

Analiza imagistică multispectrală

- Imaginile sunt compatibile cu modelul digital;
- Raportul prezintă numai o selecție a întregii anvelope în imagini;
- Avantaje:
 - cea mai rapidă metodă de cartarea a unor astfel de detalii,
 - pune în evidență și diferențiază în unele cazuri intervențiile de chituiră, inclusiv diferențele între materialele componente ale mortarelor folosite la chituiră (astfel pot fi discriminate atât mortare diferite ce provin din aceeași etapă de intervenție, cât și din etape cronologice diferite),
 - pot fi evidențiate pe suprafață prezența sărurilor, a depunerilor de natură biologică (în anumite cazuri) sau a altor materiale ce au capacitatea de a fi fluorescente la iradiere UV,
- Dezavantaje:
 - eficiența metodei este influențată de prezența umidității,
 - condițiile optime de înregistrare presupun lipsa radiației vizibile (a becurilor de iluminat public din jurul Porții Sărutului),
 - pentru analiza întregului monument este necesară schelă.

Nota: Este analiza care va permite cea mai rapidă și comodă analiză comparată cu rapoartele geologilor (de exemplu studiul cu releveele mai vechi și cu eventuale documentații fotografice)

Transversală

Est



D2

D1

Sud

Nord

Vest









Coloană sud – interior, vedere dinspre nord











Latura de nord









Coloana sud. Vedere dinspre vest









Coloana sud - îmbinare cu lintoul. Verdere dinspre vest





Verdere din sud

Foto 10





F 11

Verdere dinspre est

Foto 11





Coloana sud. Vedere dinspre vest

Foto 12

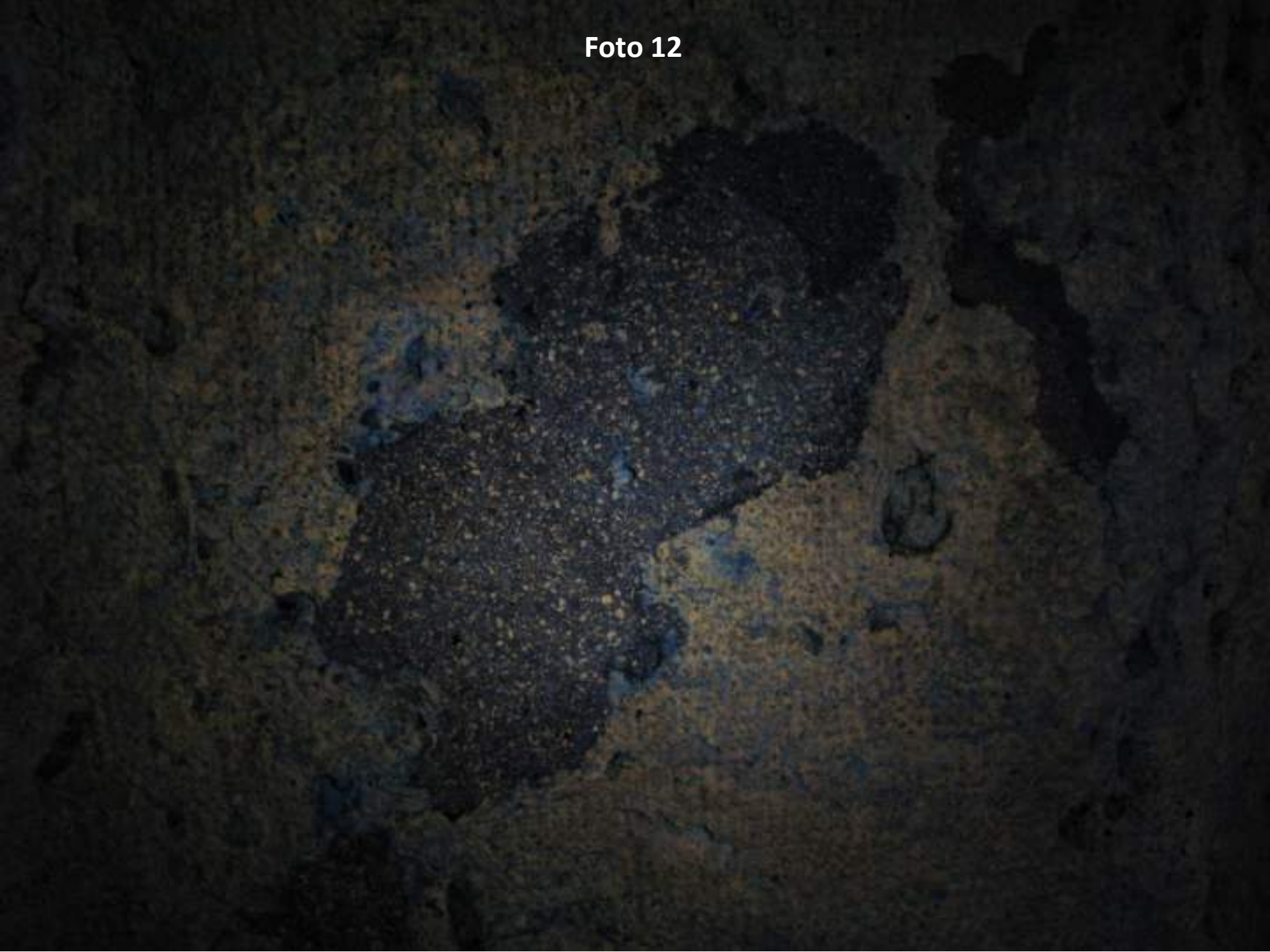
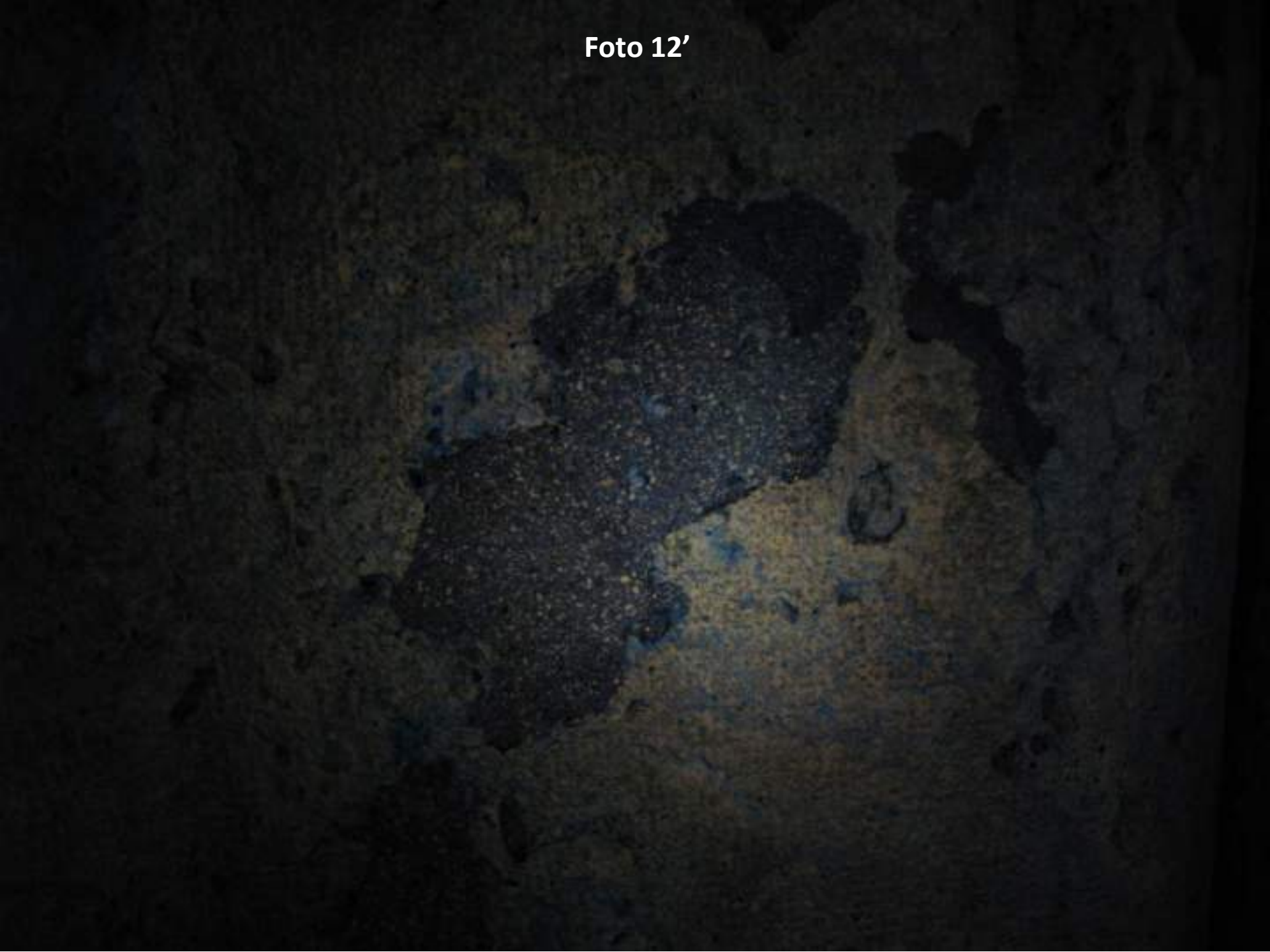


