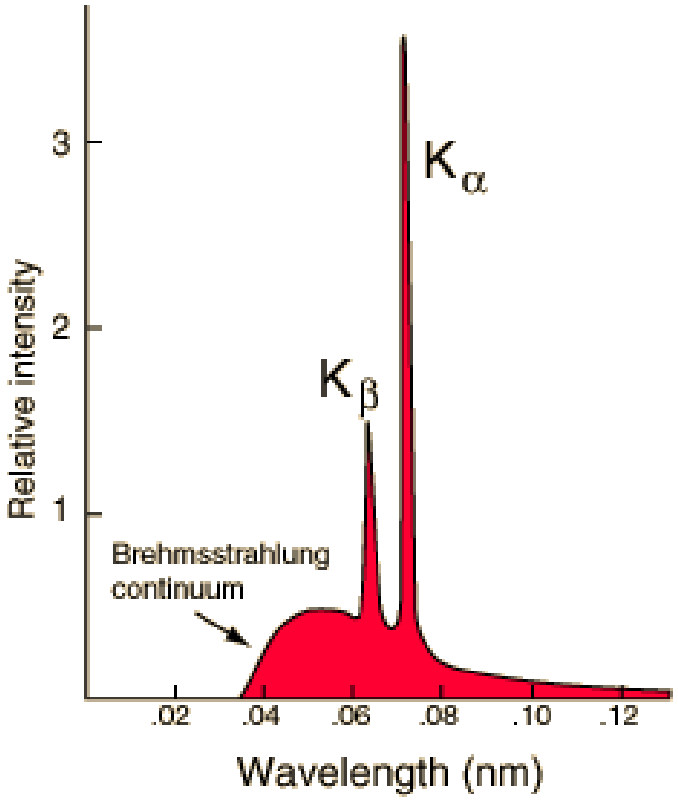
NaCl

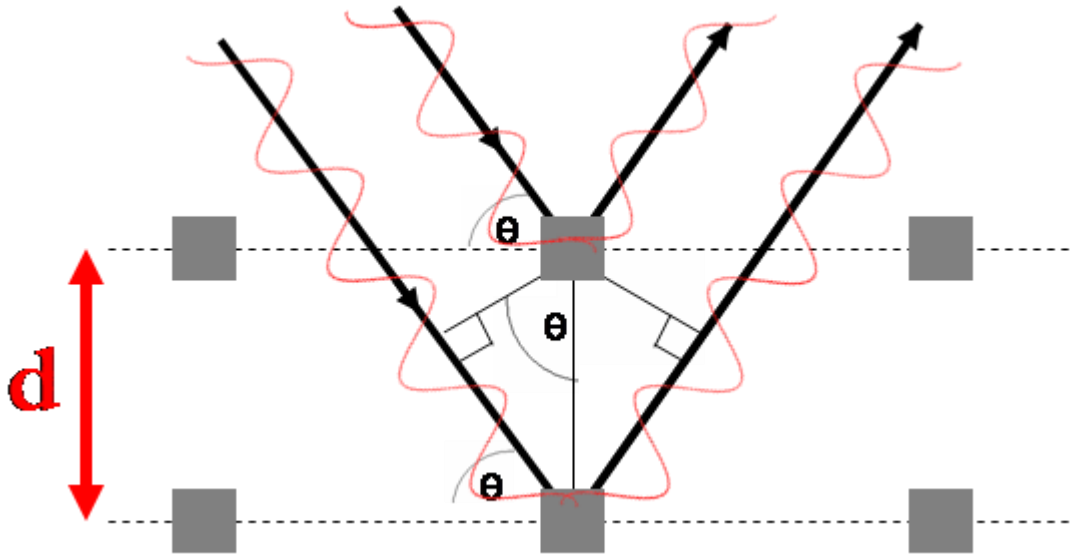


Na_2SO_4




Περιθλασίμετρο
Ακτίνων-Χ Σκόνης
ΑΝΙΧΝΕΥΤΗΣ ΑΚΤΙΝΩΝ-Χ
X-Rays
2θ
θ
ΔΕΙΓΜΑ
ΣΩΛΗΝΑΣ ΑΚΤΙΝΩΝ-Χ
SIEMENS



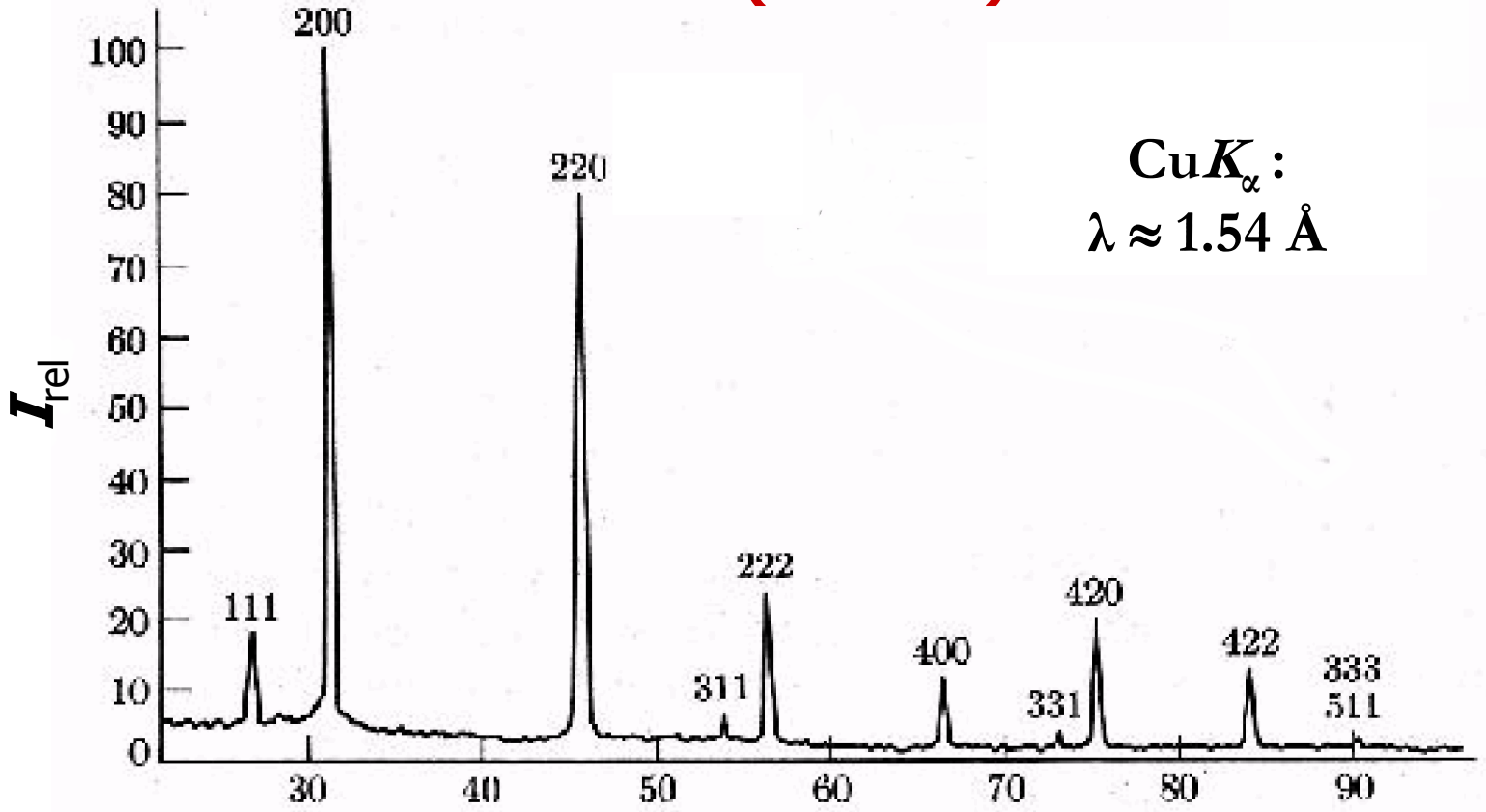


MoK_α:
$\lambda \approx 0.71$ Å

$n\lambda = 2d\eta\mu\theta$

ΔΙΑΓΡΑΜΜΑ ΠΕΡΙΘΛΑΣΗΣ ΑΚΤΙΝΩΝ-Χ ΣΚΟΝΗΣ

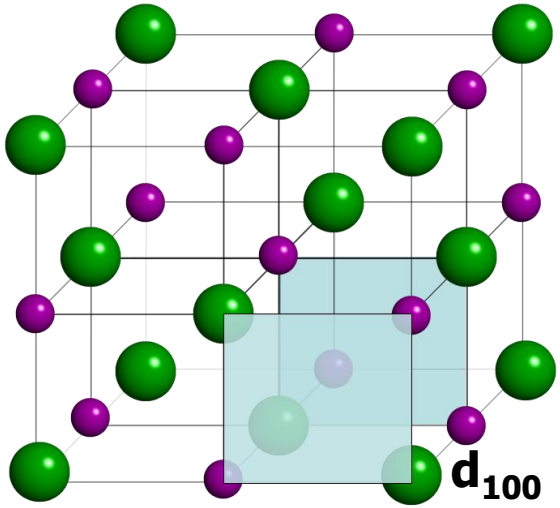
NaCl (ΑΛΙΤΗΣ)



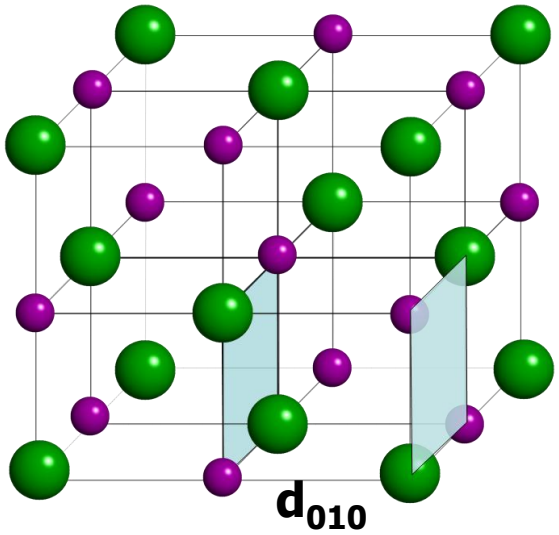
$Cu K_{\alpha}$:

$\lambda \approx 1.54$ Å

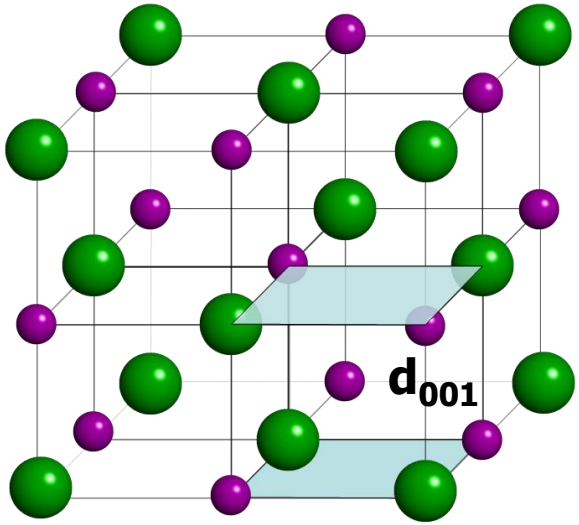
$I(INTENSITY)_{rel}$= Counts*100/$Counts_{max}$



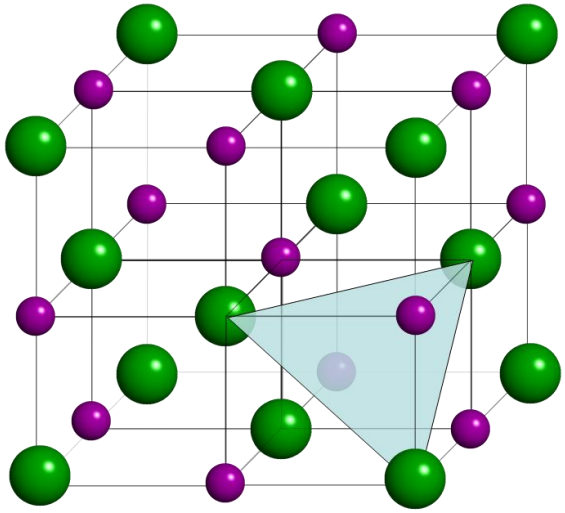
(100)



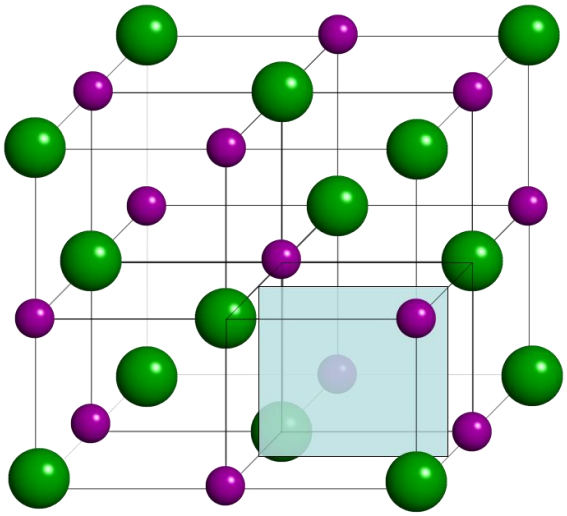
(010)



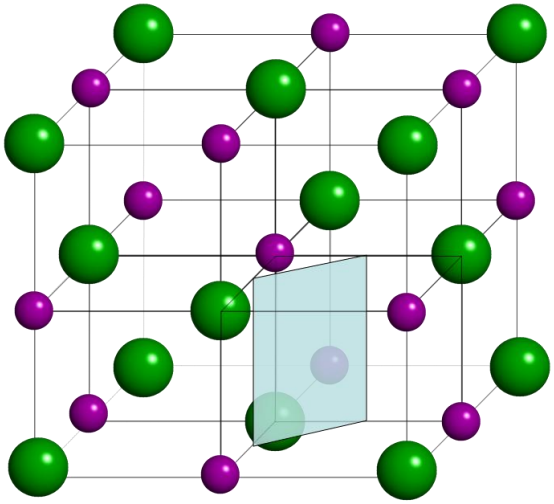
(001)



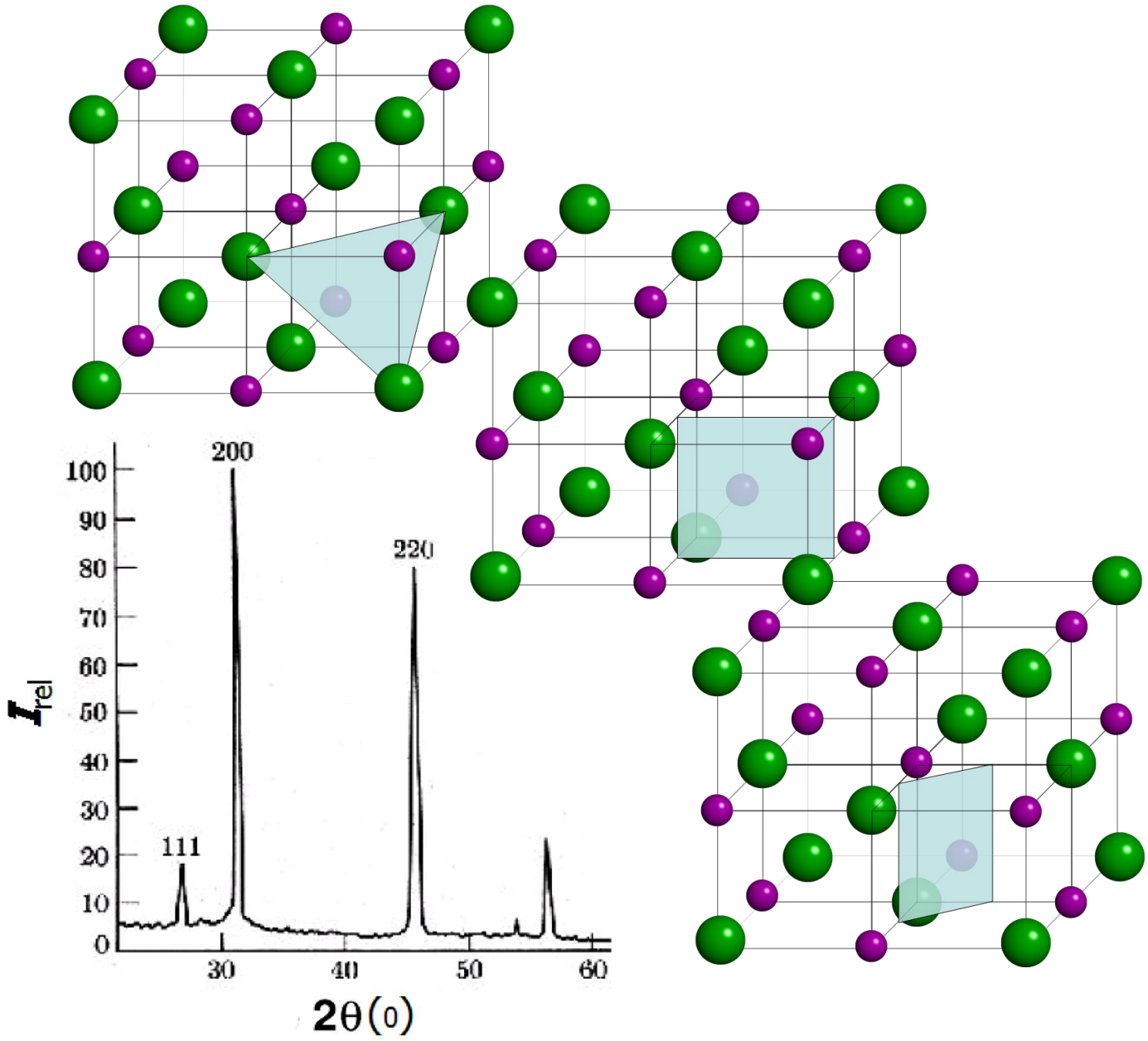
(111)



(200)



(220)


200
220
111
100
90
80
70
60
50
40
30
20
10
0
30
40
50
60
I_{rel}
2θ(0)

ΚΥΒΙΚΟ: $a=b=c=a_0$ και $d_{hkl} = a_0/(h^2+k^2+l^2)^{1/2}$

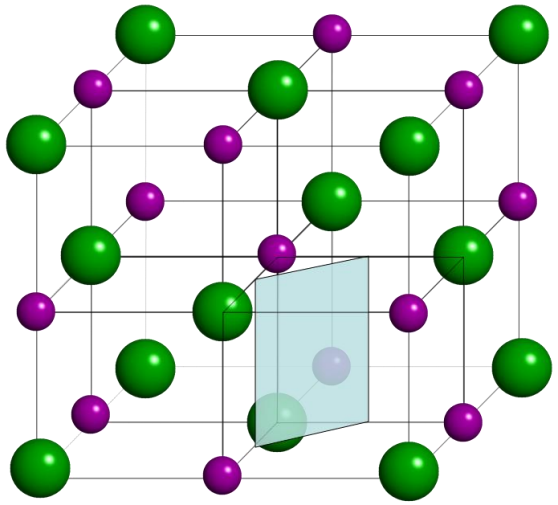
$$\lambda = 2d_{hkl}\sin\theta_{hkl} \Rightarrow \lambda^2 = 4d^2_{hkl}\sin^2\theta_{hkl} \Rightarrow$$
$$\lambda^2 = (4a_0^2/(h^2+k^2+l^2))\sin^2\theta_{hkl} \Rightarrow$$
$$\lambda^2/4a_0^2 = \sin^2\theta_{hkl}/(h^2+k^2+l^2) = \sin^2\theta_{hkl}/\mathbf{s}$$