Foto 12'



Analiza spectroscopica

Sunt raportate alaturat analizele de caracterizare chimica elementala a blocurilor de material (dupa caz, efectuate in mai multe puncte de interes). Dupa stiinta echipei, ca si celelate informatii raportate, este prima caracterizare de acest fel facuta pentru material.

Analizele se vor putea deezvolta, in special intr-un mod directionat de planul elaborat impreuna cu geologul si restauratorul.

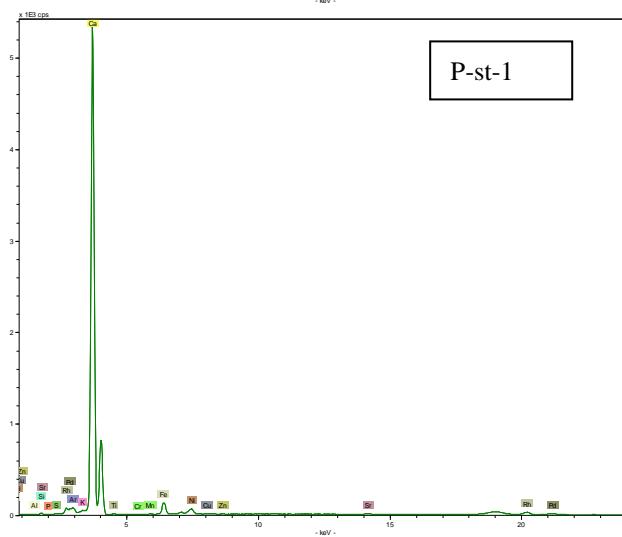
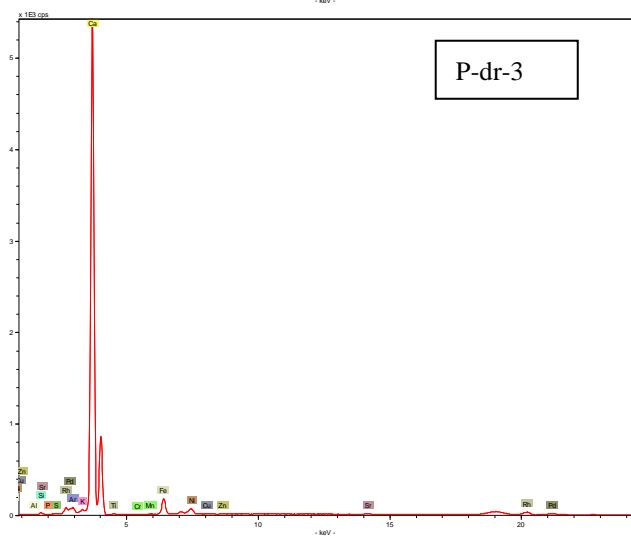
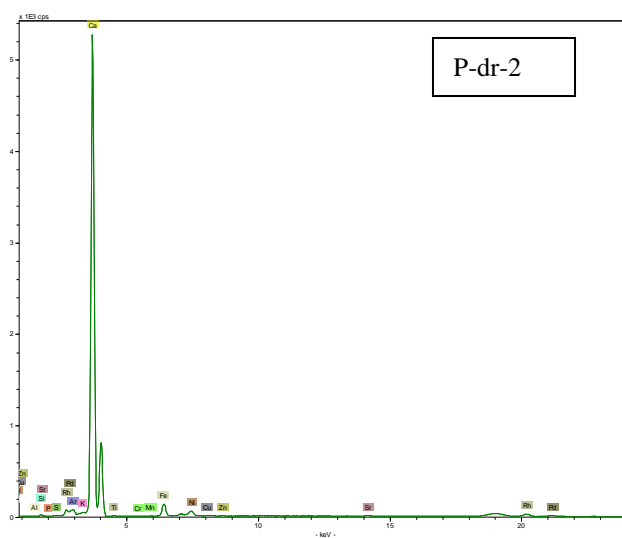
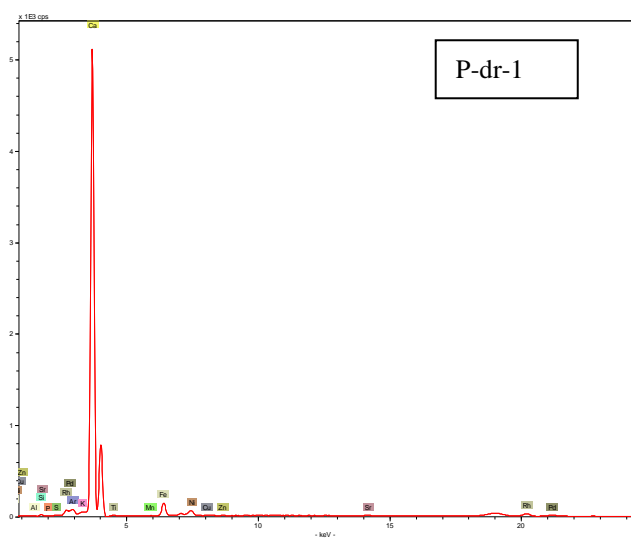
Sunt rezultate extrem de utile pentru studierea mecanismelor de degradare, pentru alegerea materialelor pentru interventii (restaurare, intretinere, protectie), sunt esentiale in stabilirea “amprenteii” materialului, la care se face apel in situatii critice si nedorite de vandalism cu urmari grave etc. Compatibilitatea eventualelor materiale de adaus se poate evalua in etapa de proiectare a oricarei interventii.

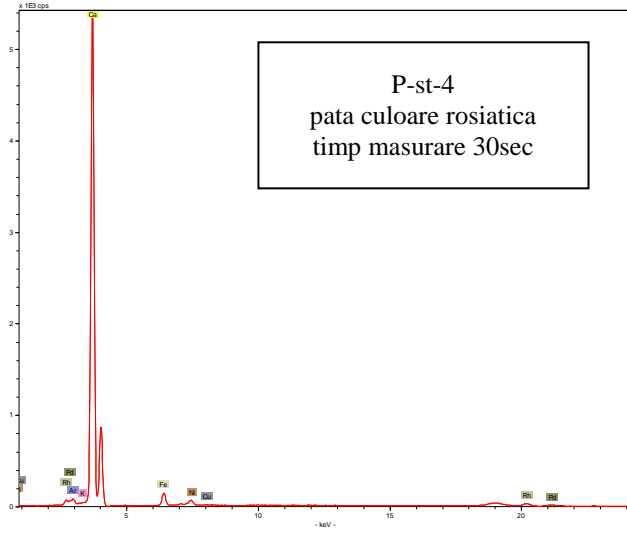
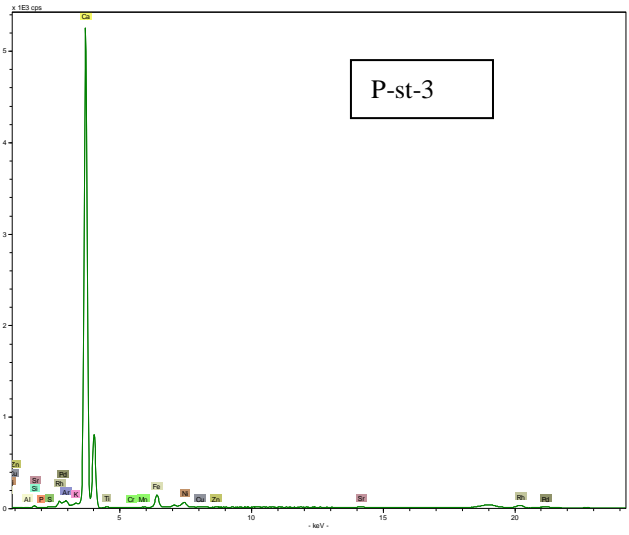
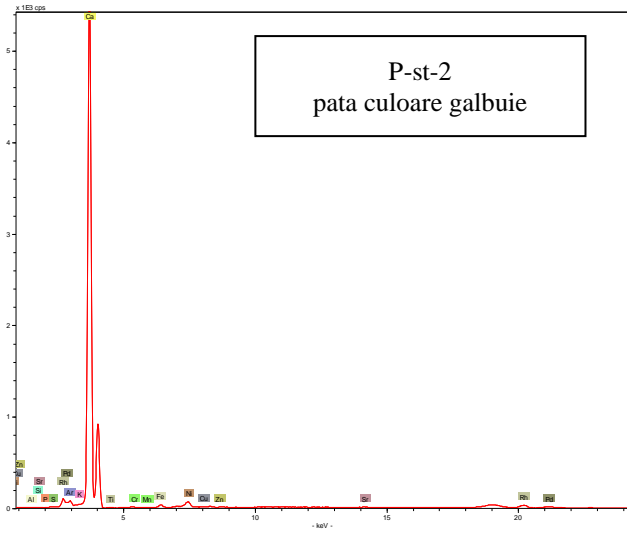
Analizele spectroscopice sunt efectuate si pentru mai multe piese din gradina Casei Ganescu, caz in care ofera “amprenta” necesara pentru inventariereasi identificarea pieselor.

Un mai amplu comentariu se urmareste si in legatura cu analizele altor piese (precum bancile din piatra amplasate la N si S de Poarta; blocul de piatra de langa turnul de apa din parc etc). Analizele si interpretarea pluridisciplinara a datelor pot deschide cercetari privind originea materialelor, ruta, identificarea materialeor inrudite, corelari cu studiile de istorie a artei etc.

Bancile de piatra

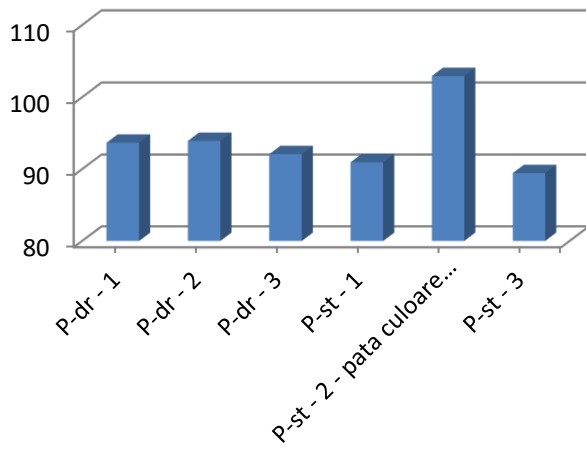
- Elemente comune in spectre: Ca (*ma*), Fe (*mi*), Al, Si, P, S, K, Cr, Mn, Cu, Zn, Sr, Nd (?), Sm (?), Te (?), Sn (?) (*u*), Ar (din aer), Rh, Pd, Ni (din aparat)
- Proba P-st-2-pata culoare galbuie are spectrul putin diferit de celelalte puncte:
 - nu pare a avea K si Mn
 - are cel mai putin Fe si cel mai mult Ca (dar similar ca nivel cu celelalte puncte)
 - probabil maximul largit care apare in jur de 5.32 KeV este un artefact
- Au fost luate in considerare spre comparatie doar probele masurate timp de 60 sec