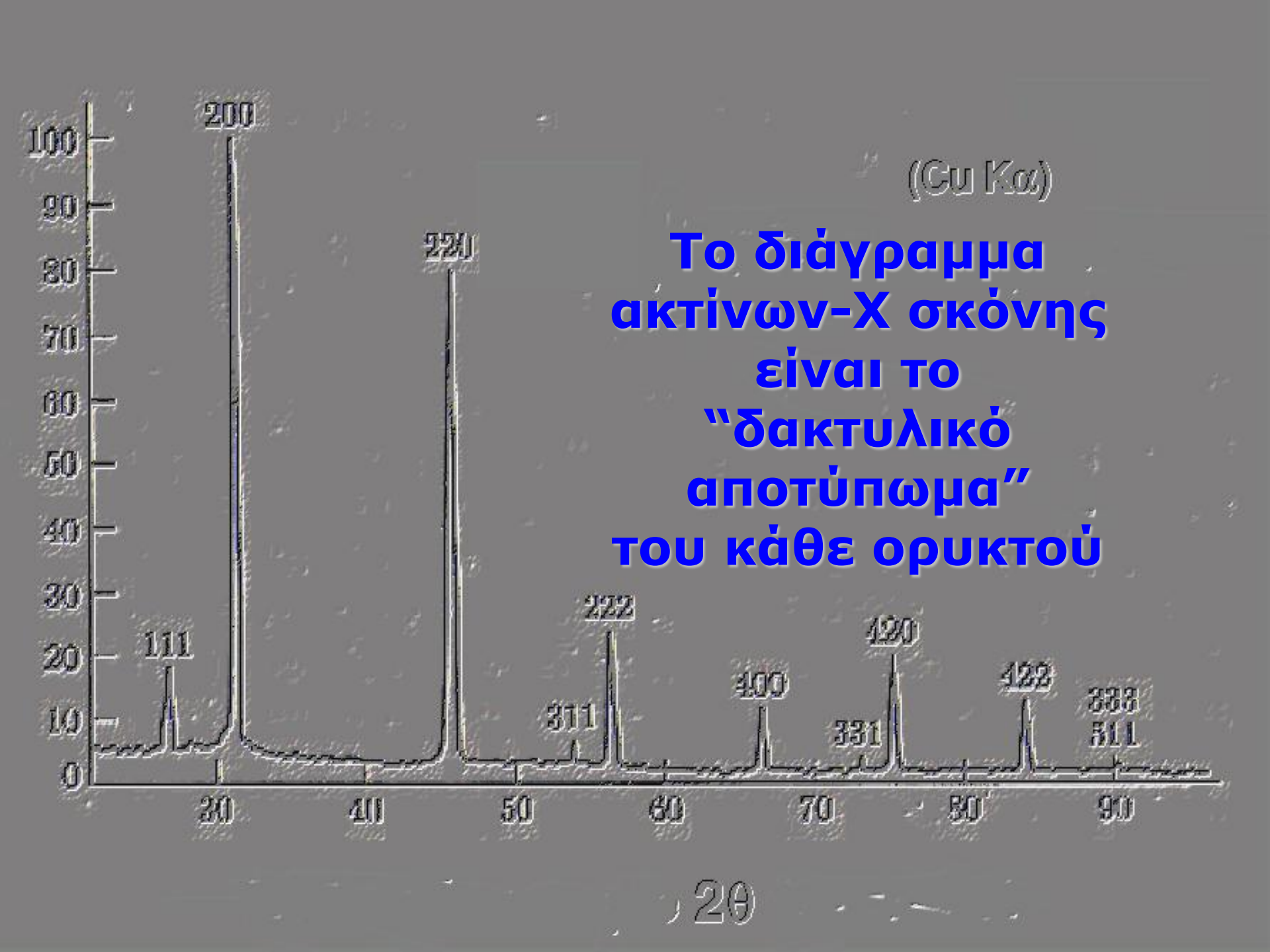
λ (CuK_α) = 1.54 Å,

a_0 (NaCl) = 5.6402 Å

$2\theta_{220} = 45.45^o$

$d_{220} = 1.994$

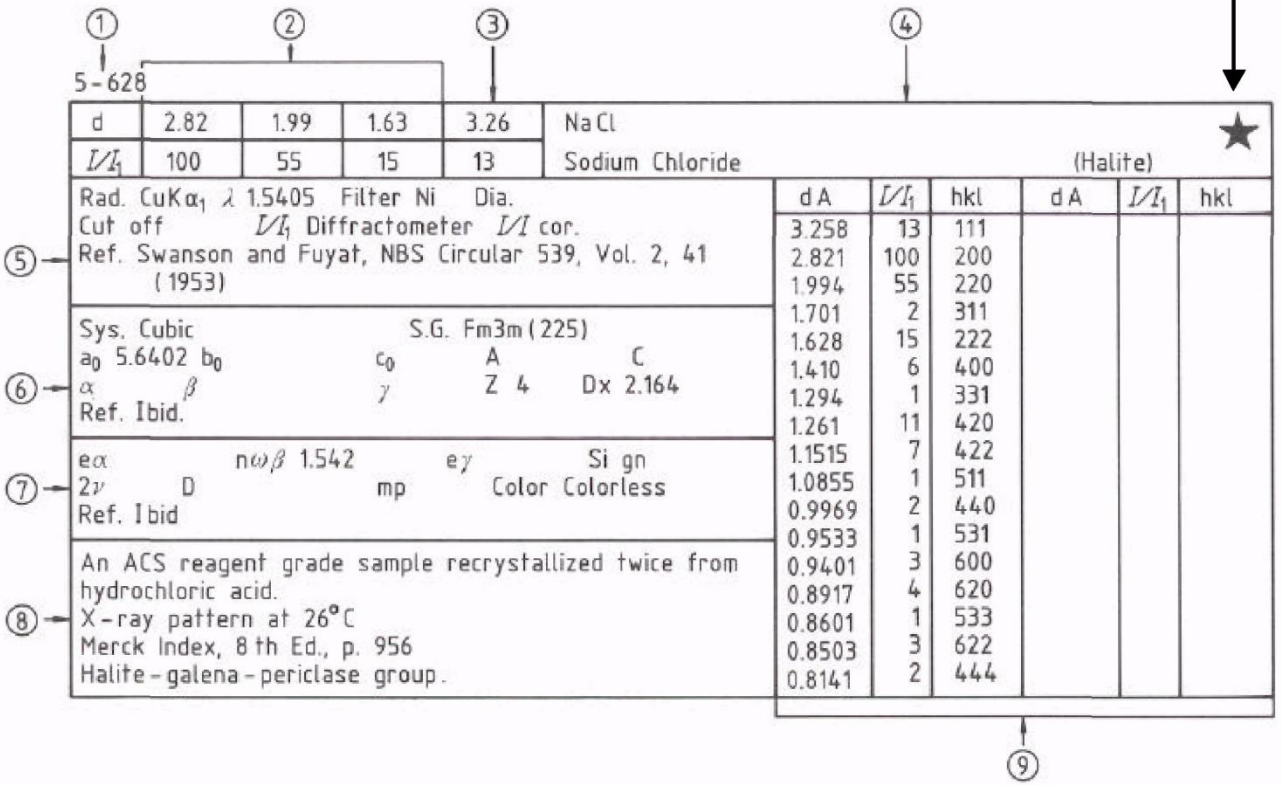



(Cu Kα)
Το διάγραμμα ακτίνων-Χ σκόνης είναι το "δακτυλικό αποτύπωμα" του κάθε ορυκτού
100
90
80
70
60
50
40
30
20
10
0
111
200
220
311
222
400
331
420
422
333
511
30
40
50
60
70
80
90
2θ

JCPDS Card

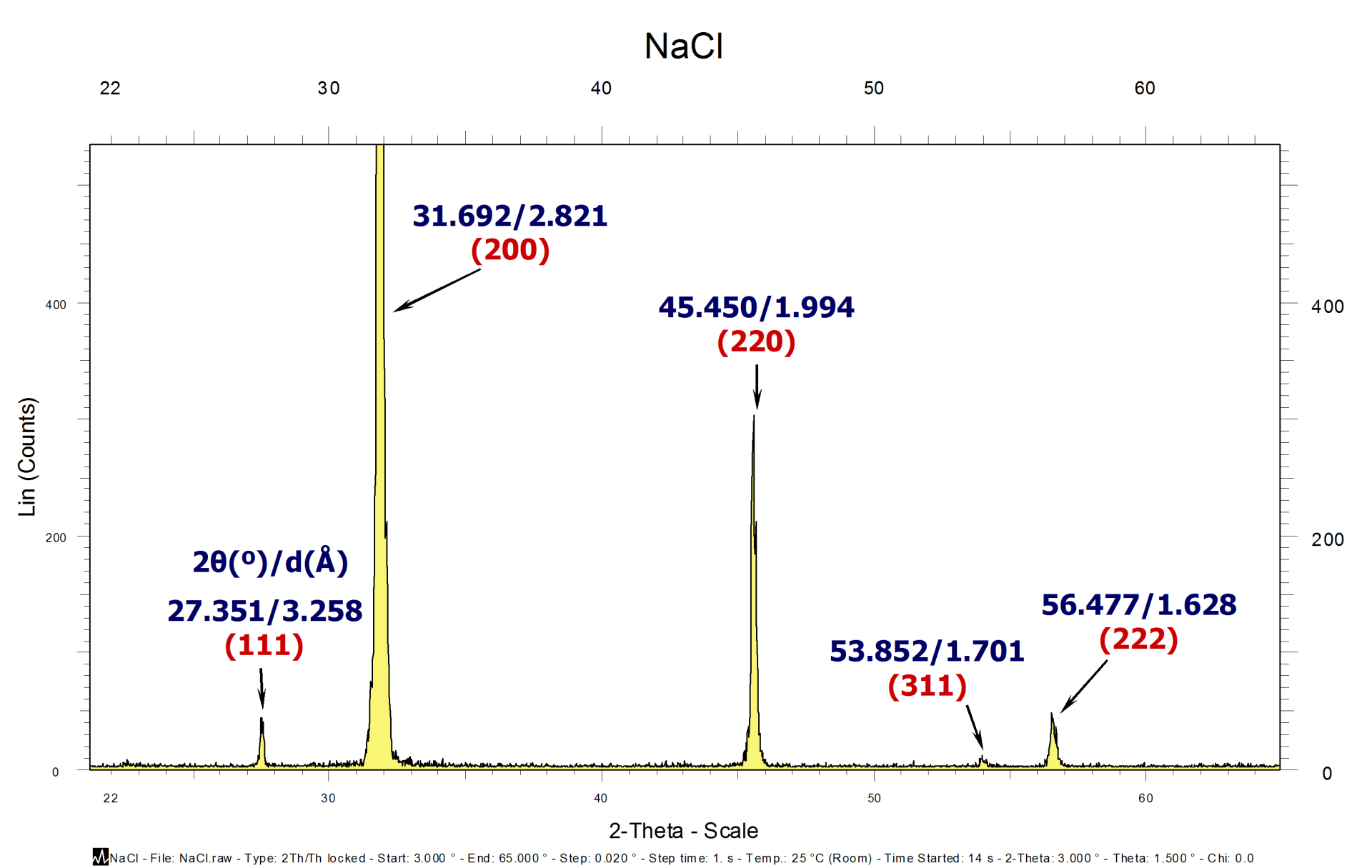
NaCl

Quality of data



1.file number 2.three strongest lines 3.lowest-angle line 4.chemical formula and name 5.data on diffraction method used 6.crystallographic data 7.optical and other data 8.data on specimen 9.data on diffraction pattern.

Joint Committee on Powder Diffraction Standards, JCPDS (1969)
Replaced by International Centre for Diffraction Data, ICDF (1978)



NaCl: a_0 = 5.6402 Å

$(n)\lambda = 2*d*\mathrm{SIN}\theta$

$\lambda = 1.54056$ Å

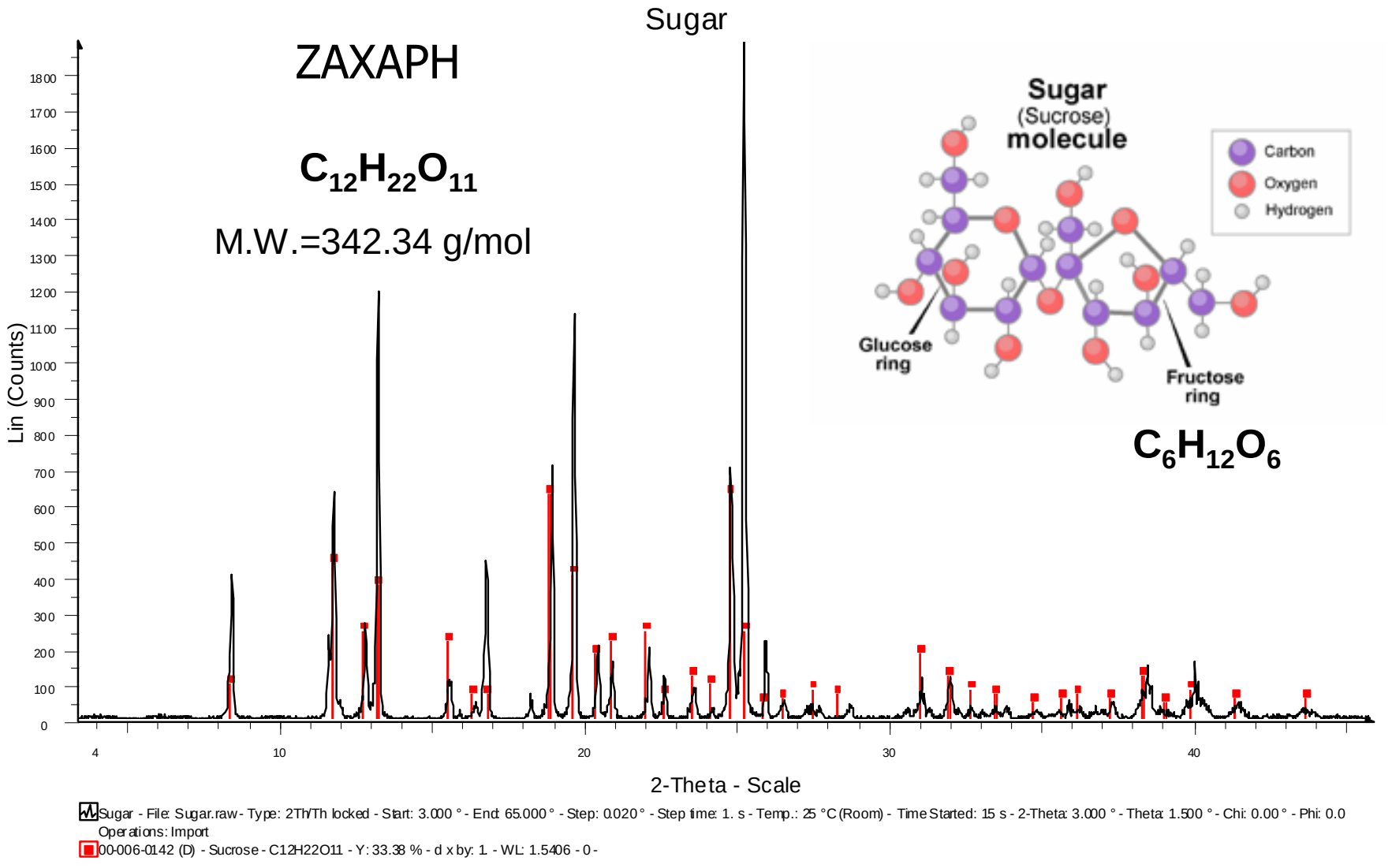
$\theta = 2\theta/2$

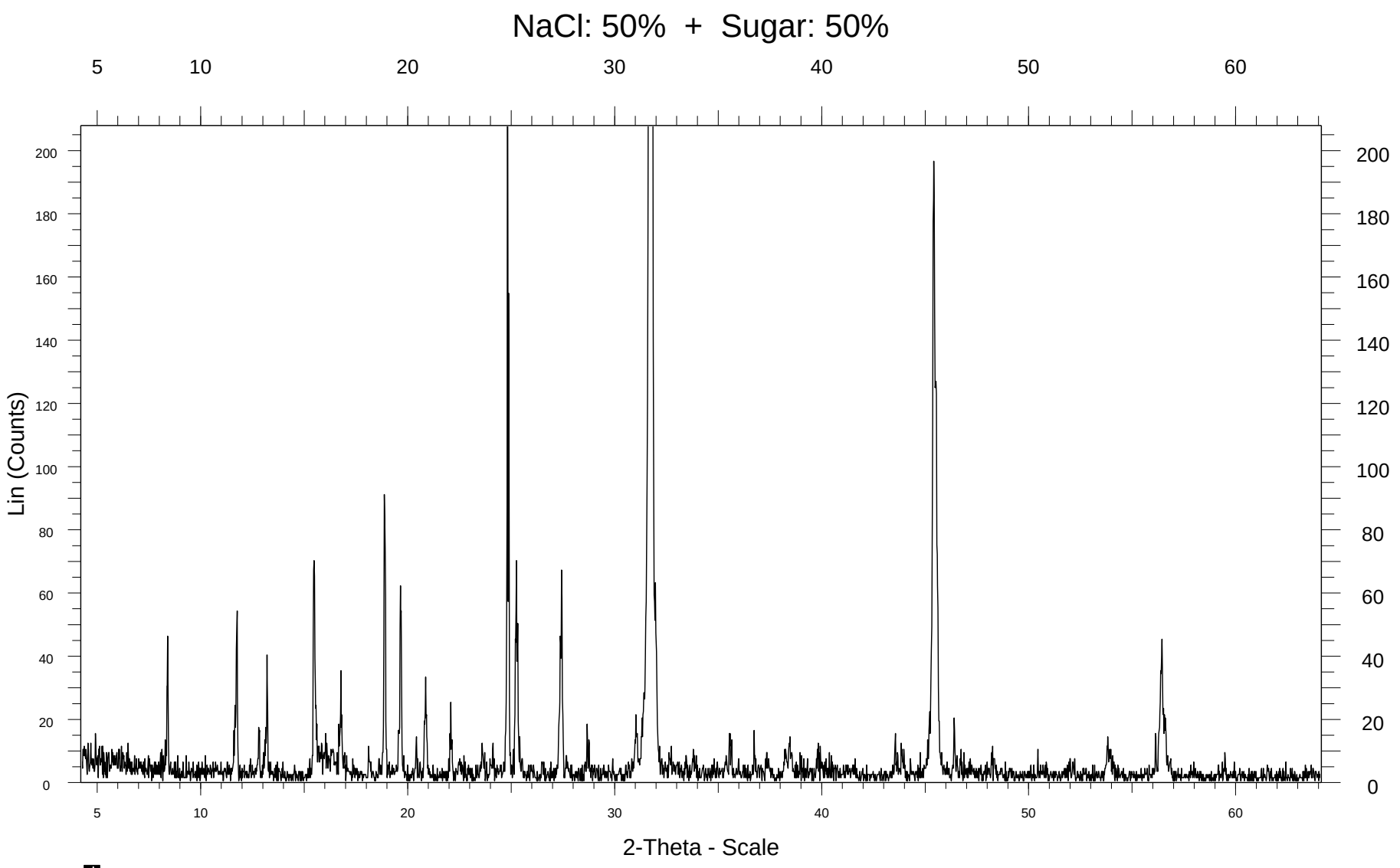
SIN2θ = SIN(θ*PI()/180)^2

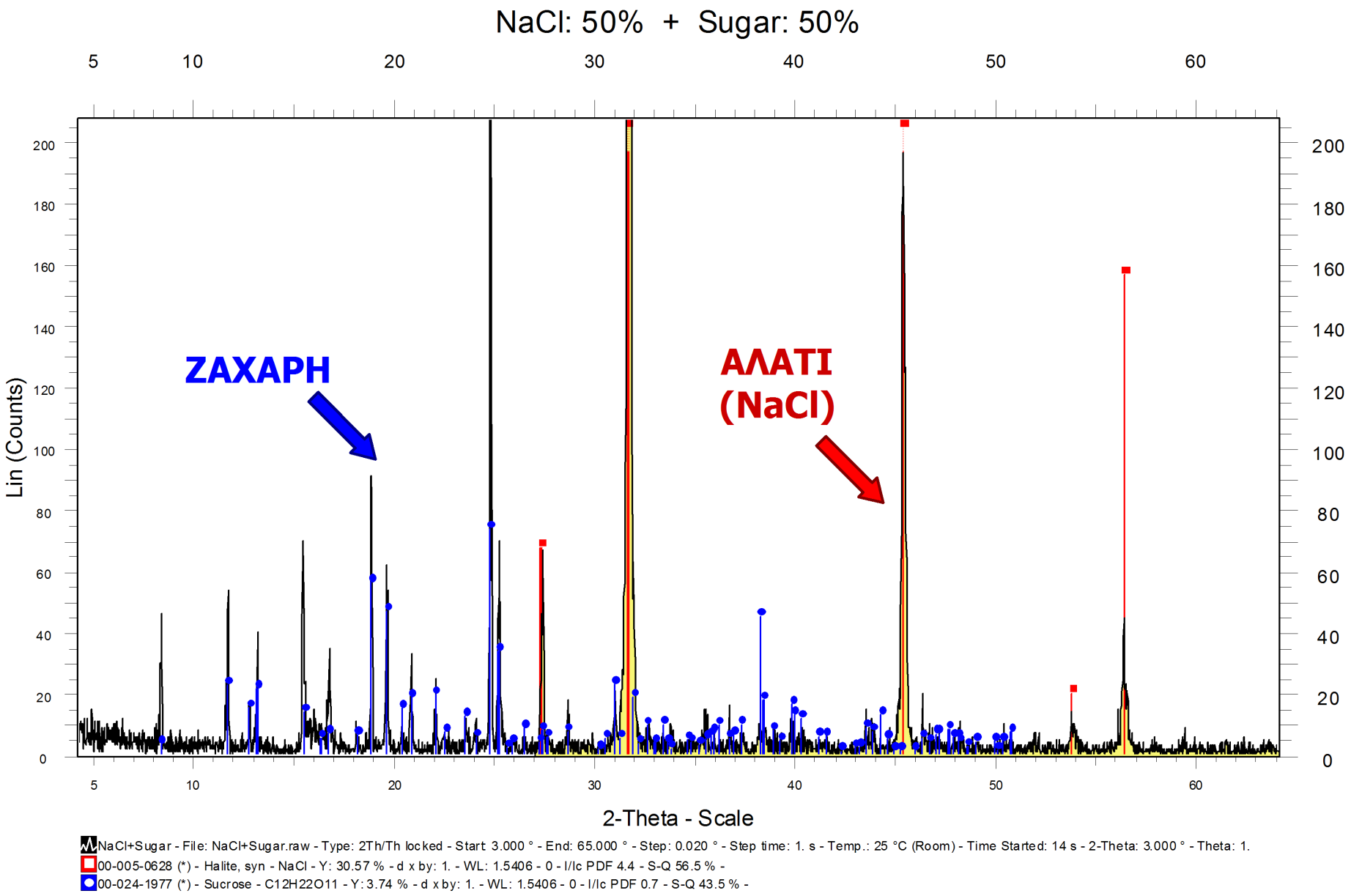
$d = \lambda/(2*\mathrm{SIN}(\theta*\mathrm{ACOS}(-1)/180))$