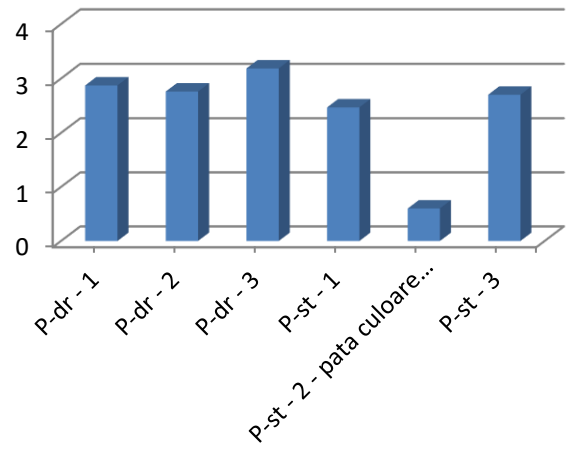


Grafice pe elemente

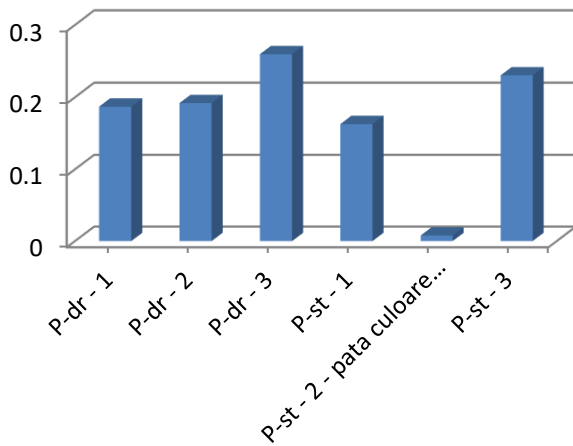
Ca K12



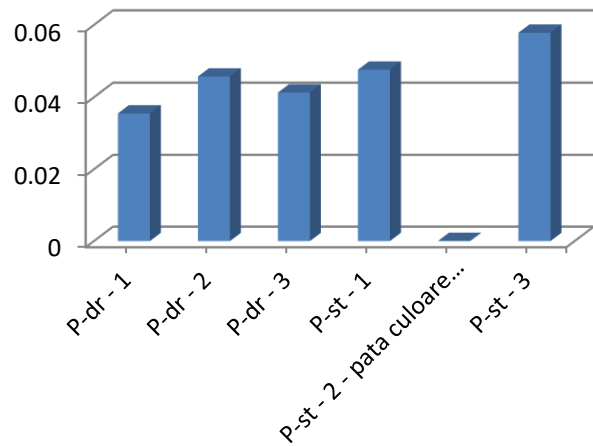
Fe K12



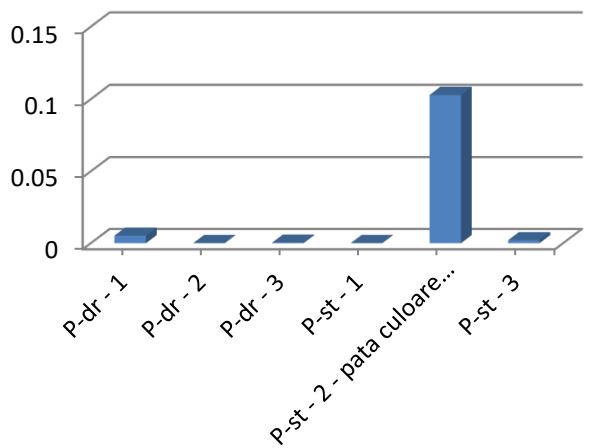
K K12



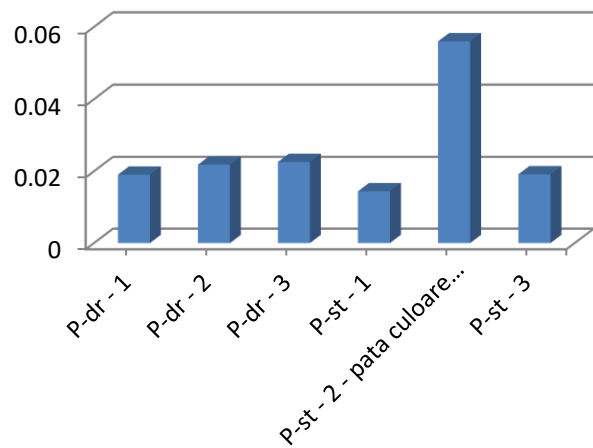
Mn K12

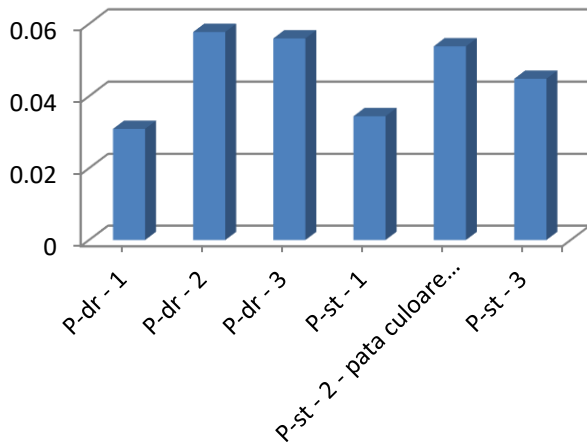
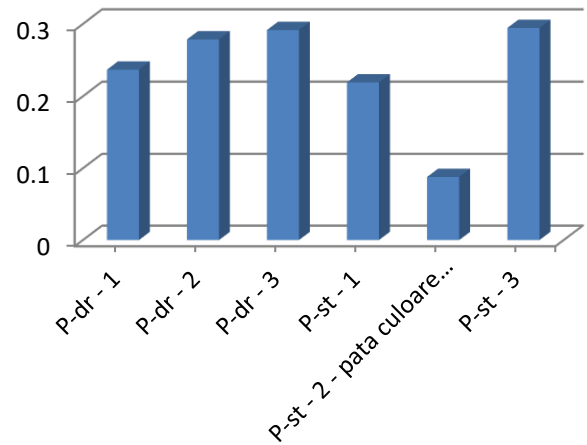
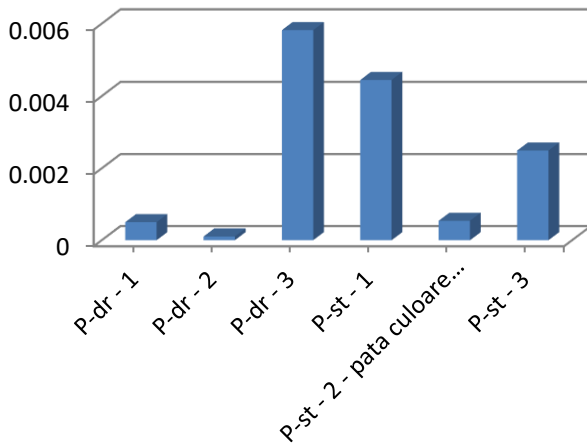
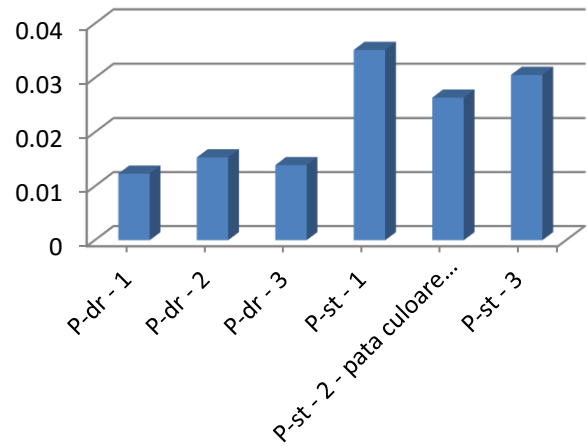
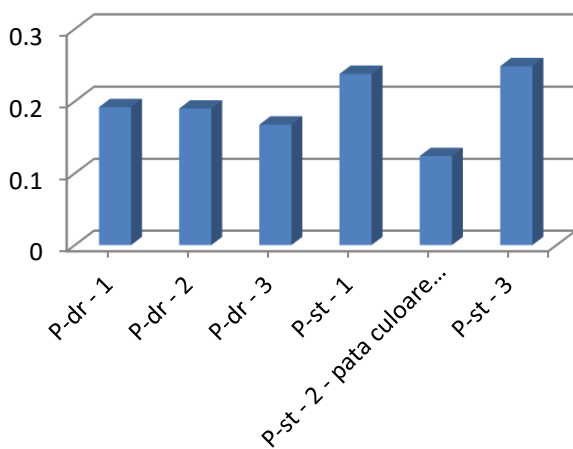
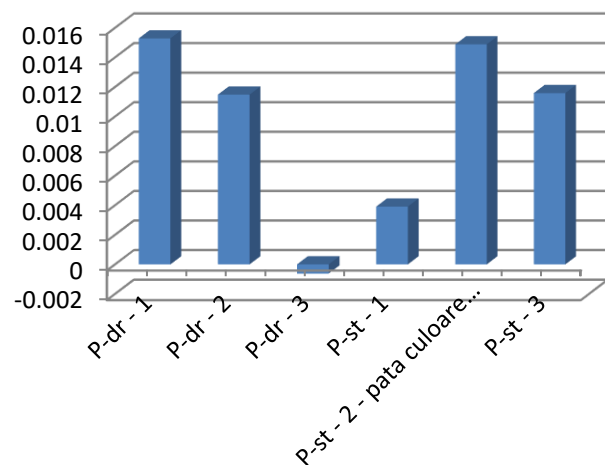