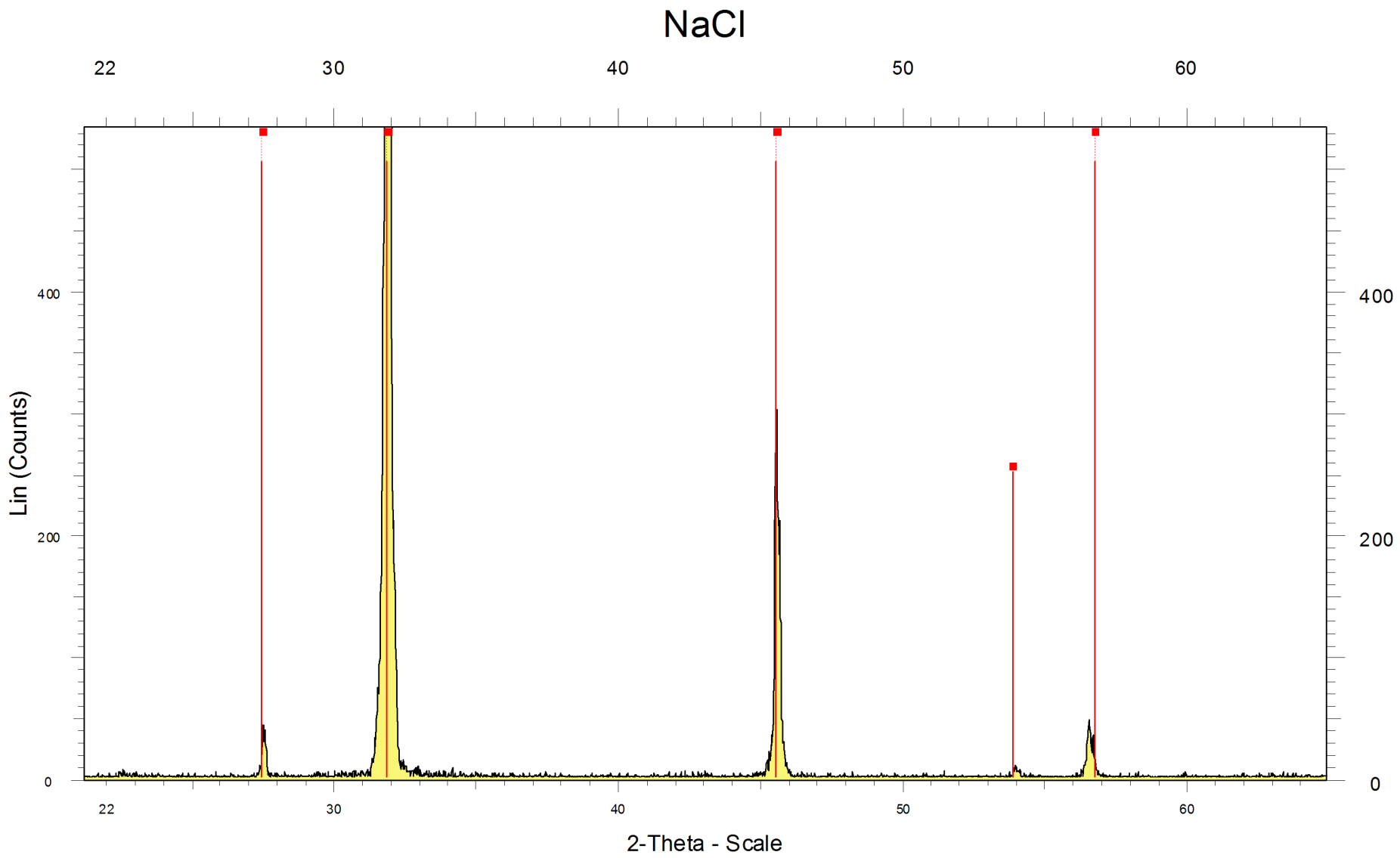
	θ	2θ	Cps	sin2θ	I rel	d	1*sin2θ/sin2θmin	2*sin2θ/sin2θmin	h2+k2+l2	hkl	α(A)
1	13.676	27.351	50	0.0559	4	3.258	1.487	2.974	2	110	**4.6076**
2	15.846	31.692	1280	0.075	100	2.821	1.984	3.967	4	200	**5.6420**
3	22.725	45.450	420	0.149	33	1.994	3.970	7.941	8	220	**5.6397**
4	26.926	53.852	10	0.205	1	1.701	5.456	10.911	11	311	**5.6416**
5	28.239	56.477	40	0.224	3	1.628	5.956	11.912	12	222	**5.6396**

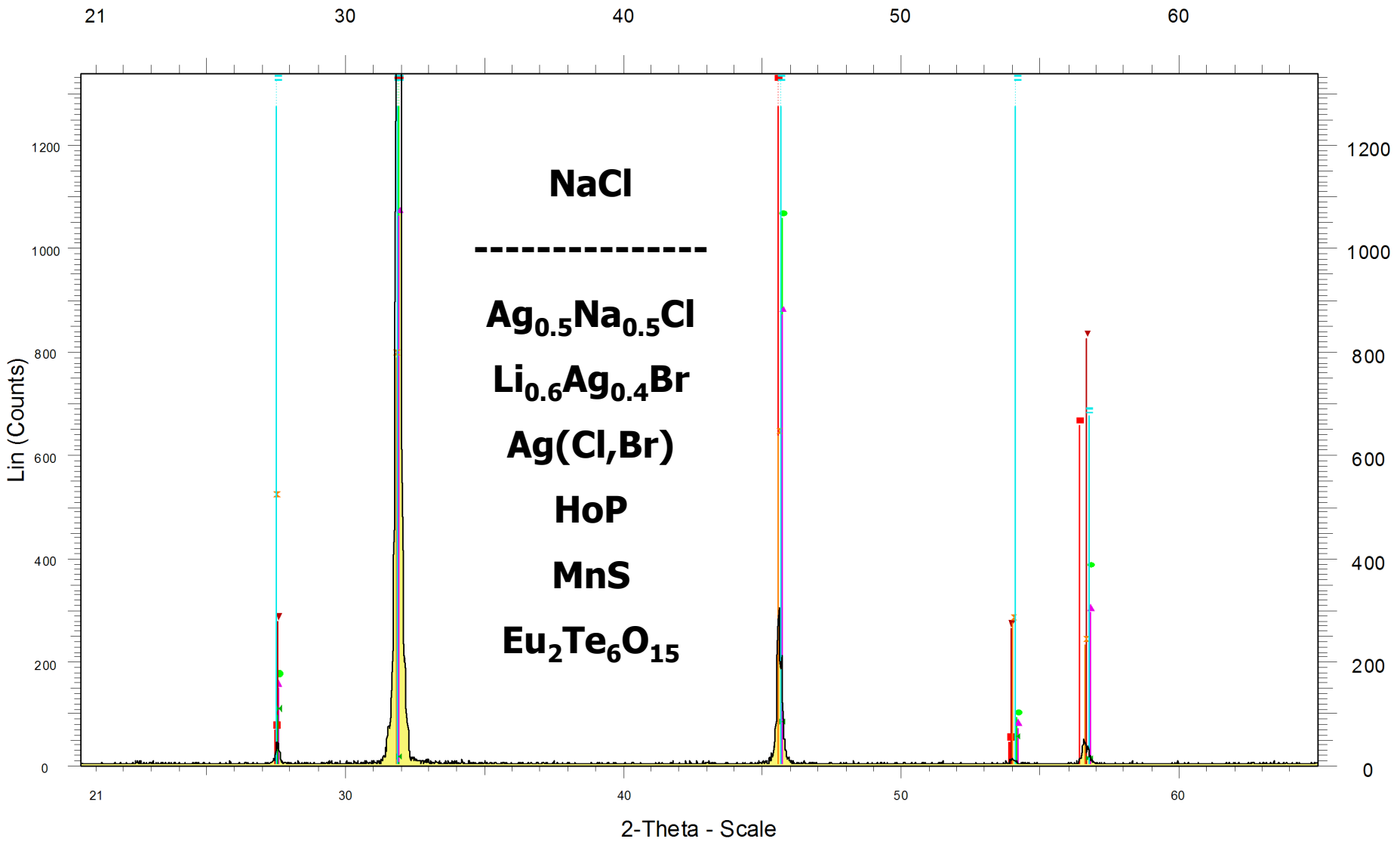
NaCl: $a_0 = 5.6402$ Å


Sugar
ZAXAPH
C12H22O11
M.W.=342.34 g/mol
Sugar
(Sucrose)
molecule
Carbon
Oxygen
Hydrogen
Glucose
ring
Fructose
ring
C6H12O6
Lin (Counts)
2-Theta - Scale
Sugar - File: Sugar.raw - Type: 2Th/Th locked - Start: 3.000 ° - End: 65.000 ° - Step: 0.020 ° - Step time: 1. s - Temp.: 25 °C (Room) - Time Started: 15 s - 2-Theta: 3.000 ° - Theta: 1.500 ° - Chi: 0.00 ° - Phi: 0.0
Operations: Import
00-006-0142 (D) - Sucrose - C12H22O11 - Y: 33.38 % - d x by: 1. - WL: 1.5406 - 0 -


NaCl: 50% + Sugar: 50%
5
10
20
30
40
50
60
Lin (Counts)
0
20
40
60
80
100
120
140
160
180
200
2-Theta - Scale
NaCl+Sugar - File: NaCl+Sugar.raw - Type: 2Th/Th locked - Start: 3.000 ° - End: 65.000 ° - Step: 0.020 ° - Step time: 1. s - Temp.: 25 °C (Room) - Time Started: 14 s - 2-Theta: 3.000 ° - Theta: 1.


NaCl: 50% + Sugar: 50%
ZAXAPH
ΑΛΑΤΙ
(NaCl)
Lin (Counts)
2-Theta - Scale
NaCl+Sugar - File: NaCl+Sugar.raw - Type: 2Th/Th locked - Start: 3.000 ° - End: 65.000 ° - Step: 0.020 ° - Step time: 1. s - Temp.: 25 °C (Room) - Time Started: 14 s - 2-Theta: 3.000 ° - Theta: 1.
00-005-0628 (*) - Halite, syn - NaCl - Y: 30.57 % - d x by: 1. - WL: 1.5406 - 0 - I/Ic PDF 4.4 - S-Q 56.5 % -
00-024-1977 (*) - Sucrose - C12H22O11 - Y: 3.74 % - d x by: 1. - WL: 1.5406 - 0 - I/Ic PDF 0.7 - S-Q 43.5 % -


NaCl
22
30
40
50
60
400
200
0
Lin (Counts)
2-Theta - Scale
NaCl - File: NaCl.raw - Type: 2Th/Th locked - Start: 3.000 ° - End: 65.000 ° - Step: 0.020 ° - Step time: 1. s - Temp.: 25 °C (Room) - Time Started: 14 s - 2-Theta: 3.000 ° - Theta: 1.500 ° - Chi: 0.0
00-002-0818 (D) - Halite - NaCl - Y: 36.38 % - d x by: 1. - WL: 1.5406 - 0 - I/Ic PDF 1. - S-Q 100.0 % -



NaCl - File: NaCl.raw - Type: 2Th/Th locked - Start: 3.000 ° - End: 65.000 ° - Step: 0.020 ° - Step time: 1. s - Temp.: 25 °C (Room) - Time Started: 14 s - 2-Theta: 3.000 ° - Theta: 1.500 ° - Chi: 0.0

00-022-0898 (*) - Silver Sodium Chloride - Ag0.5Na0.5Cl - Y: 18.17 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 3.3 - S-Q 4.0 % -

00-026-0856 (C) - Lithium Silver Bromide - Li0.6Ag0.4Br - Y: 14.21 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 1. - S-Q 10.4 % -

00-014-0255 (N) - Chlorargyrite, bromian - Ag(Cl,Br) - Y: 21.21 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 1. - S-Q 15.6 % -

00-001-0994 (D) - Halite - NaCl - Y: 43.10 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 1. - S-Q 31.7 % -

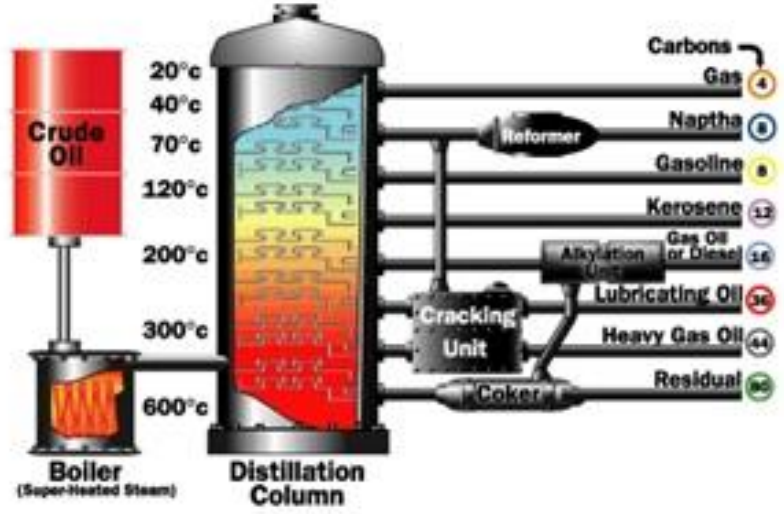
00-030-0616 (C) - Holmium Phosphide - HoP - Y: 10.54 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 19.6 - S-Q 0.4 % -

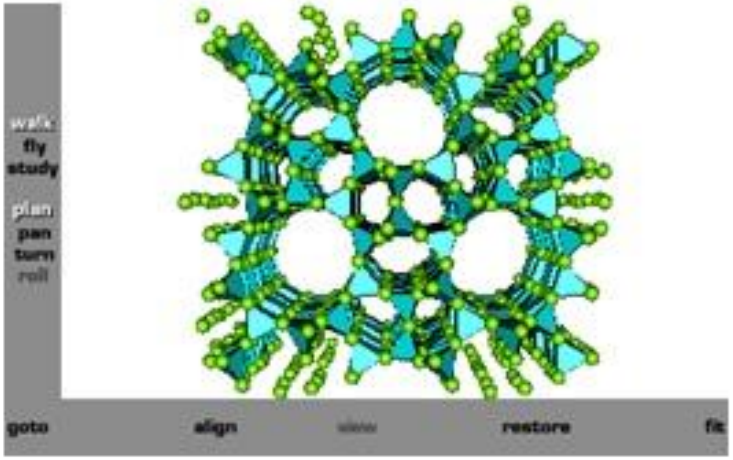
00-040-1288 (*) - Manganese Sulfide - MnS - Y: 1.29 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 1. - S-Q 0.9 % -

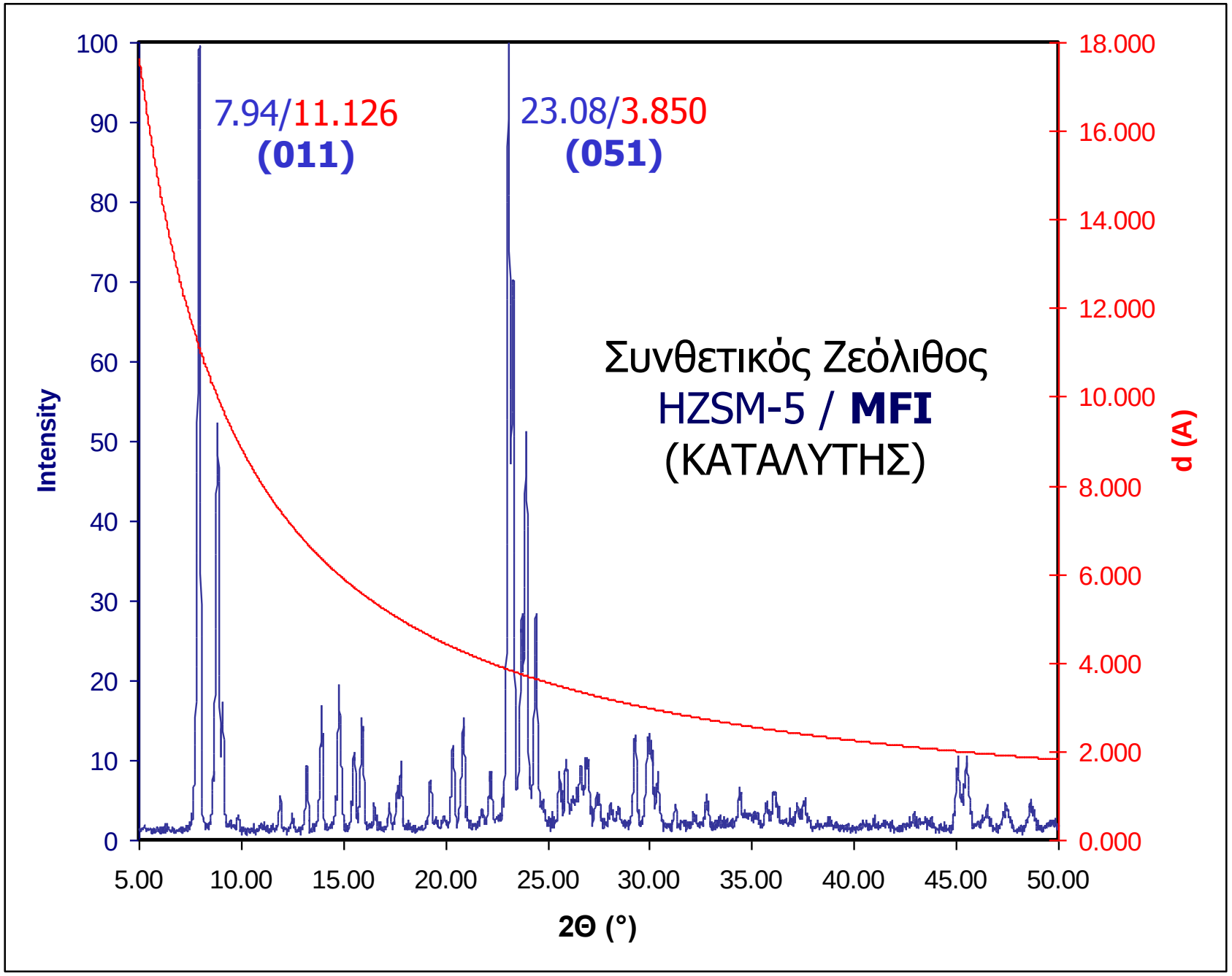
00-037-1399 (I) - Europium Tellurate - Eu2Te6O15 - Y: 50.14 % - d x by: 1. - WL: 1.5406 - Cubic - I/Ic PDF 1. - S-Q 36.9 % -

ΚΑΤΑΛΥΤΙΚΗ ΔΙΑΣΠΑΣΗ ΠΕΤΡΕΛΑΙΟΥ

Παραγωγή κλασμάτων υδρογονανθράκων με κοντύτερες ανθρακικές αλυσίδες (π.χ. C8)






7.94/11.126
(011)
23.08/3.850
(051)
Συνθετικός Ζεόλιθος
HZSM-5 / MFI
(ΚΑΤΑΛΥΤΗΣ)
Intensity
d (A)
2Θ (°)
100
90
80
70
60
50
40
30
20
10
0
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00