Nd L1

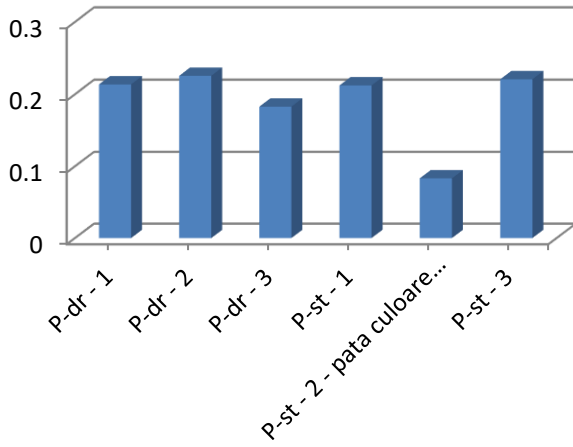


P K12

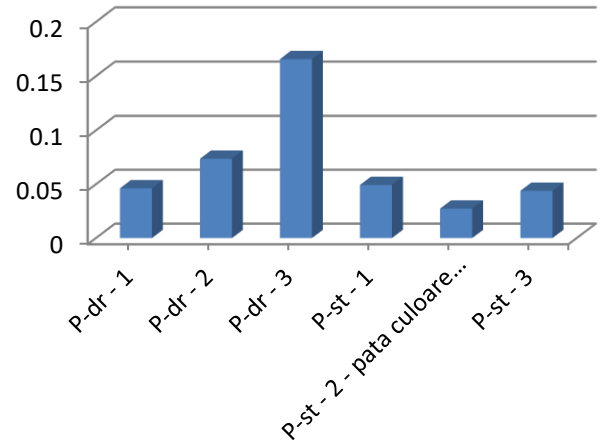


S K12**Si K12****Sm L1****Sn K12****Sr K12****Te K12**

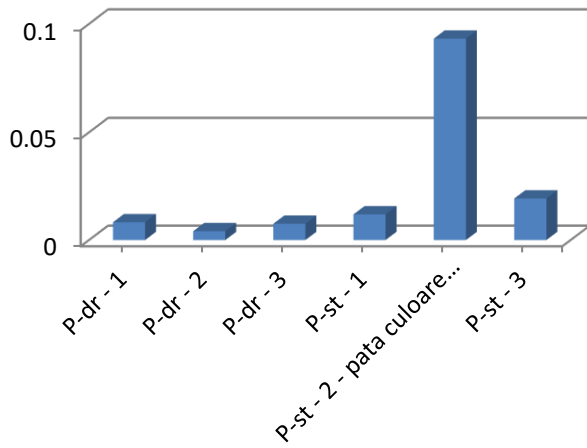
Ti K12



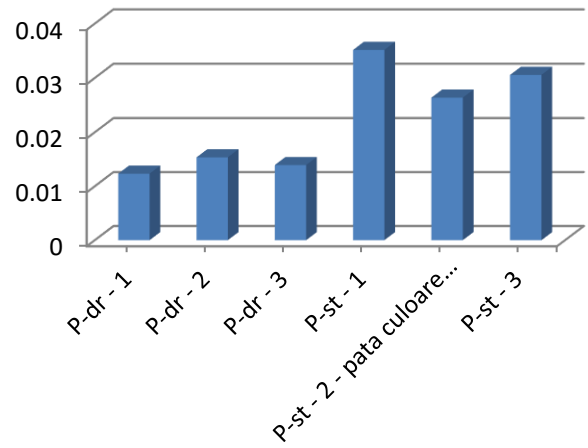
Zn K12



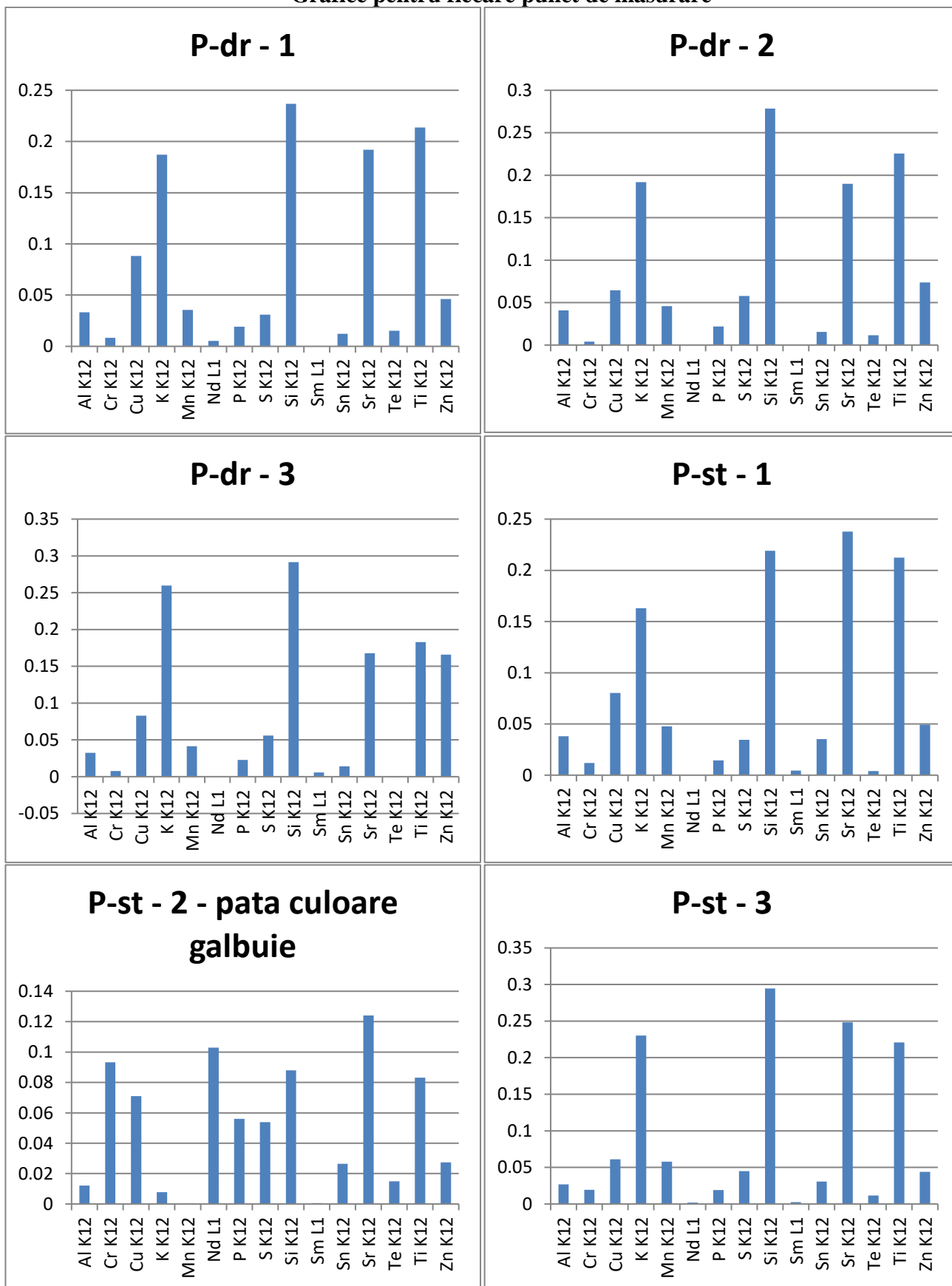
Cr K12



Sn K12

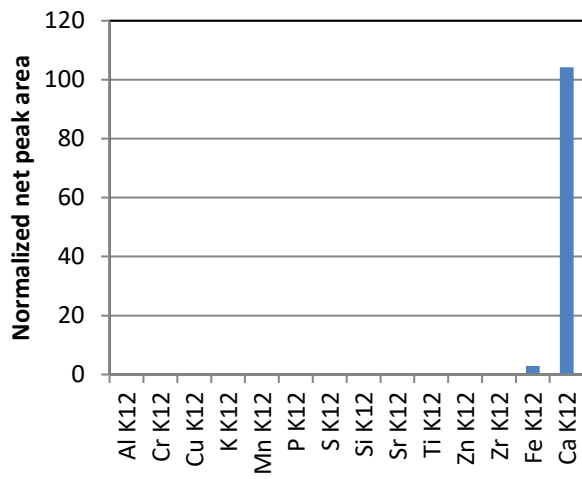


Grafice pentru fiecare punct de masurare

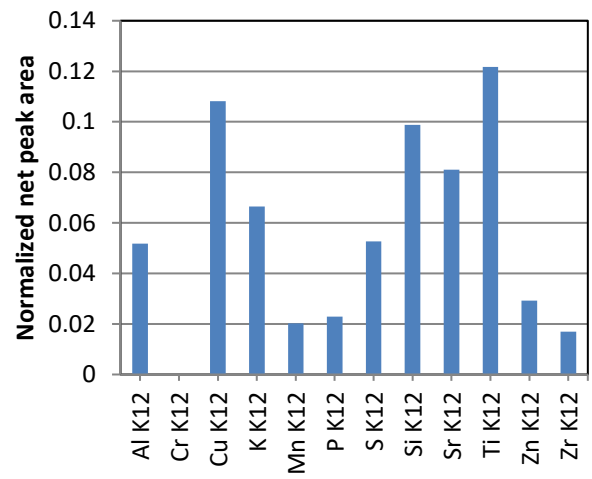


*din graficele de mai sus au fost omise valorile de Ca si Fe, care sunt elementele majoritare in spectru, pentru a se putea evidientia contributia elementelor in urme