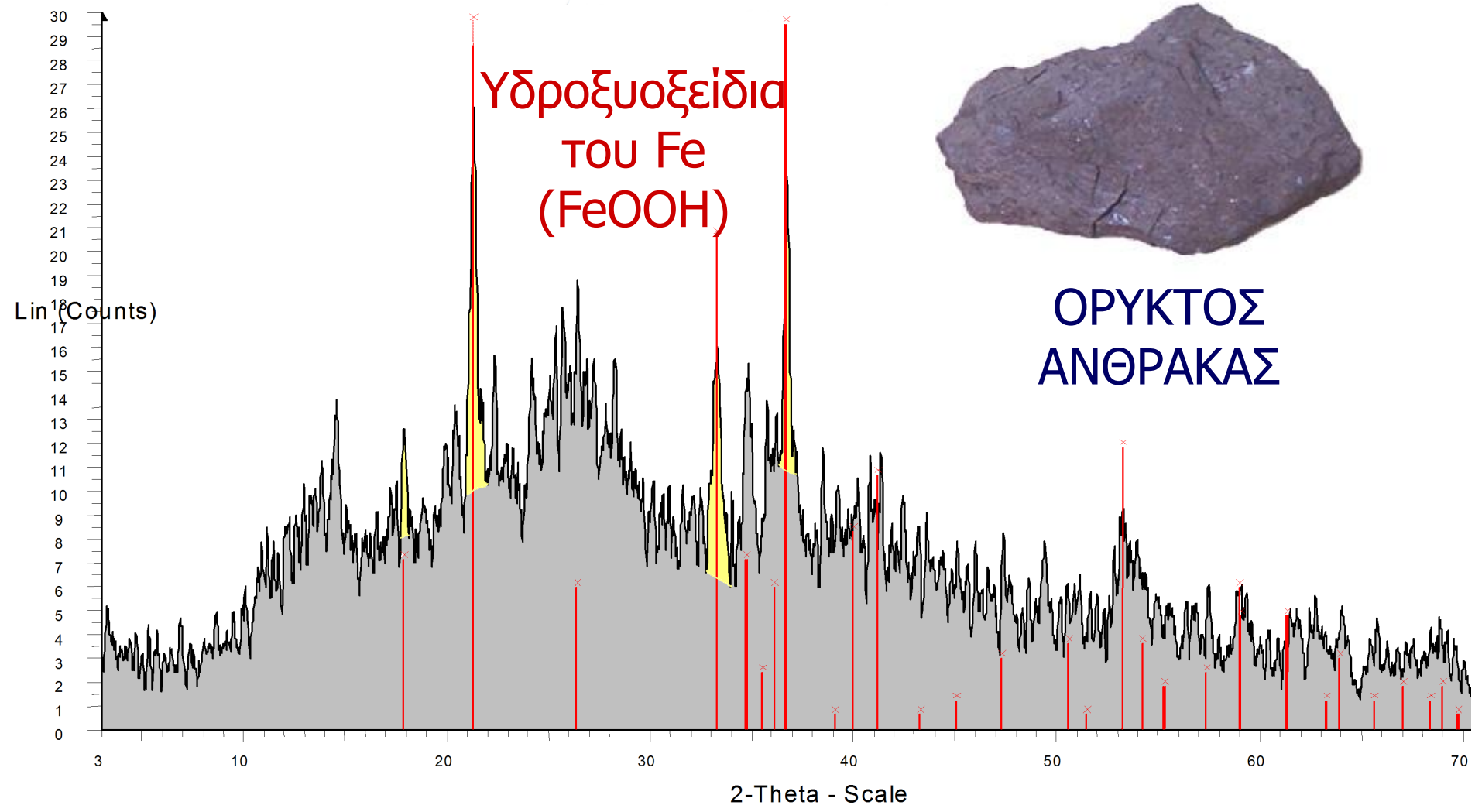
ΑΜΟΡΦΟ ΥΛΙΚΟ

Χαμηλός αριθμός κτύπων

Χαρακτηριστικό "σαμάρι"

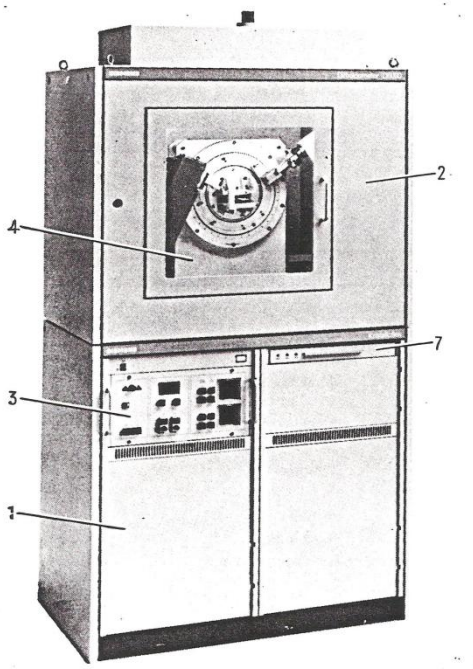
ΟΡΥΚΤΟΣ ΑΝΘΡΑΚΑΣ

ΑΜΟΡΦΟ ΥΛΙΚΟ ΜΕ ΠΡΟΣΜΕΙΞΗ ΚΡΥΣΤΑΛΛΙΚΟΥ ΥΛΙΚΟΥ



ΠΕΡΙΘΛΑΣΗ ΑΚΤΙΝΩΝ-Χ

Περιθλασίμετρο Ακτίνων-Χ Σκόνης



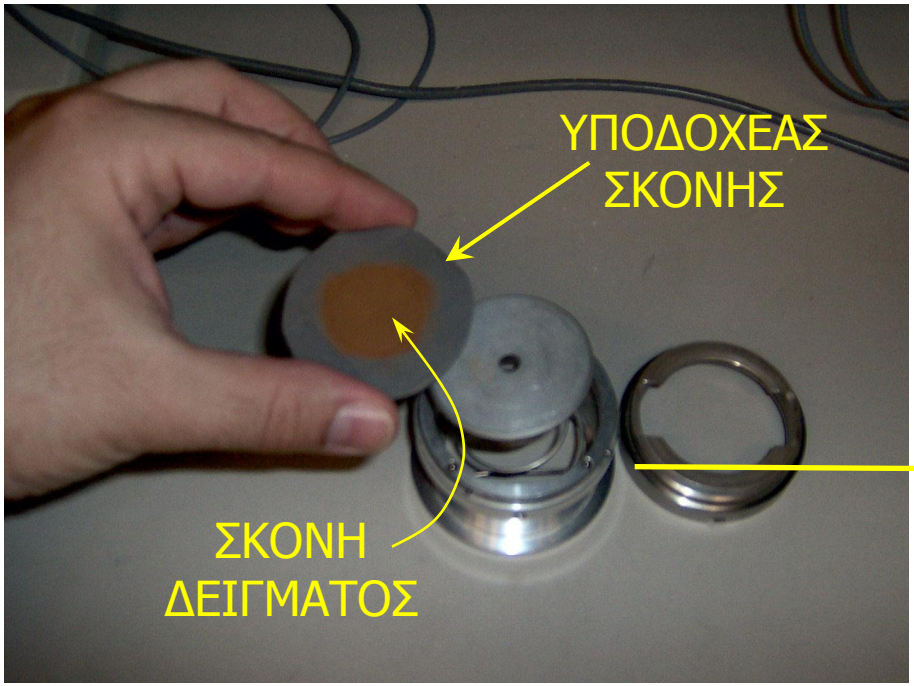
1 Standgehäuse
Console
Console

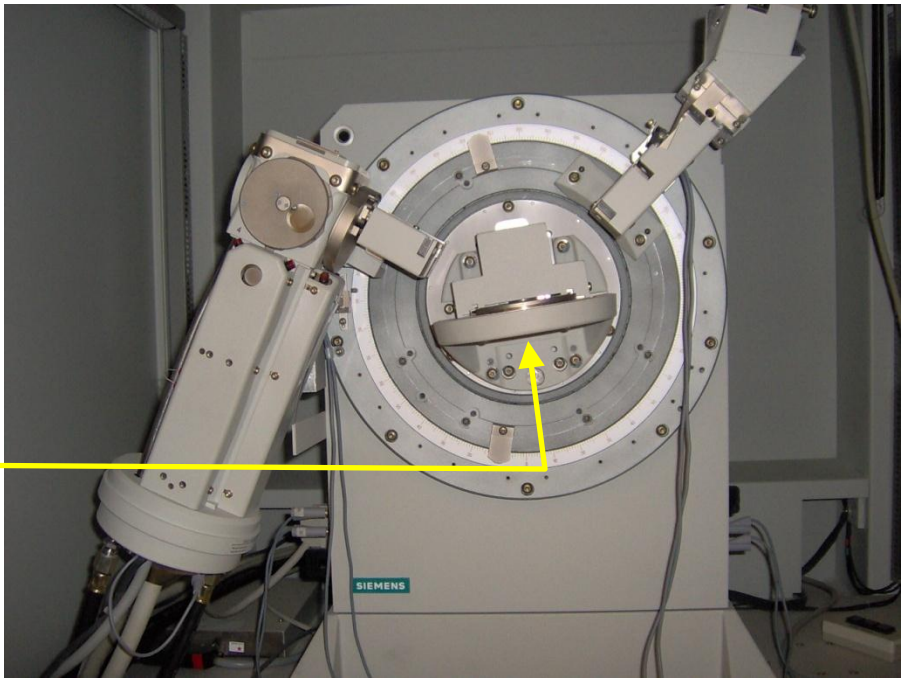
2 Strahlenschutzgehäuse
Radiation protection
Boîtier de protection des radiations

3 Röntgengenerator KRISTALLOFLEX®
KRISTALLOFLEX® X-ray generator
Générateur de rayons X KRISTALLOFLEX®

4 Goniometer
Goniometer
Goniomètre

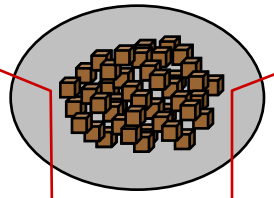
7 Bedienfeld
Control panel
Panneau de commande





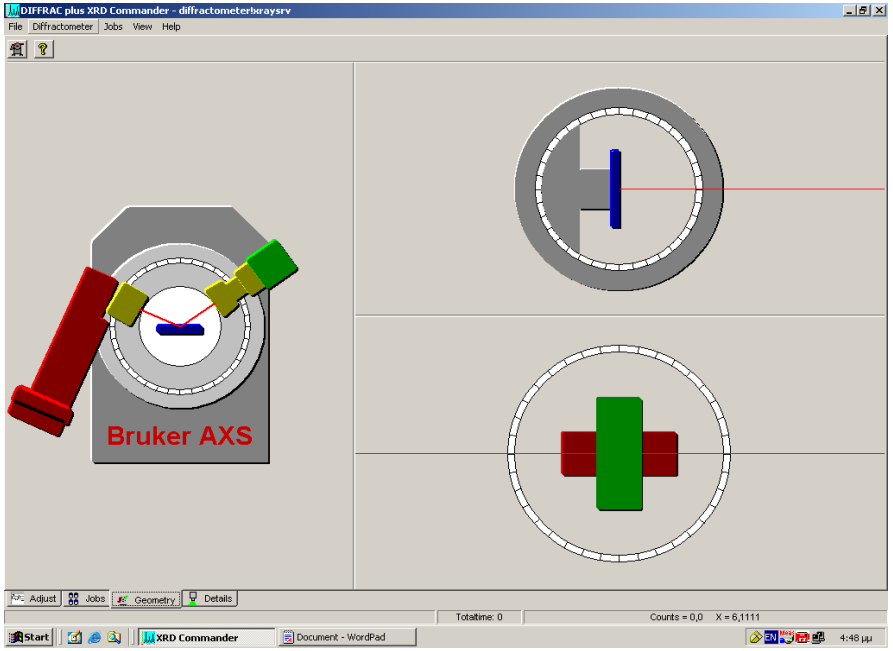
ΜΕΓΕΘΟΣ ΚΟΚΚΩΝ ΣΚΟΝΗΣ

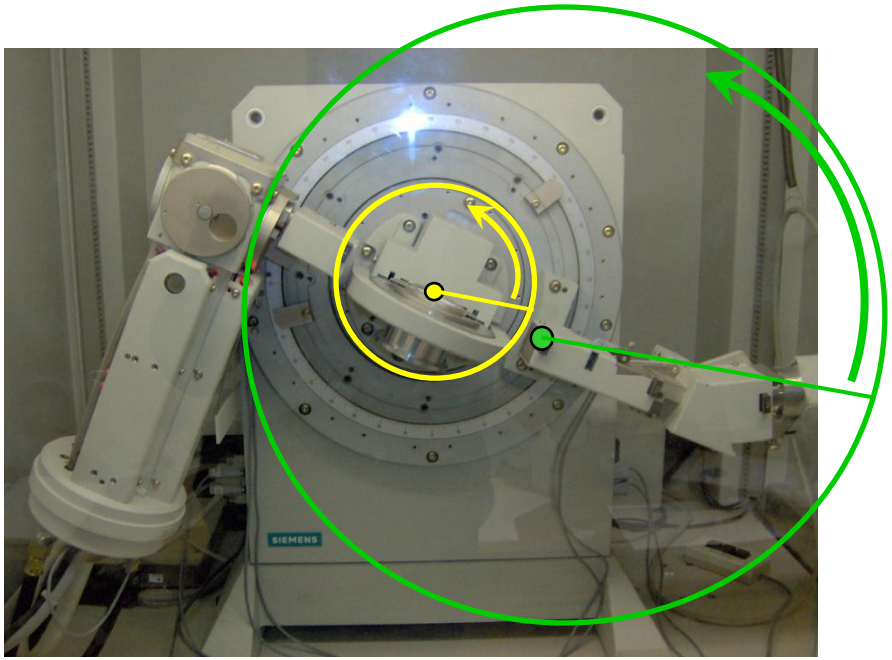
0.1 μm (100 nm) – 40 μm

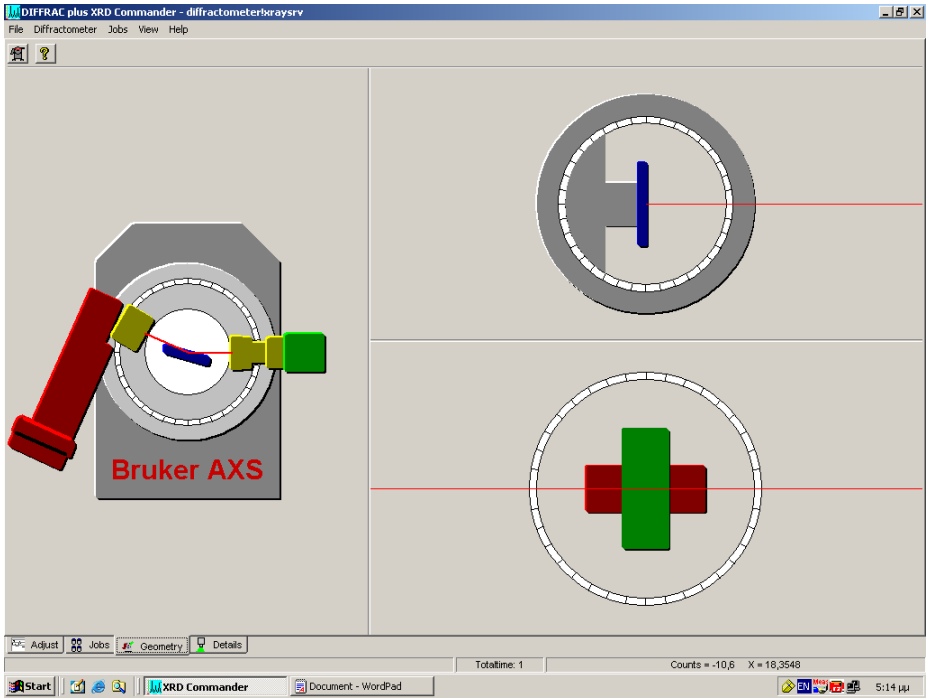


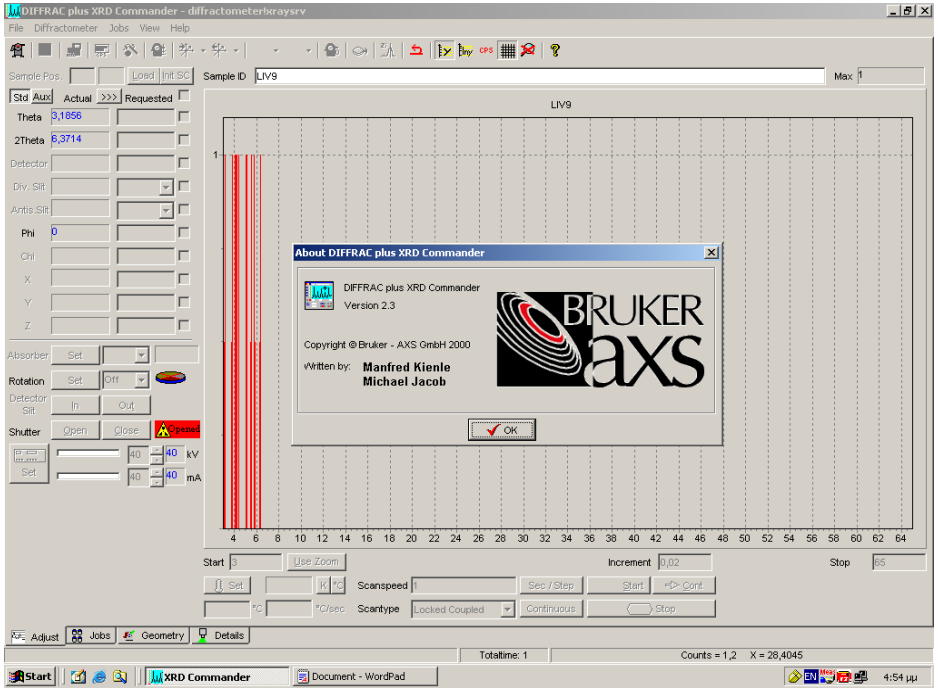
ΔΙΕΥΡΥΝΣΗ ΚΟΡΥΦΩΝ

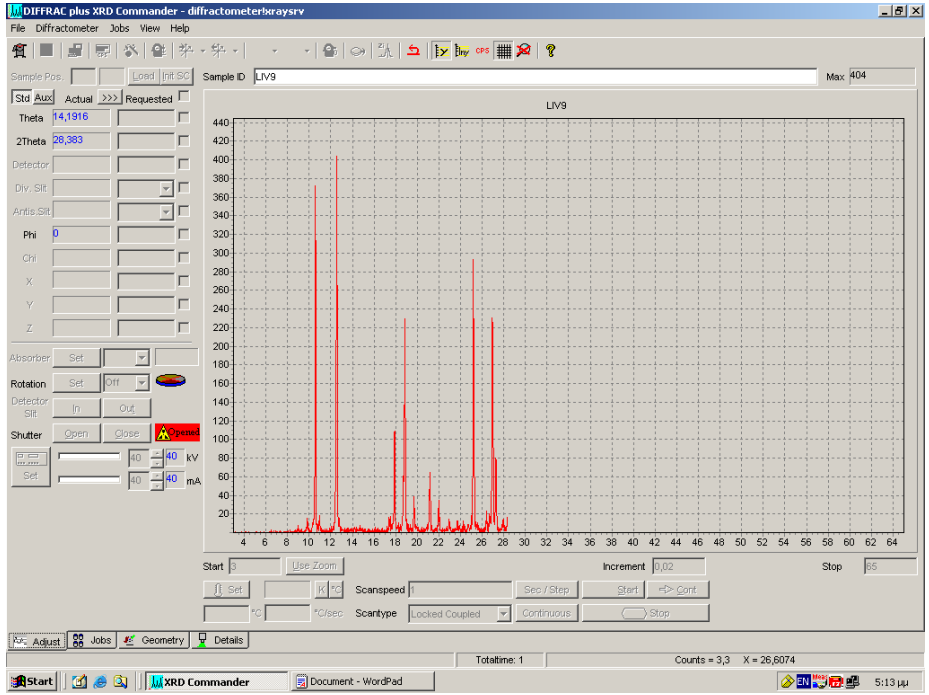
ΜΕΙΩΜΕΝΗ ΠΕΡΙΘΛΑΣΗ

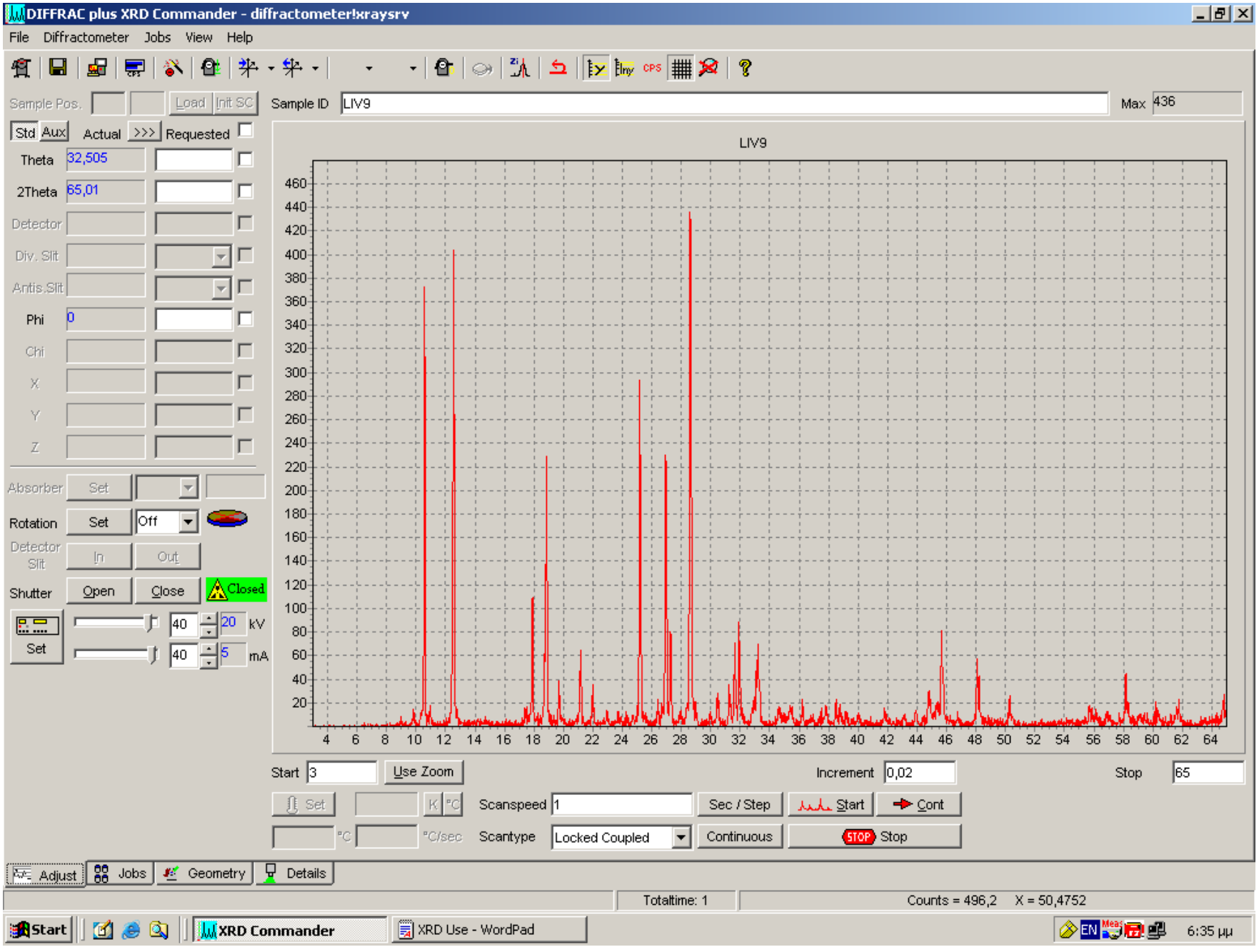



SIEMENS


DIFFRAC plus XRD Commander - diffractometer:\raysrv
File Diffractometer Jobs View Help
Bruker AXS
Adjust Jobs Geometry Details
Totaltime: 1
Counts = -10,6 X = 18,3548
Start XRD Commander Document - WordPad
5:14 µµ


DIFFRAC plus XRD Commander - diffractometer:\raysrv
File Diffractometer Jobs View Help
Sample ID LIV9
LIV9
About DIFFRAC plus XRD Commander
DIFFRAC plus XRD Commander
Version 2.3
Copyright © Bruker - AXS GmbH 2000
Written by: Manfred Kienle
Michael Jacob
BRUKER axs
OK
Theta 3,1856
2Theta 6,3714
Phi 0
Adjust Jobs Geometry Details
Totaltime: 1
Counts = 1,2 X = 28,4045
Start XRD Commander Document - WordPad
4:54 µµ


DIFFRAC plus XRD Commander - diffractometer:\raysrv
File Diffractometer Jobs View Help
Sample ID LIV9
LIV9
Theta 14,1916
2Theta 28,383
Phi 0
Adjust Jobs Geometry Details
Totaltime: 1
Counts = 3,3 X = 26,6074
Start XRD Commander Document - WordPad
5:13 µµ


DIFFRAC plus XRD Commander - diffractometer!xraysrv
File Diffractometer Jobs View Help
Sample Pos. Load Init SC
Sample ID LIV9
Max 436
Std Aux Actual >>> Requested
Theta 32,505
2Theta 65,01
Detector
Div. Slit
Antis.Slit
Phi 0
Chi
X
Y
Z
Absorber Set
Rotation Set Off
Detector Slit In Out
Shutter Open Close Closed
Set 40 20 kV
40 5 mA
LIV9
Start 3 Use Zoom
Increment 0,02
Stop 65
Set K °C
Scanspeed 1 Sec / Step Start Cont
°C °C/sec Scantype Locked Coupled Continuous STOP Stop
Adjust Jobs Geometry Details
Totaltime: 1
Counts = 496,2 X = 50,4752
Start XRD Commander XRD Use - WordPad
EN 6:35 µµ

PowDLL

users.uoi.gr/nkourkou/powdll/

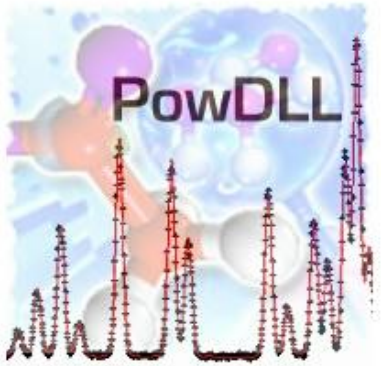
Search

PowDLL .NET converter for XRPD files

Home (Lab) | Download | Hints'n'Tips | Screenshots | For programmers | Updates

PowDLL is a .NET dynamic link library used for the interconversion procedure between variable formats of Powder X-Ray files. The DLL is capable of handling the most common file formats (binary and ASCII). The library can be used as a reusable component with any .NET language or as a **standalone utility**.

PowDLL can run on windows OS as long as they have dotnet runtimes version 2 (or later) installed (i.e., Windows Vista SP1 or later). Linux is also supported through Wine.



Imports

Bruker/Siemens RAW (versions 1,2,4), Bruker BRML, STOE RAW (plus multi-range files), Scintag RAW (plus multi-range files), Rigaku RAW, Shimadzu RAW, Philips RD, Philips SD, Scintag RD, Panalytical XRDML, INEL Binary,

Exports

Bruker/Siemens RAW (versions 1,2), Philips RD, Scintag ARD, Sietronics CPI, Riet7 DAT, DBWS, GSAS (CW STD), Jade MDI, Rigaku RIG, Philips UDF, UXD, XDA, XDD, Panalytical XRDML, ASCII XY Files, MS-Excel Multiple XY,

Citation

Please cite if you find PowDLL useful:

PowDLL, a reusable .NET component for interconverting powder diffraction data: Recent developments, N. Kourkoumelis, ICDD Annual Spring

QUALX2

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IC CNR

Qualx2

a qualitative phase analysis software

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30 September – 3 October 2019

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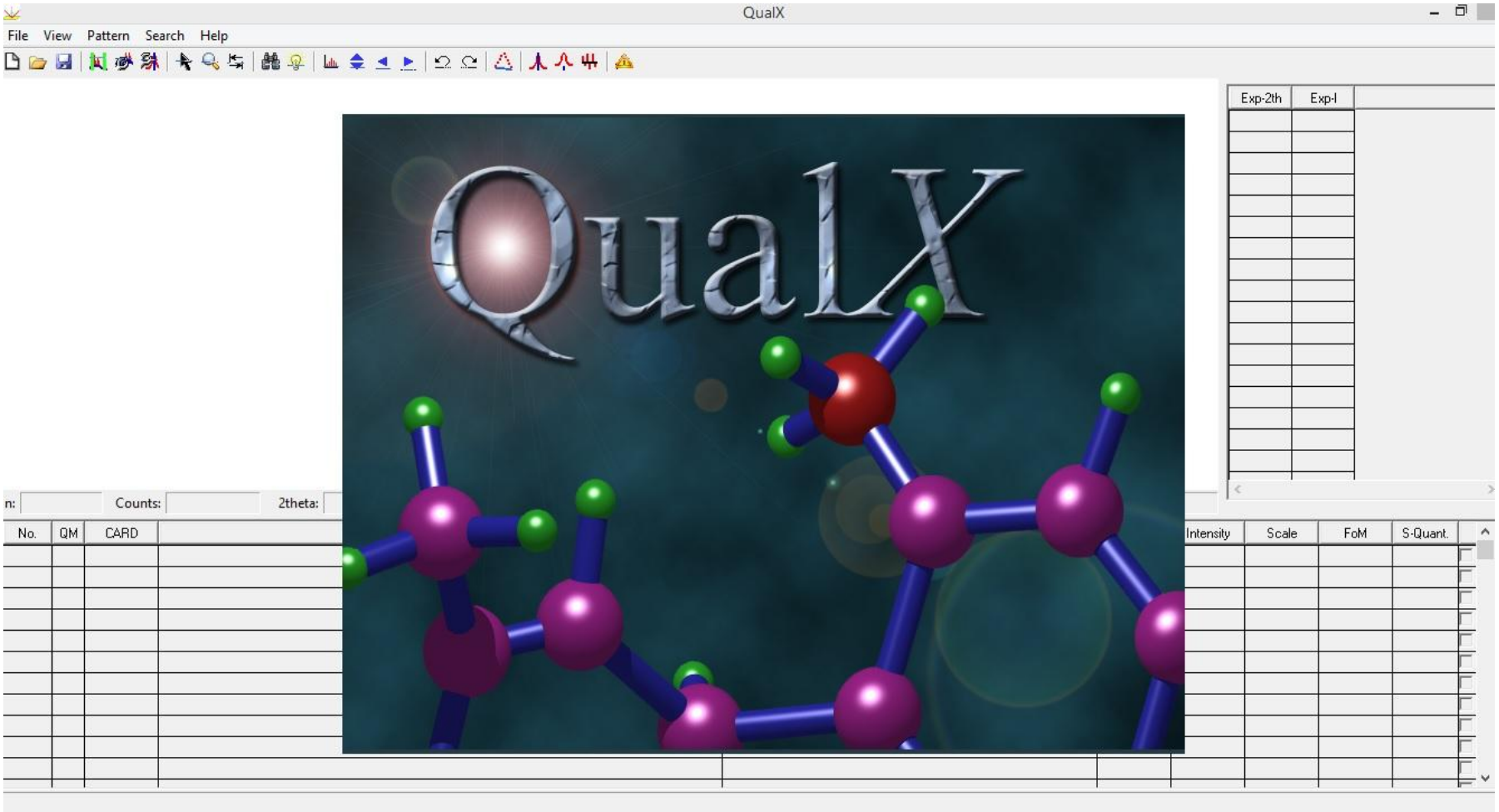
QualX User Experience Survey

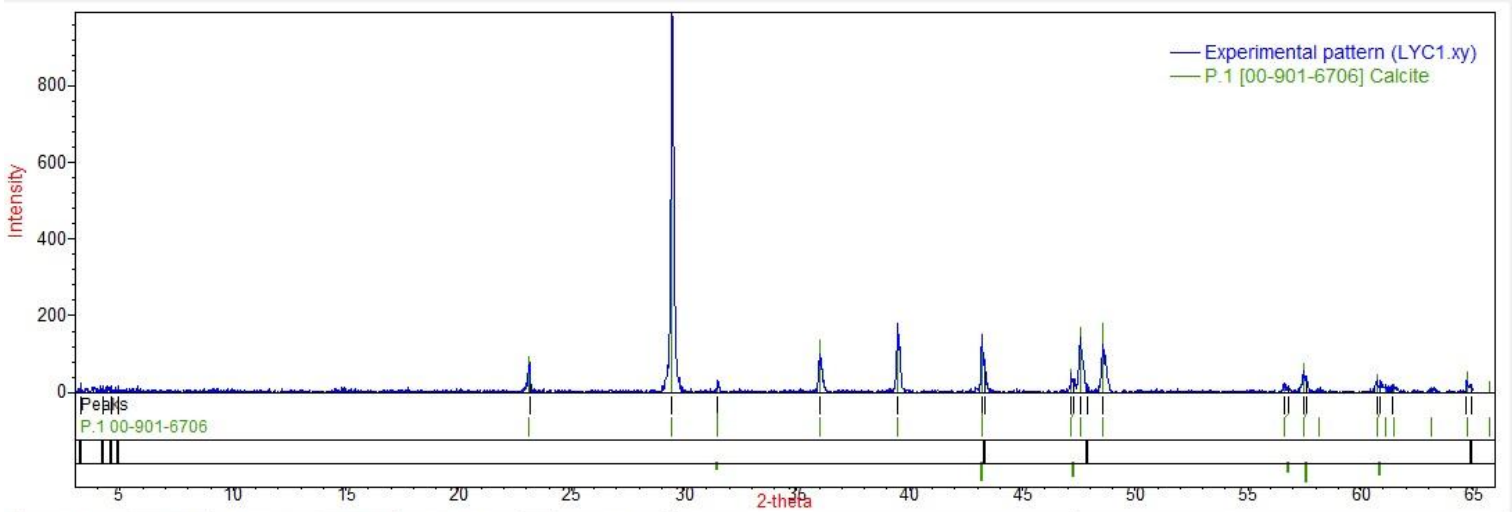
QUALX2


QualX
File View Pattern Search Help
QualX
Exp-2th
Exp-I
n:
Counts:
2theta:
No.
QM
CARD
Intensity
Scale
FoM
S-Quant.

ΑΣΒΕΣΤΟΛΙΘΟΣ ΛΥΚΑΒΗΤΤΟΥ

QualX - [C:\Users\ath\Desktop\New folder\X\Limestone_Lycabettus.qlx]

File View Pattern Search Help



Exp-2th	Exp-I	P1-2th	P1-I
3.22	24.4		
4.22	15.4		
4.60	16.5		
4.92	17.4		
23.16	77.7	23.08	92.2
29.46	1000.0	29.44	978.7
31.48	29.6	31.48	18.8
36.00	100.0	36.01	137.0
39.48	178.8	39.45	176.6
43.22	151.1	43.21	132.3
43.34	86.6		
47.16	47.9	47.17	58.9
47.26	36.6		
47.56	144.8	47.57	169.8
47.88	18.9		
48.58	127.2	48.56	180.4
56.60	23.4	56.63	25.2

n: 1870 Counts: 995.37 2theta: 40.384 d: 2.232

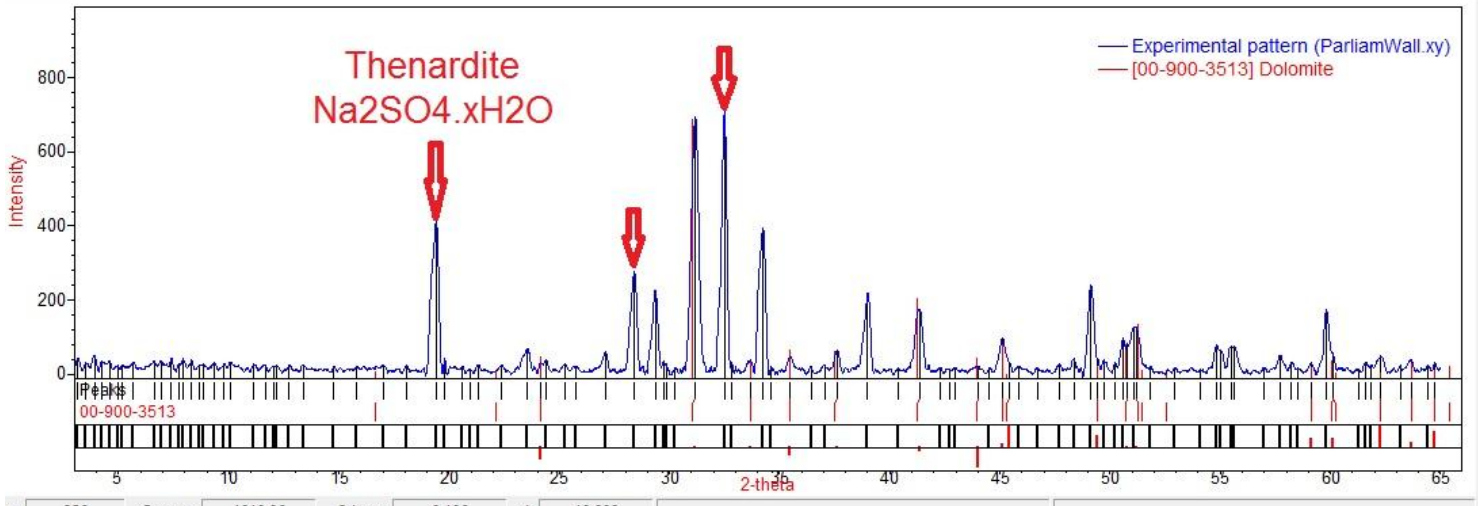
No.	QM	CARD	Compound Name	Chemical Formula	Peakpos.	Intensity	Scale	FoM	S-Quant.
P.1	C	00-901-6706	[Calcite]	C Ca O3	0.88525	0.81166	0.97866	0.84629	100.0%
1	C	00-152-8121		Co0.63 Te	0.70545	0.37513	0.22156E-01	0.51475	14.063
2	C	00-900-9901	[Imgreite]	Ni0.966 Se0.4 Te0.634	0.52213	0.40439	0.43716E-01	0.47941	10.403
3	C	00-101-0962	Calcium carbonate [Calcite]	Ca C O3	0.60371	0.30531E-01	0.10913E-01	0.41636	3.456
4	C	00-150-1511		[Pb(Mg1/3Nb2/3)O3]0.68-[PbTiO3]0.32	0.78189	1.0000	0.36037E-02	0.41469	6.459
5	C	00-412-4262		C350 H350 Au130 S50	0.63714	0.40099	0.66543E-02	0.39383	51.913
6	C	00-151-0766	Mo2 Ni B2	B2 Mo2 Ni	0.44894	0.51396	0.12578E-01	0.38176	7.027
7	C	00-151-0854	Y B2	B2 Y	0.37733	0.22802	0.69557E-02	0.36578	8.970
8	C	00-154-7286		K14.4Fe14.4Ti1.6O32	0.63760	0.15372	0.75150E-02	0.36118	3.971
9	C	00-451-0870		C252 H314 Cl6 Co24 N6 O57 P8 S24	0.51760	0.50869	0.17600E-01	0.35711	17.860
10	C	00-151-0717	Ho B2	B2 Ho	0.87829	0.32208	0.44825E-02	0.35512	16.628

Matched POW_COD Ca 59 Selected Card 00-901-6706 C Ca O3

ΤΟΙΧΟΣ ΒΟΥΛΗΣ

QualX - [C:\Users\ath\Desktop\New folder\X\ParliamWall.qlx]

File View Pattern Search Help

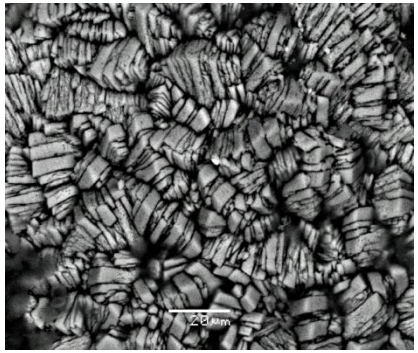


Exp-2th	Exp-I	9003513	9003513
3.14	43.0		
3.52	32.4		
3.90	51.4		
4.24	34.4		
4.58	34.9		
4.94	22.9		
5.16	25.9		
5.64	31.6		
6.60	36.9		
6.96	37.2		
7.36	41.4		
7.74	26.7		
7.92	41.3		
8.32	37.5		
8.68	26.1		
8.84	29.1		
9.34	32.6		

n: 256 Counts: 1010.06 2theta: 8.106 d: 10.898

No.	QM	CARD	Compound Name	Chemical Formula	Peakpos.	Intensity	Scale	FoM	S-Quant.
1	C	00-900-3513	[Dolomite]	C Ca0.5 Mg0.5 O3	0.78222	0.65899	0.68713	0.72795	2.029
2	C	00-770-1475		C7 H6 P S2, Cl4 Ga	0.55410	0.36583	0.14954	0.71051	0.881
3	C	00-406-7719		C32 H32 Br2 N4 Pd S2	0.56521	0.32987	0.24452	0.71042	1.830
4	C	00-222-4674	[N,N-Bis(diphenylphosphino)propylamine- \k^2^P,P]dichloridoplatinum(II)	[Pt Cl2 (C27 H27 N P2)]	0.56622	0.43595	0.17356	0.70963	2.356
5	C	00-715-3395		C23 H15 Br	0.56184	0.36733	0.27911	0.70854	0.900
6	C	00-153-4414	((U O2)4 Cl2 O2 (O H)2 (H2 O)6) (H2 O)4	Cl2 H22 O22 U4	0.55656	0.38484	0.33915	0.70835	9.318
7	C	00-150-3825		C17 H21 Br O3	0.57691	0.35800	0.29571	0.70832	1.346
8	C	00-710-3654		C30 H34 Cl4 P2 Pd1	0.56466	0.31811	0.24912	0.70698	2.595
9	C	00-901-5497	[Debattistiite]	Ag9 As6 Hg0.5 S12.14 Te1.86	0.56892	0.38627	0.35693	0.70634	2.114
10	C	00-722-3130		C12 H10 Cl2 N2 O3	0.58353	0.25988	0.15376	0.70626	0.701
11	C	00-150-2343		C19 H13 Cl O S	0.54843	0.34094	0.31763	0.70595	0.736

Matched POW_COD Ca 2903 Selected Card 00-900-3513 C Ca0.5 Mg0.5 O3



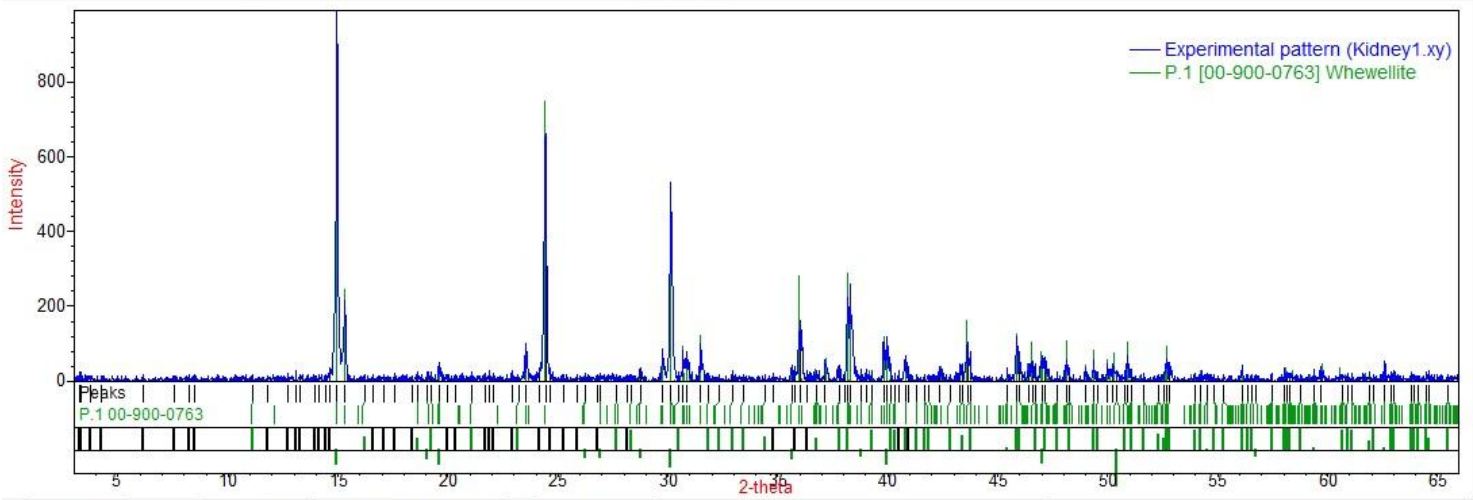
ΠΕΤΡΑ ΝΕΦΡΟΥ

ΧΟΥΕΛΙΤΗΣ

$Ca(C_2O_4)\cdot(H_2O)$

QualX - [C:\Users\ath\Desktop\New folder\X\Kidney1.qlx]

File View Pattern Search Help



Exp-2th	Exp-I	P1-2th	P1-I
3.22	24.3		
3.34	24.2		
3.76	11.6		
4.24	11.5		
6.12	15.8		
7.56	14.9		
8.22	18.3		
8.46	18.1		
11.12	15.5	11.08	0.1
11.82	14.6		
12.74	21.7		
13.08	29.5		
13.24	16.8		
13.96	14.8		
14.16	18.2		
14.42	17.6		
14.64	33.9		

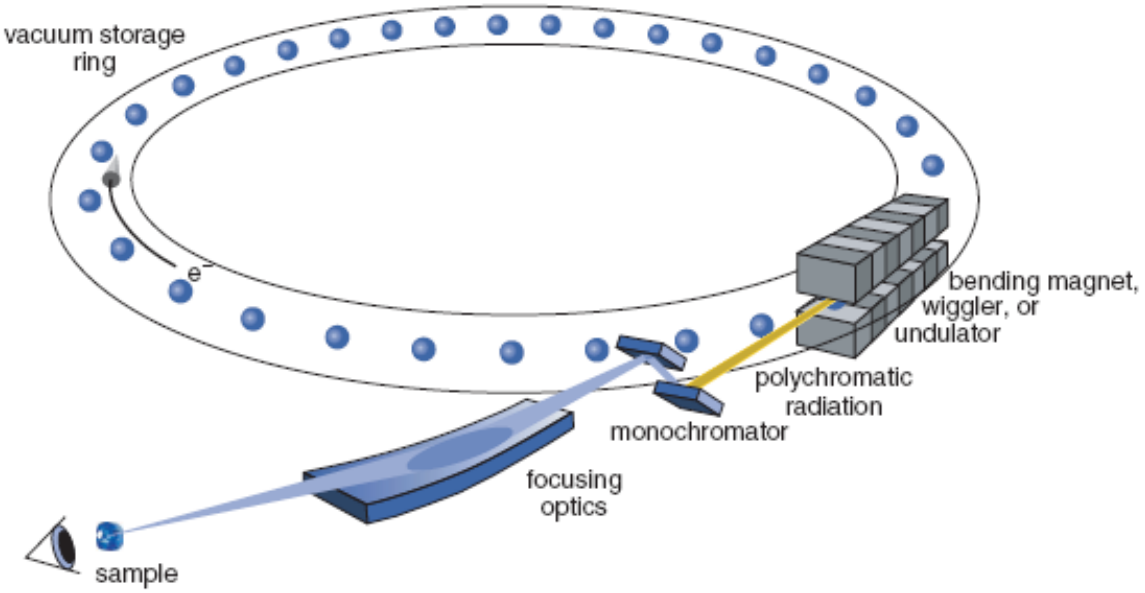
n: 2331 Counts: 962.75 2theta: 49.607 d: 1.836

No.	QM	CARD	Compound Name	Chemical Formula	Peakpos.	Intensity	Scale	FoM	S-Quant.
P.1	C	00-900-0763	[Whewellite]	C4 H2.57 Ca2 O10	0.62778	0.42135	0.81057	0.74431	100.0%
1	C	00-200-6013		C20 H23 Cl O6 Si	0.56582	0.15625	0.69373E-01	0.63989	0.701
2	C	00-450-9958		C14 H14 N2 O2	0.55268	0.14094	0.91320E-01	0.63778	0.878
3	C	00-411-0698		C12 H14 B7 Mn O3	0.58953	0.14900	0.87603E-01	0.63769	1.054
4	C	00-200-7903	(4-dimethylaminophenyl)(2-nitrophenyl)diazene	NO2C6H4NNC6H4N(CH3)~2~	0.56369	0.11108	0.44670E-01	0.63678	0.614
5	C	00-221-9184	(E,E)-N,N -Bis(4- methoxybenzylidene)cyclohexane-1,2-diamine	C22 H26 N2 O2	0.57914	0.94471E-01	0.48481E-01	0.63678	0.739
6	C	00-710-9260		C22 H24 N2 O4	0.58203	0.76102E-01	0.50941E-01	0.63665	1.017
7	C	00-413-2162	nv236-E1	C17 H19 N O3	0.58420	0.10930	0.40372E-01	0.63601	0.762
8	C	00-154-5235		C21 H29 N O4	0.54385	0.10084	0.38313E-01	0.63600	0.568
9	C	00-722-2891	I3 Cl2 Al Cl4	Al Cl6 I3	0.55258	0.30778	0.62159E-01	0.63545	1.258
10	C	00-723-9148		C8 H12 Cl Cu2 N6 O14 Tb	0.56284	0.20093	0.16017	0.63527	3.832

Matched POW_COD Ca 2885 Selected Card 00-900-0763 C4 H2.57 Ca2 O10

ΠΕΡΙΘΛΑΣΗ ΑΚΤΙΝΩΝ-Χ ΜΕ ΧΡΗΣΗ ΑΚΤΙΝΟΒΟΛΙΑΣ ΣΥΝΧΡΟΤΡΟΝ (SR-XRD)

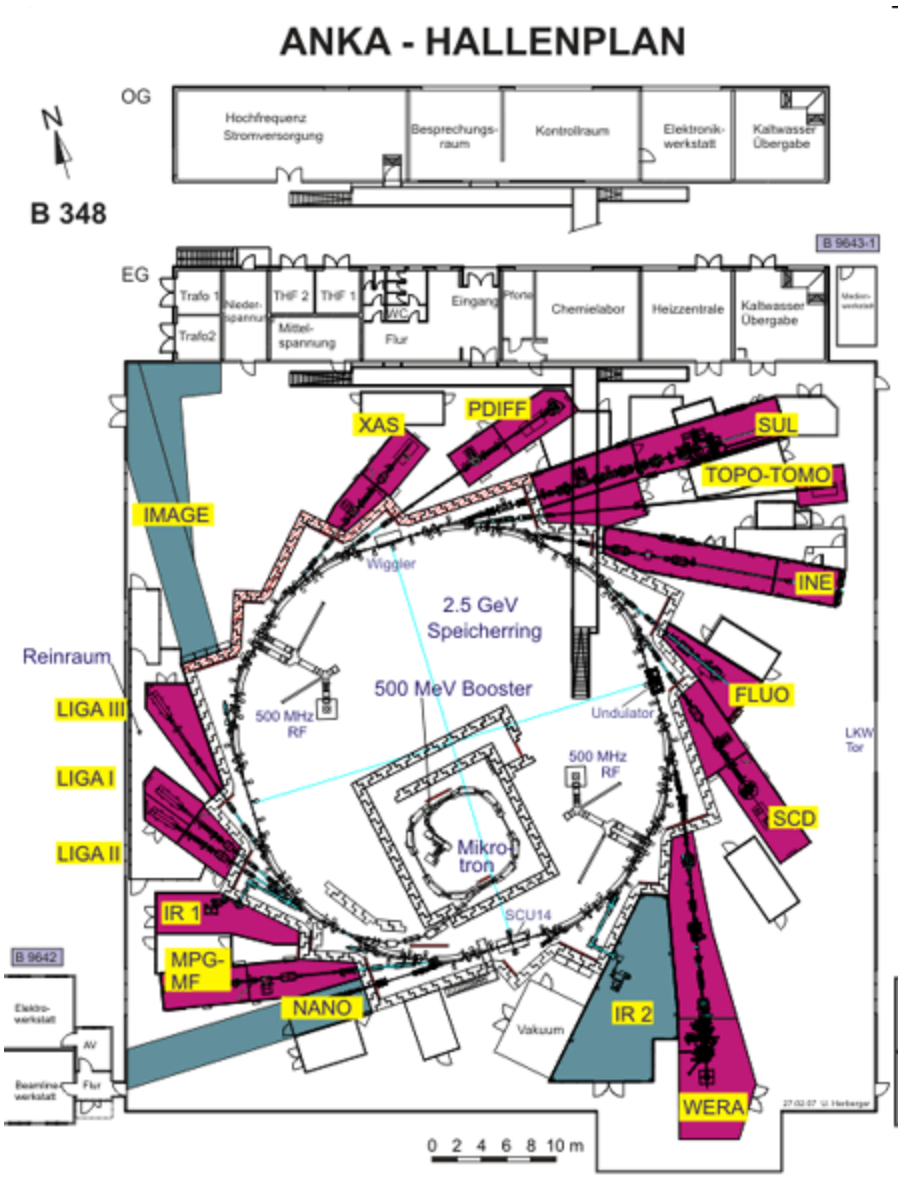
Ακτινοβολία που παράγεται από ηλεκτρόνια τα οποία κινούνται σε κλειστές τροχιές και με ταχύτητες που πλησιάζουν την ταχύτητα του φωτός (0.985c)

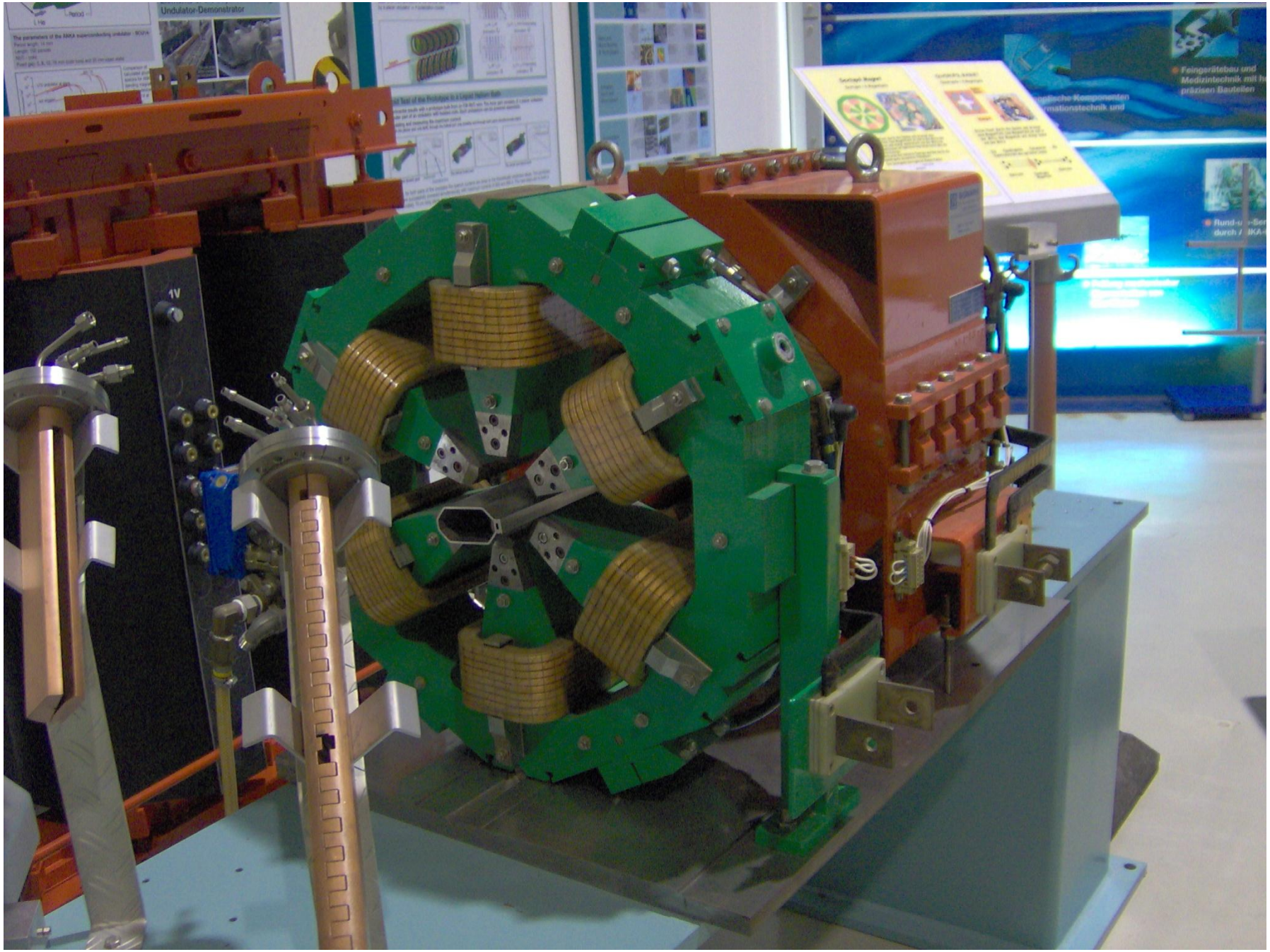


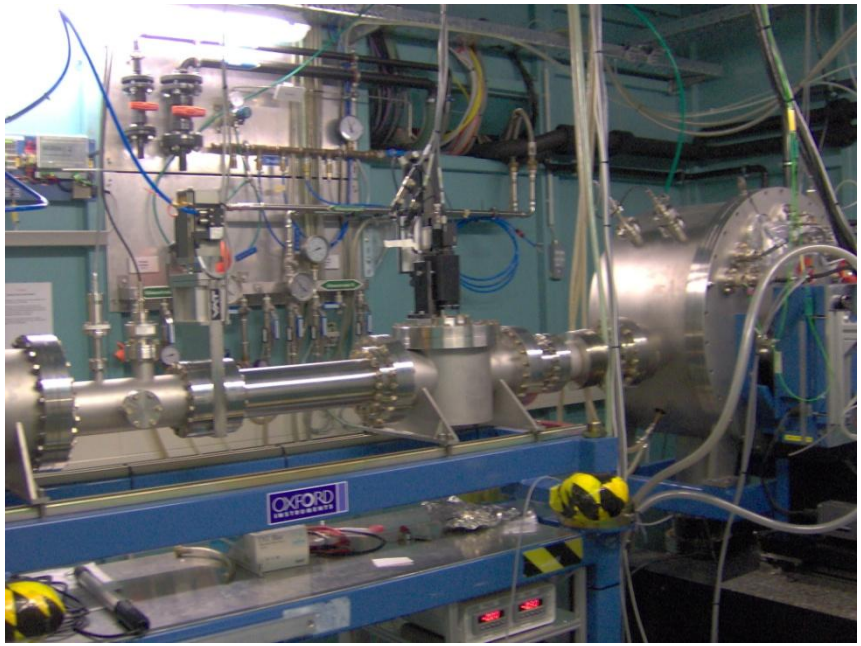
Karlsruhe Institute of Technology

ANKA

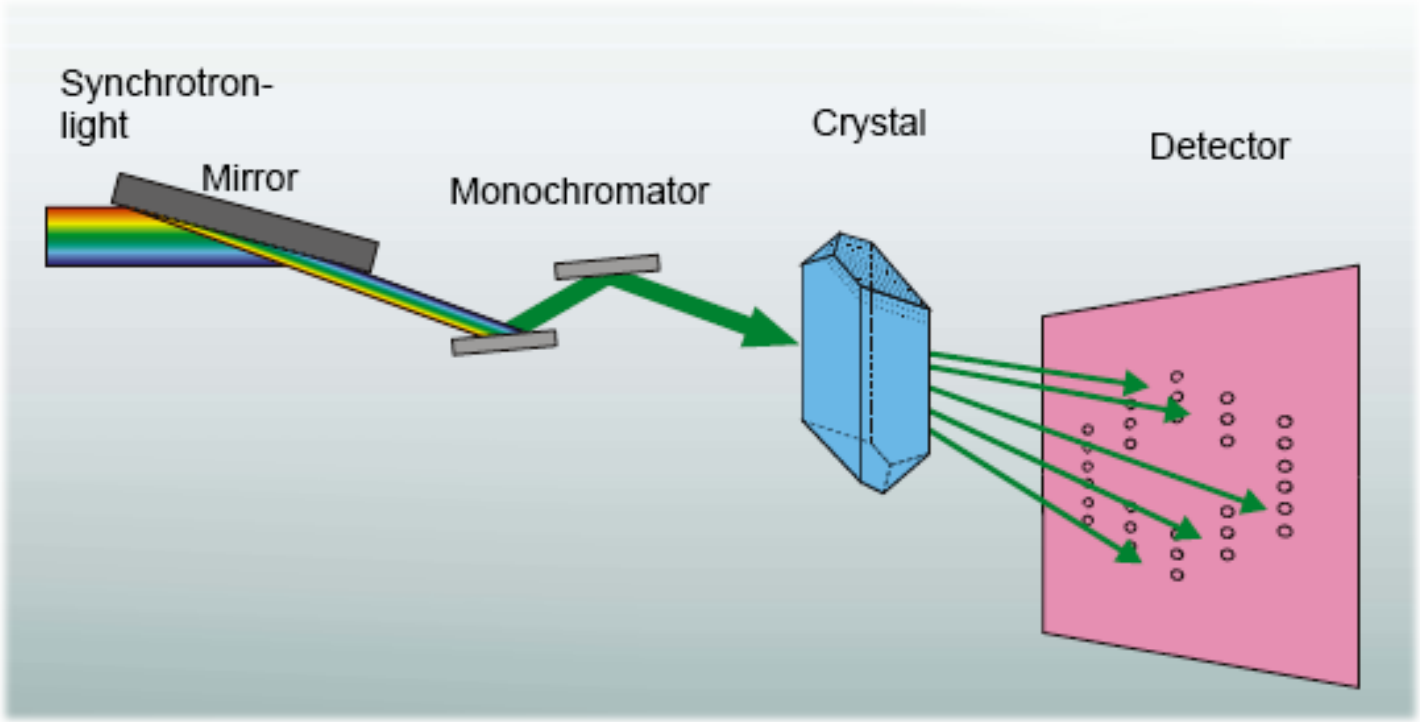
- Συνεχές φάσμα που εκτείνεται από το IR ως τις σκληρές ακτίνες-Χ
- Υψηλή ένταση (10^6 μεγαλύτερη από τις λυχνίες ακτίνων-Χ
- Δέσμη πολύ μικρής διατομής και μικρής γωνιακής απόκλισης
- Διαφορετικές γραμμές ακτινοβολίας (beamlines) για εκτέλεση ταυτόχρονων πειραμάτων

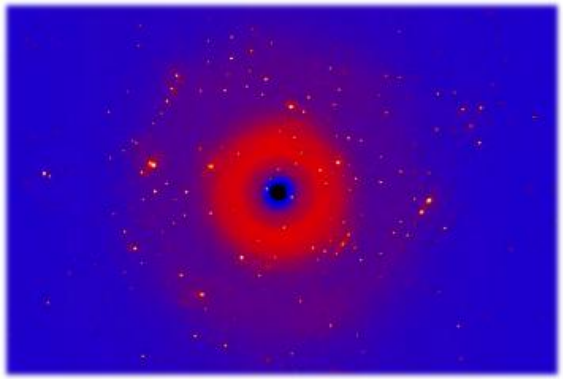


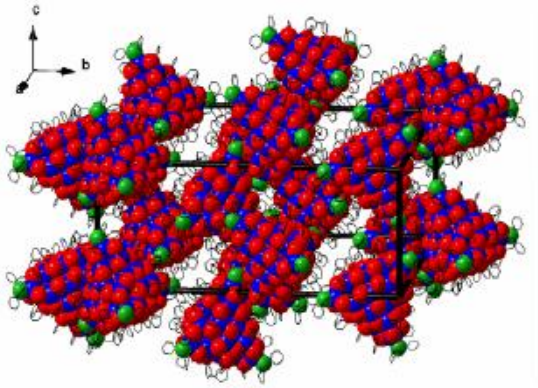

Undulator-Demonstrator
1V



KIT-ANKA
PDIFF

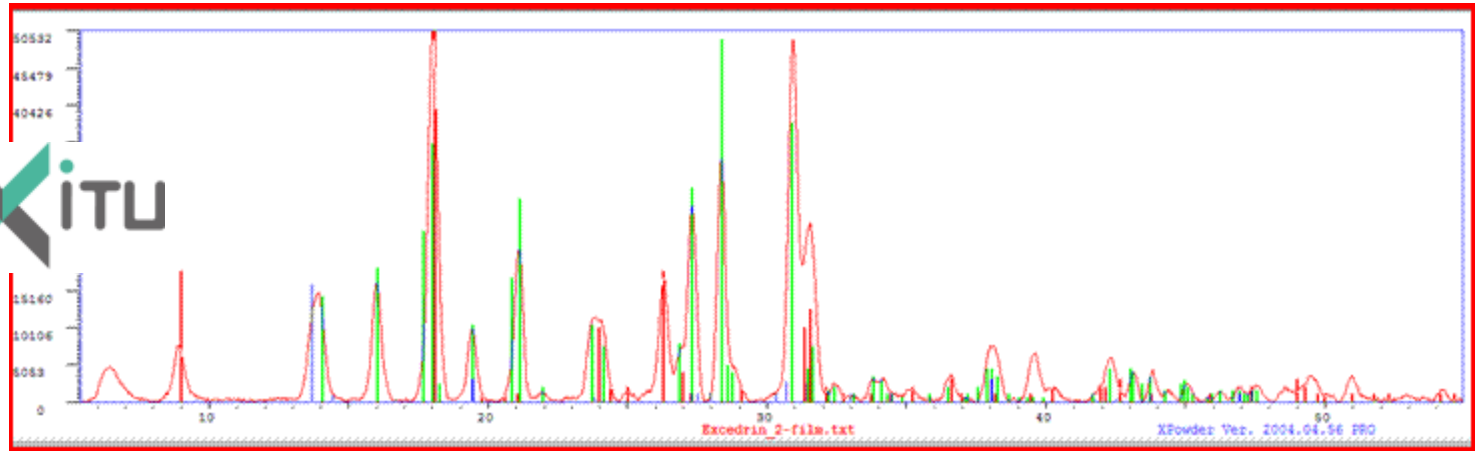

Synchrotron-
light
Mirror
Monochromator
Crystal
Detector




c
b

ΦΟΡΗΤΟ ΠΕΡΙΘΛΑΣΙΜΕΤΡΟ ΑΚΤΙΝΩΝ-Χ (XRD)

inXitu



Earth, Moon, and Planets (2005)
DOI 10.1007/s11038-005-9013-2

INSTRUMENTATION FOR GEOLOGICAL FIELD WORK ON THE MOON

D. L. TALBOYS, G. W. FRASER, R. M. AMBROSI, N. NELMS
N. P. BANNISTER, M. R. SIMS, D. PULLAN and J. HOLT
Space Research Centre, University of Leicester, University Road, Leicester, LE2 7RH UK
(E-mail: dlt3@star.le.ac.uk)

(Accepted 26 May 2005)

Abstract. A human return to the Moon will require that astronauts are well equipped with instrumentation to aid their investigations during geological field work. Two instruments are described in detail. The first is a portable X-ray Spectrometer, which can provide rapid geochemical analyses of rocks and soils, identify lunar resources and aid selection of samples for return to Earth. The second instrument is the Geological and Radiation environment package (GEORAD). This is an instrument package, mounted on a rover, to perform *in-situ* measurements on the lunar surface. It can be used for bulk geochemical measurements of rocks and soils (particularly identifying KREEP-enriched rocks), prospect for ice in shadowed areas of craters at the poles and characterise the lunar radiation environment.

ΡΟΜΠΟΤΙΚΗ ΟΡΥΚΤΟΛΟΓΙΚΗ ΑΝΑΛΥΣΗ

CHEMIN (CHEMistry-**MIN**eralogy**)**:

ΦΟΡΗΤΟ ΣΥΣΤΗΜΑ XRD/XRF ΓΙΑ ΤΟ Mars Science Laboratory

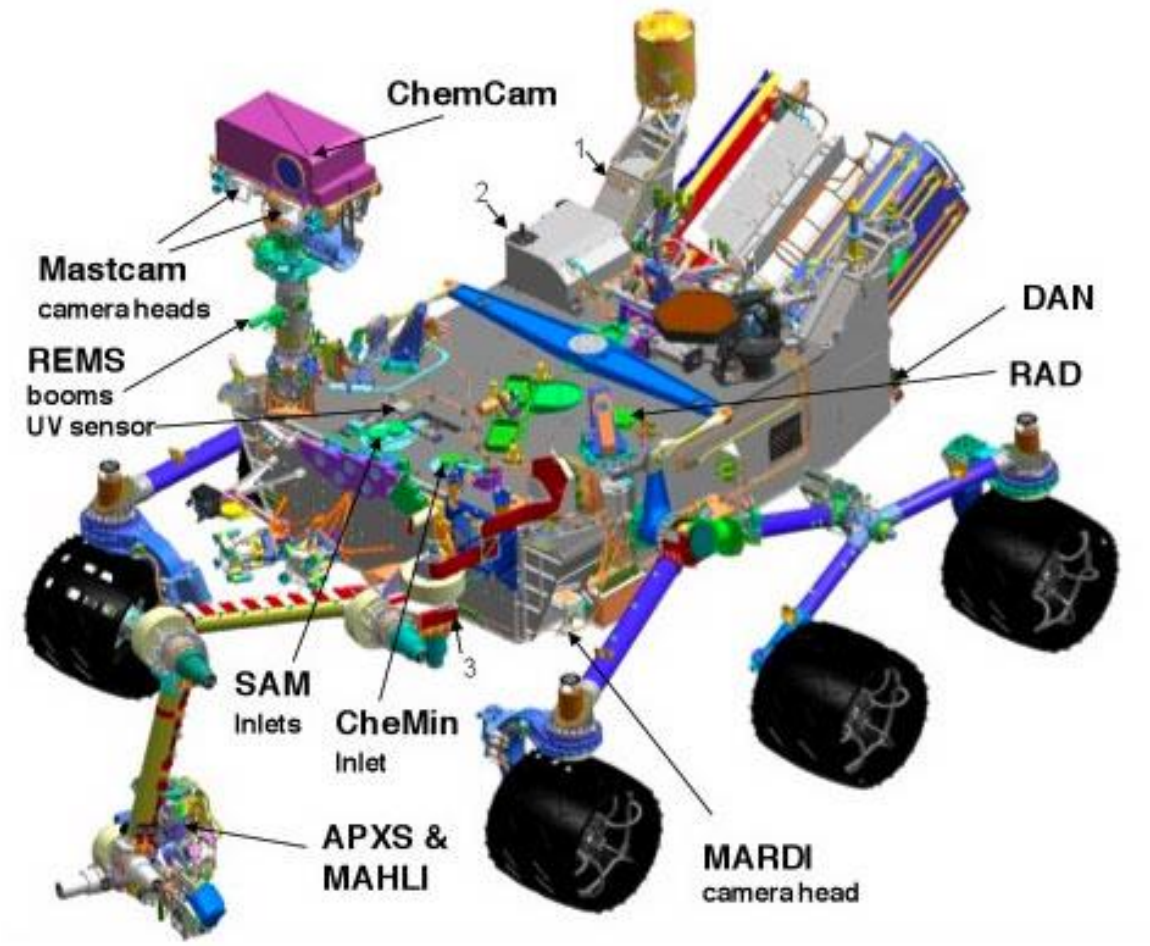
(**Curiosity Rover**)

ΡΟΜΠΟΤΙΚΗ ΟΡΥΚΤΟΛΟΓΙΚΗ ΑΝΑΛΥΣΗ

CHEMIN (CHEMistry-**MIN**eralogy**)**:

ΦΟΡΗΤΟ ΣΥΣΤΗΜΑ XRD/XRF ΓΙΑ ΤΟ Mars Science Laboratory

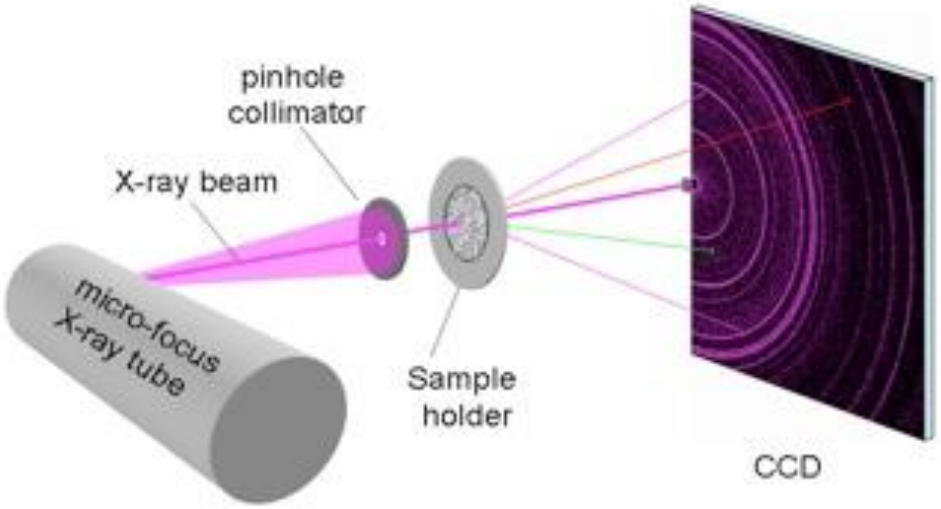
(**Curiosity Rover**)

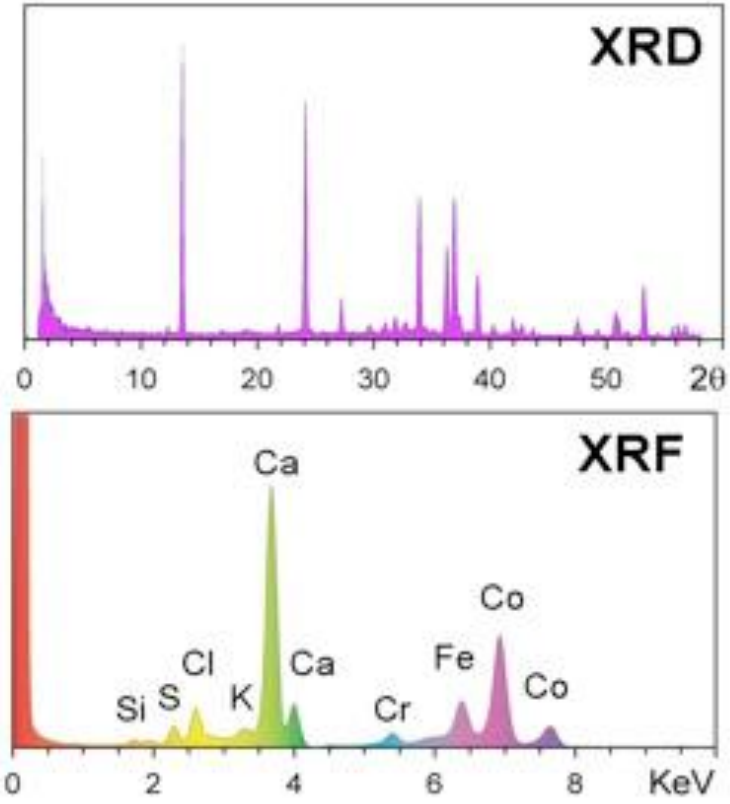


ΡΟΜΠΟΤΙΚΗ ΟΡΥΚΤΟΛΟΓΙΚΗ ΑΝΑΛΥΣΗ

CHEMIN (CHEMistry-**MIN**eralogy**)**:

ΦΟΡΗΤΟ ΣΥΣΤΗΜΑ XRD/XRF ΓΙΑ ΤΟ Mars Science Laboratory (**Curiosity**)

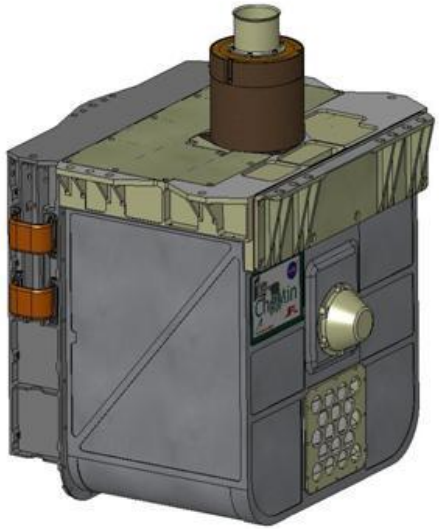


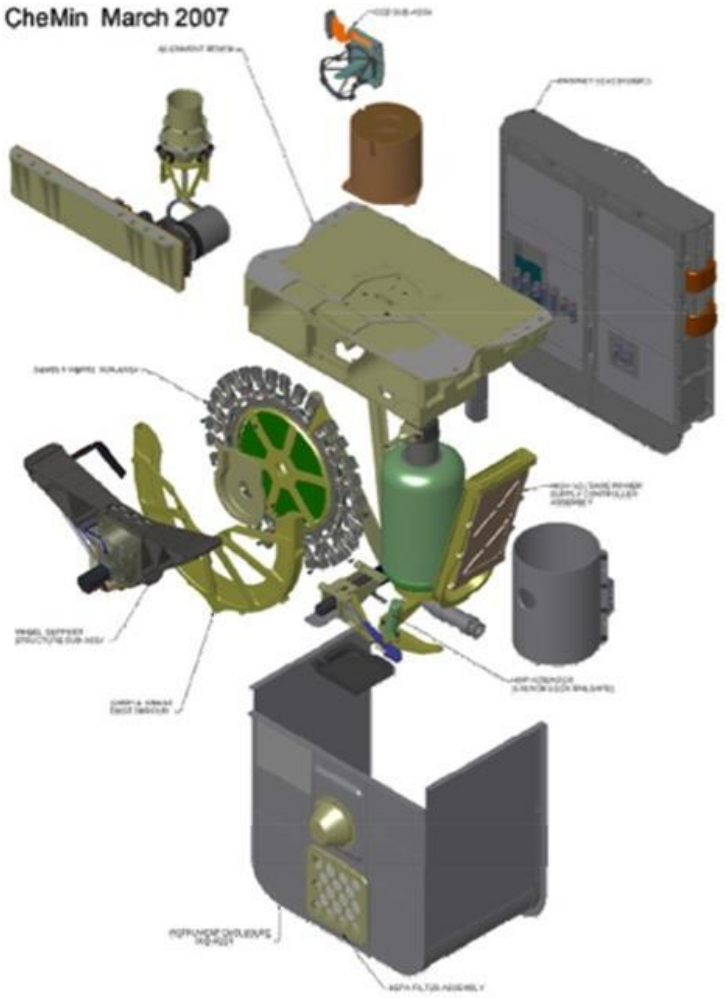


ΡΟΜΠΟΤΙΚΗ ΟΡΥΚΤΟΛΟΓΙΚΗ ΑΝΑΛΥΣΗ

CHEMIN (CHEMistry-**MIN**eralogy**)**:

ΦΟΡΗΤΟ ΣΥΣΤΗΜΑ XRD/XRF ΓΙΑ ΤΟ Mars Science Laboratory (**Curiosity**)





Field deployment of a portable X-ray diffraction/X-ray flourescence instrument on Mars analog terrain

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D. Blake and S. Feldman
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S. Chipera and D. Vaniman
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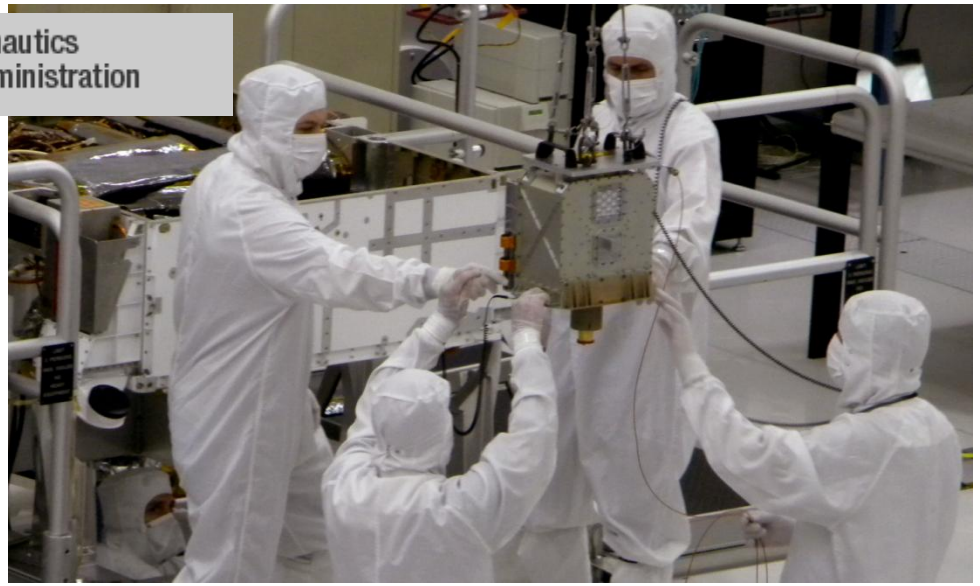
D. Bish
Indiana University, 1001 E 10th Street, Bloomington, Indiana 47405

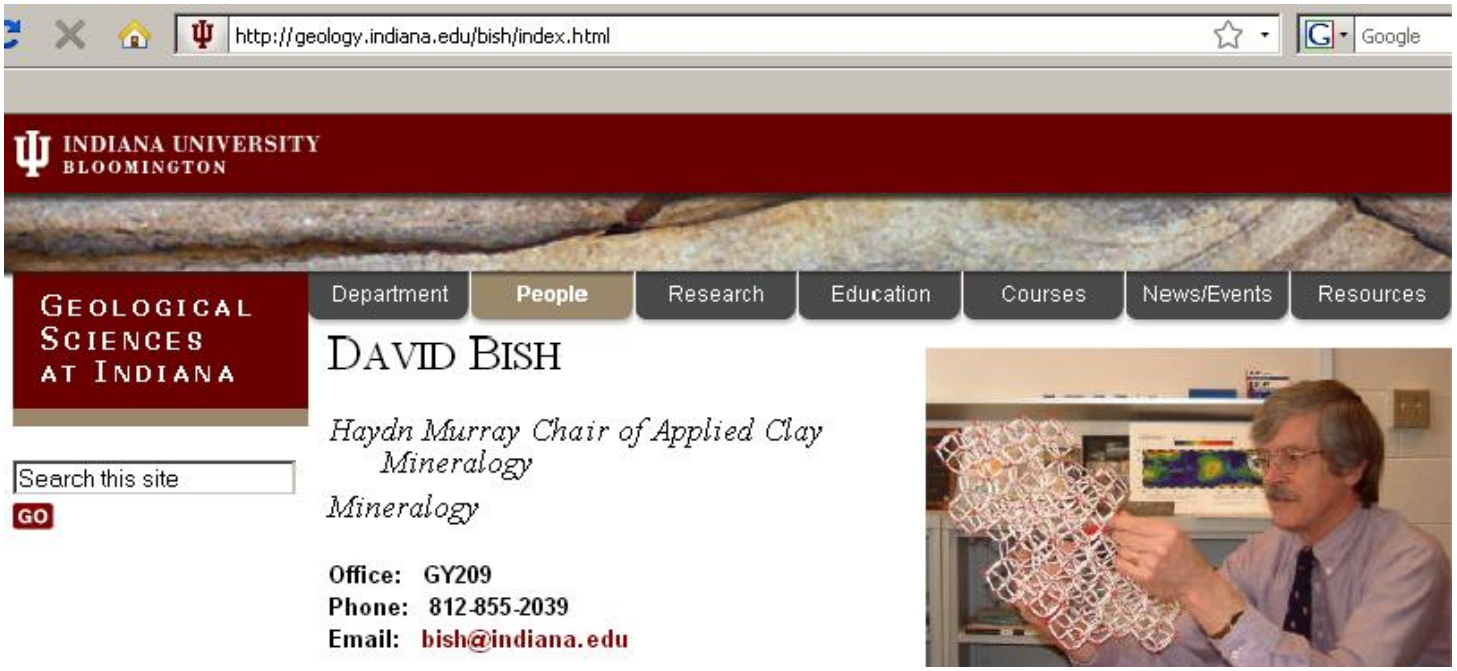
(Received 31 October 2004; accepted 22 March 2005)

CheMin is a miniature X-ray diffraction/X-ray fluorescence instrument that is included in the payload of the Mars 2009 Mars Science Laboratory mission. A portable CheMin prototype was built to test the capability of the instrument for remote *in situ* mineralogical characterization of geological materials. The instrument was successfully deployed at a variety of Mars analog sites in Death Valley, CA, in May 2004. © *2005 International Centre for Diffraction Data.* [DOI: 10.1154/1.1913719]



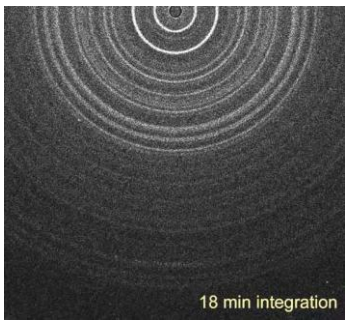
PHILIPPE SARRAZIN

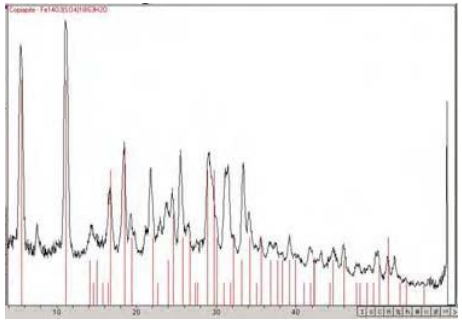
inXitu

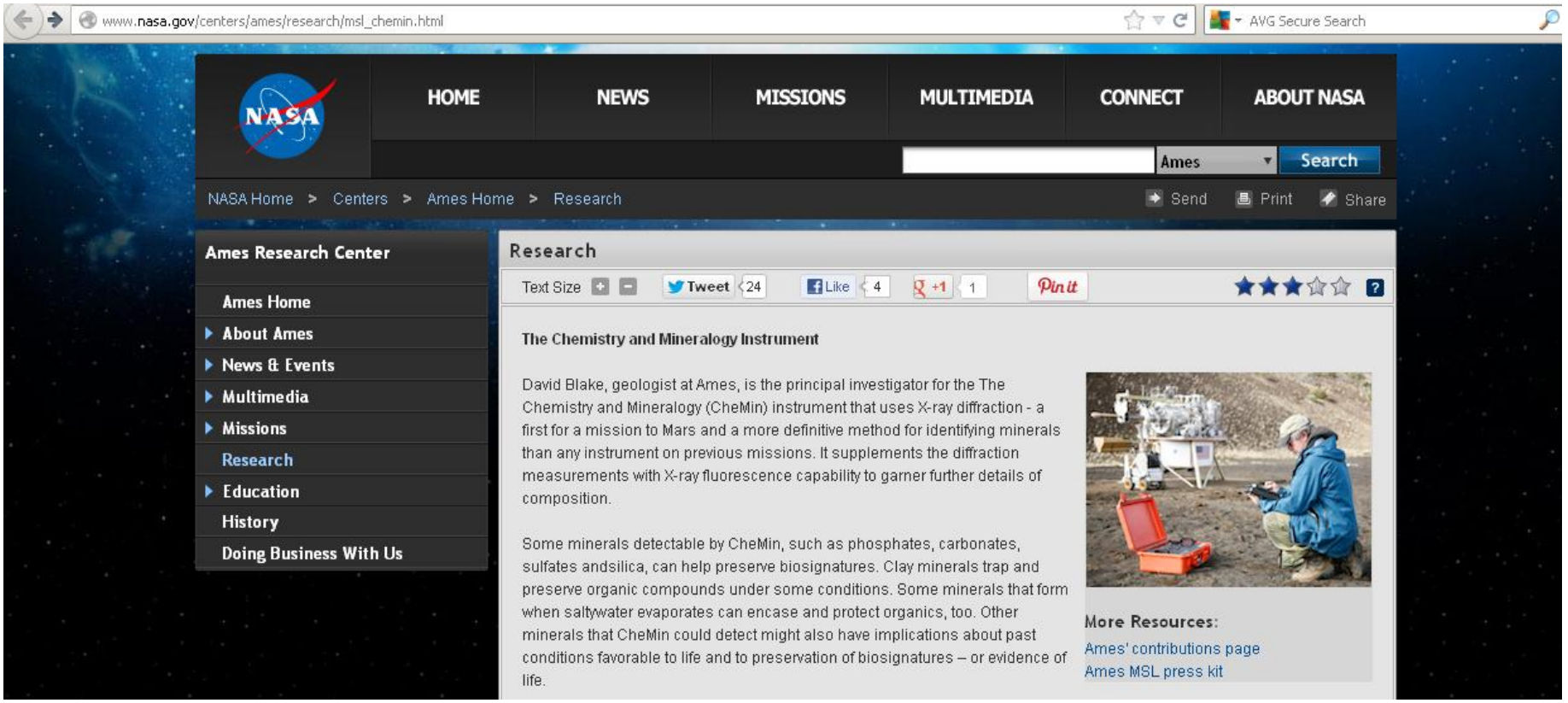


Lunar and Planetary Science XXXVIII (2007)

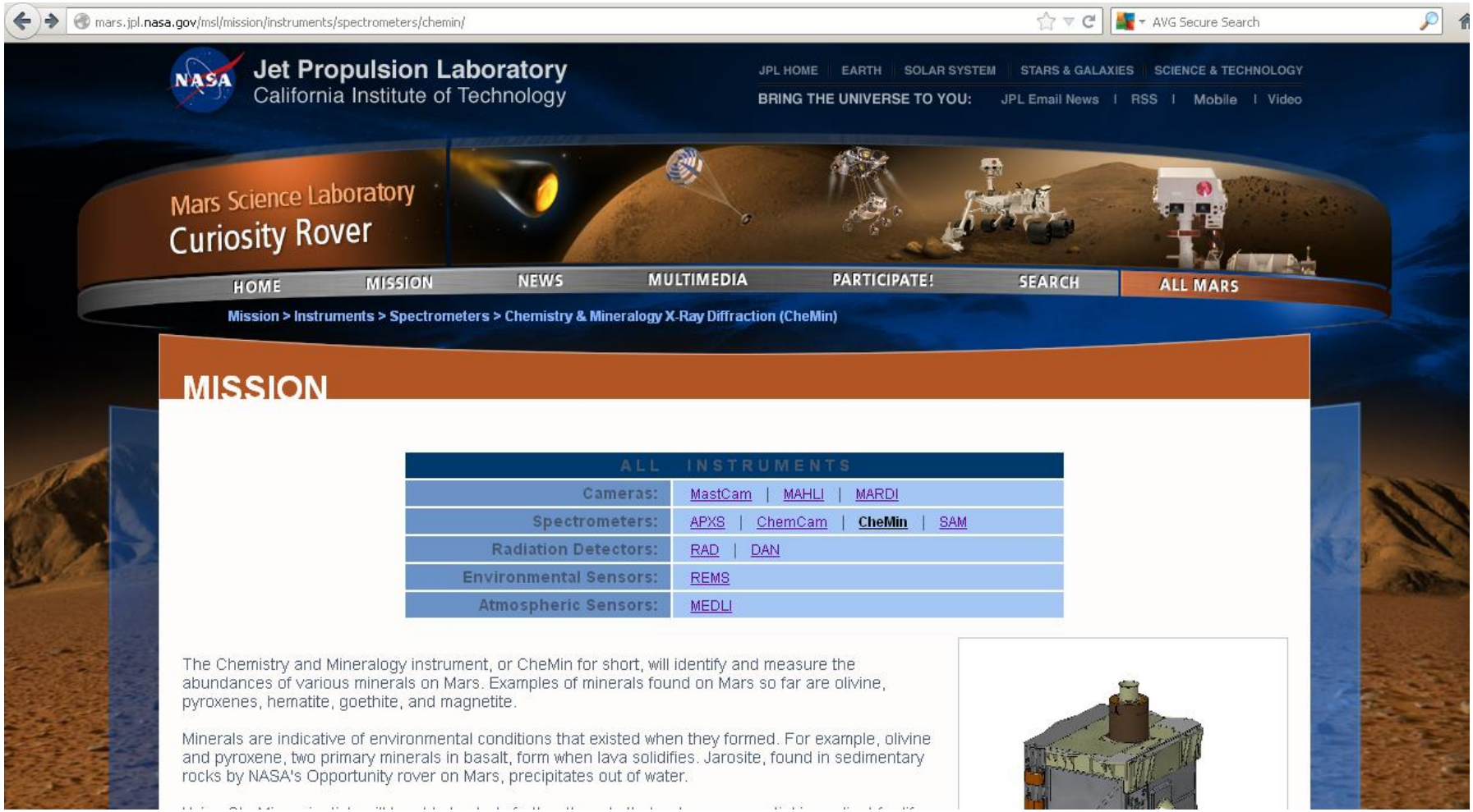
MINERALOGICAL IN-SITU INVESTIGATION OF ACID-SULFATE SAMPLES FROM THE RIO TINTO RIVER, SPAIN, WITH A PORTABLE XRD/XRF INSTRUMENT. P. Sarrazin[1], D.W. Ming[2], R.V. Morris[2], D. Fernández-Remolar[3], R. Amils[3], R.E. Arvidson[4], D. Blake[5], D. L. Bish[6], [1]inXitu Inc., 2551 Casey Ave Ste A, Mountain View, CA 94043 psarrazin@inxitu.com; [2] NASA Johnson Space Center, Mail Code KX3, Houston, TX 77058; [3] Centro de Astrobiología (CSIC/INTA) 28850 Torrejón de Ardoz, Madrid, Spain; [4] Earth and Planetary Sciences, Washington University, St. Louis, MO 63130; [5] NASA Ames Research Center, Moffett Field, CA 94035; [6] Dept. of Geological Sciences, Indiana Univ., Bloomington, IN 47405-1405.





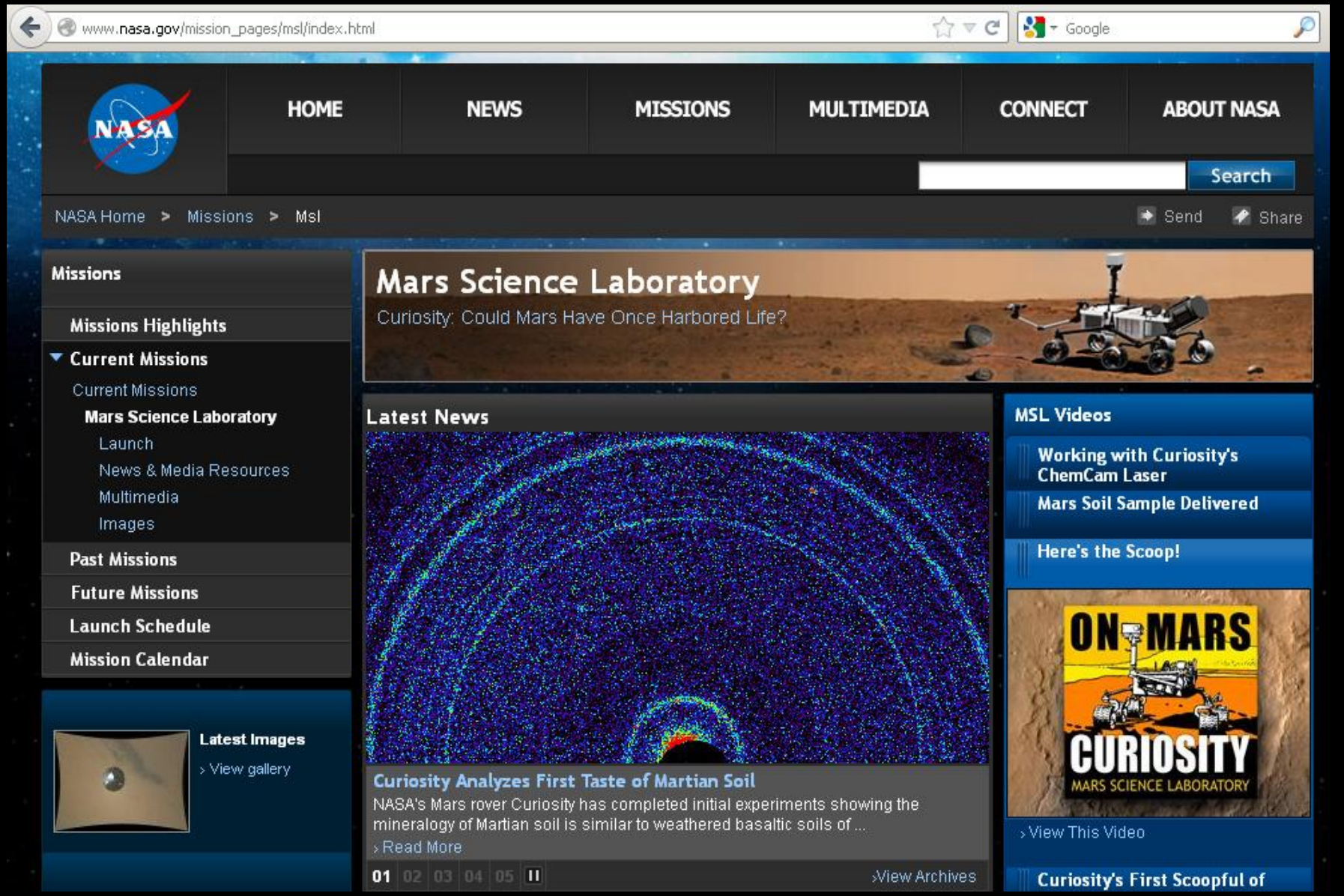


http://www.nasa.gov/centers/ames/research/msl_chemin.html

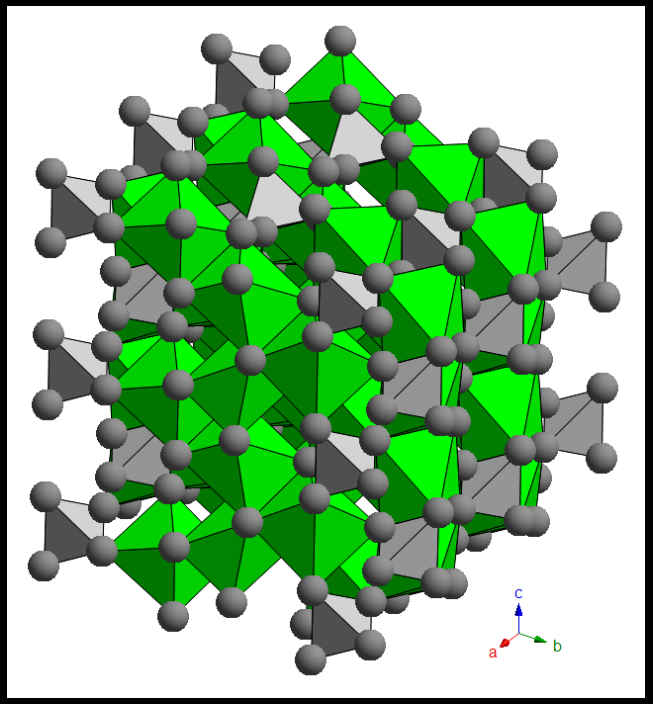


http://mars.jpl.nasa.gov/msl/mission/instruments/spectrometers/chemin/

ΕΠΙΤΟΠΟΥ (*in-situ*) ΟΡΥΚΤΟΛΟΓΙΚΗ ΑΝΑΛΥΣΗ ΣΤΟΝ ΑΡΗ ΜΕ XRD (Οκτώβριος 2012)

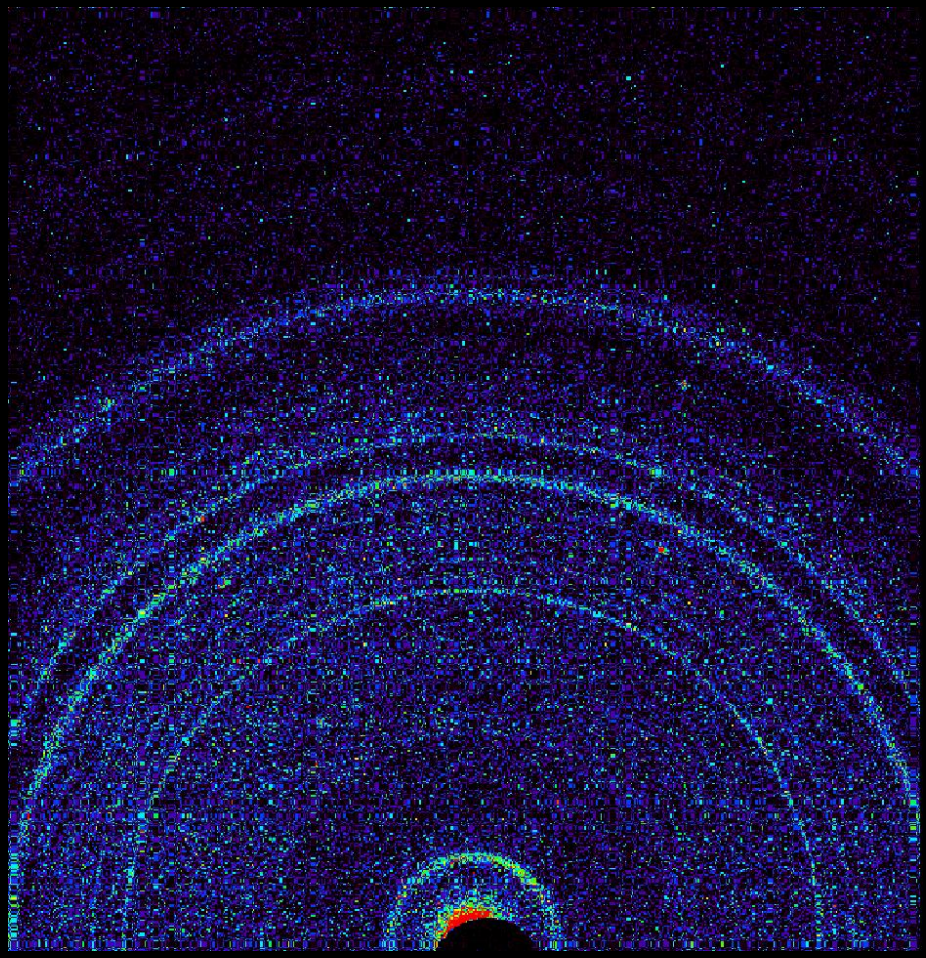


ΟΡΥΚΤΑ ΣΤΟ ΕΔΑΦΟΣ ΤΟΥ ΑΡΗ
(Οκτώβριος 2012)



ΟΡΥΚΤΑ ΣΤΟ ΕΔΑΦΟΣ ΤΟΥ ΑΡΗ:

• ΟΛΙΒΙΝΗΣ • ΑΣΤΡΙΟΙ • ΠΥΡΟΞΕΝΟΙ



ΦΟΡΗΤΟ ΣΥΣΤΗΜΑ XRD/XRF

in situ XRD/XRF

Specifications

XRD resolution: 0.25° 2θ FWHM
XRD range: 20-55° 2θ
Detector type: 1024 x 256 pixels - 2D Peltier-cooled CCD
XRD geometry: Reflection based
Sample orientation: Flat or convex of infinite size
XRF energy resolution: 200 eV at 5.9 keV
XRF energy range: 3 to 25 keV
X-ray target material: Co or Cu (Cu standard)
X-ray tube voltage: 30kV
X-ray tube power: 10W
Data Storage: 40 Gb - Ruggedized internal hard drive
Wireless Connectivity: 802.11 b/g for remote control from web browser
Operating Temperature: -10°C to 35°C
Dimensions: 48.5 x 39.2 x 19.2cm base; 8.5 X 16 X 4 cm Head
Weight: 12 kg base; 7kg head

Duetto

Duetto is featured in the May 2008 issue of Nature magazine.

About inXitu inc.

inXitu Inc. is a leader in portable XRD/XRF based instrumentation. We specialize in developing the technologies required to enable the next generation of scientific instruments used for materials analysis. The technology used in our portable rock and mineral analyzer received a prestigious R&D 100 award and has been-chosen to fly on the Mars Science Laboratory rover scheduled for launch in 2011.

X-ray Diffraction / X-ray Fluorescence instrument for art conservation

inXitu

inXitu Inc. 2551 Casey Avenue Suite A, Mountain View, California USA 94043
Tel 001 (650) 567-0081 Fax 001 (650) 567-0082
email: Sales@inxitu.com web:www.inxitu.com