P-st - 4 - pata culoare rosiatica



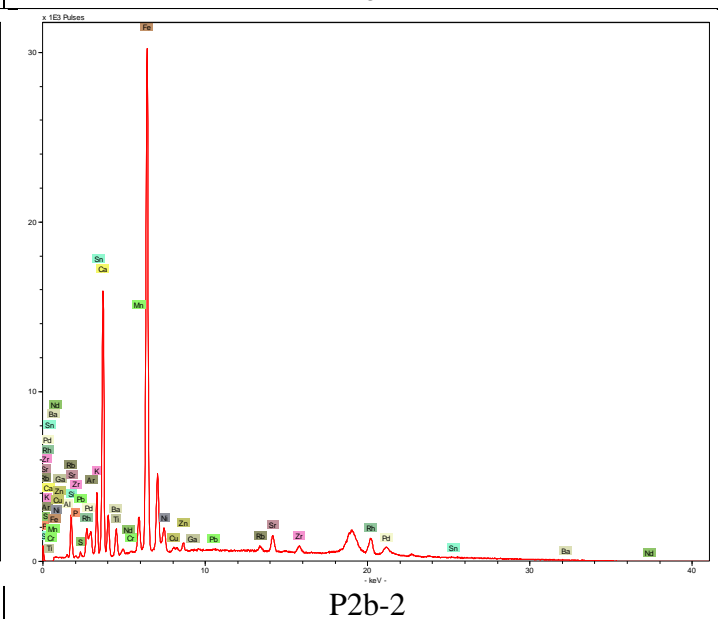
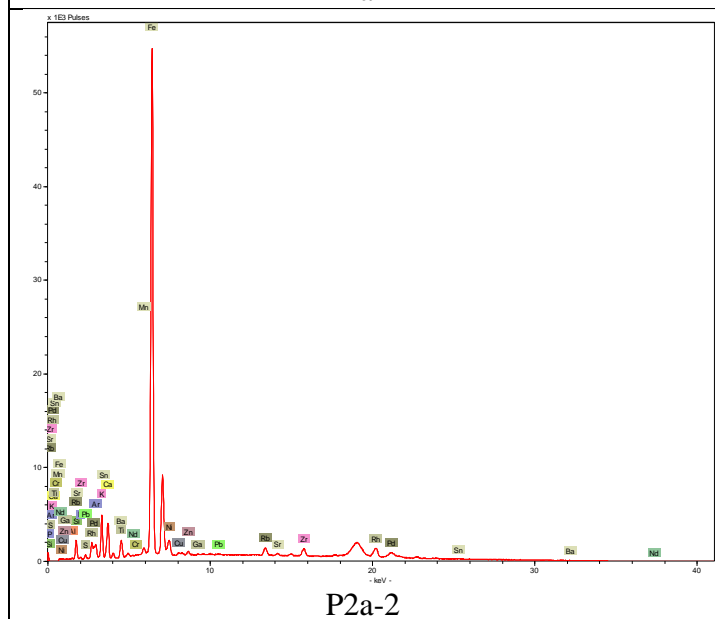
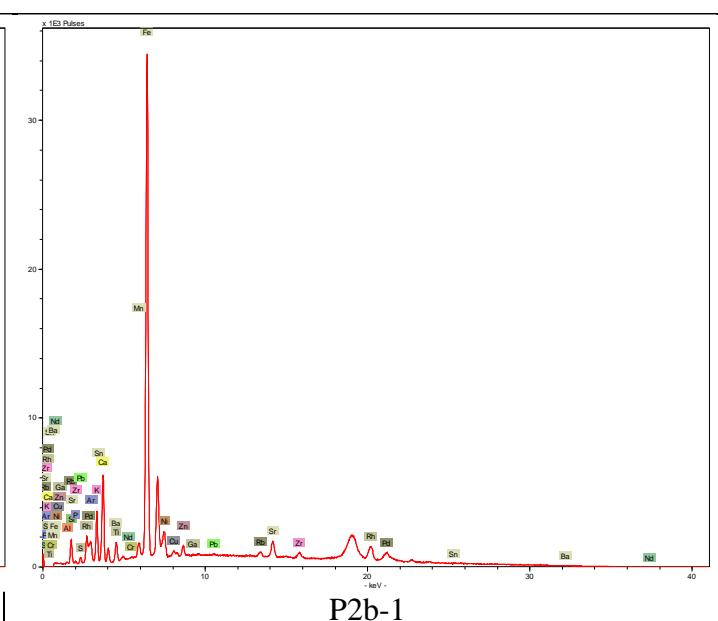
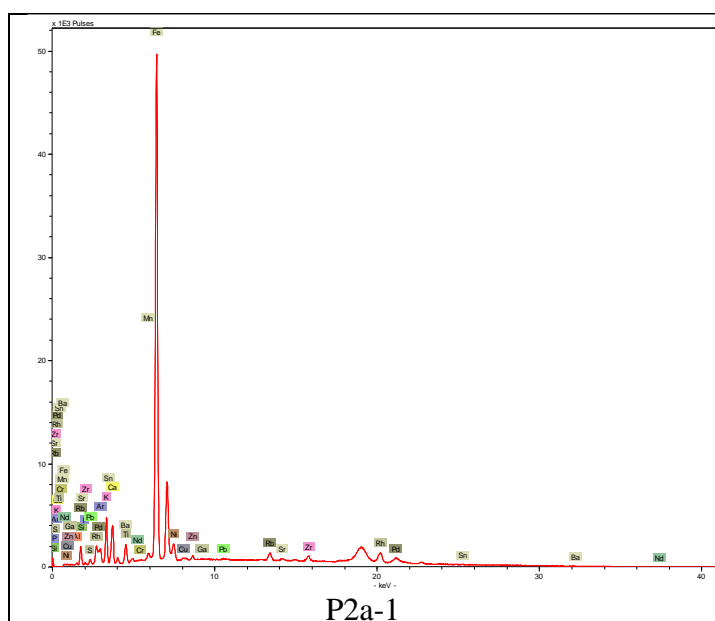
P-st - 4 - pata culoare rosiatica

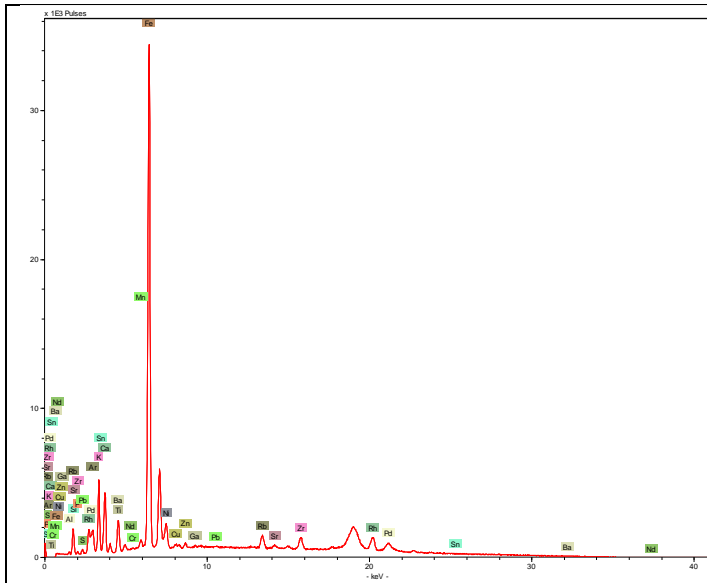


Pata de culoare rosiatica, masurata timp de 30 s

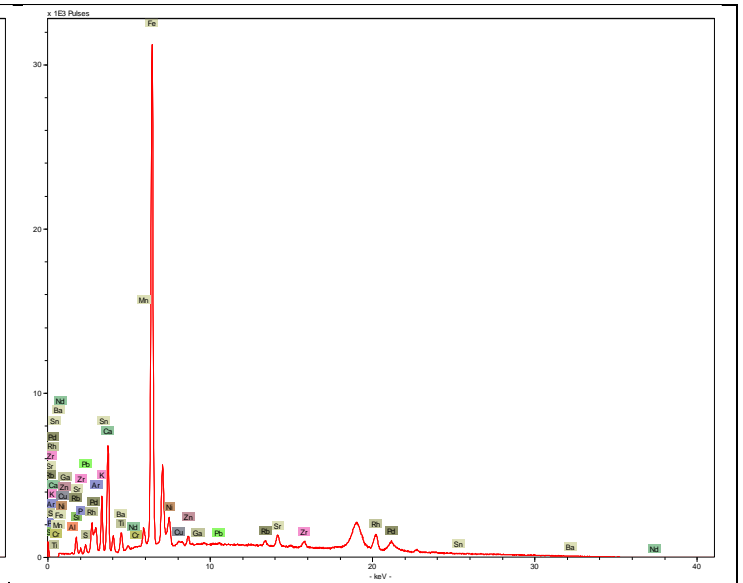
Gradina de piatra - obiecte cu baza si parte superioara -

- Au fost analizate 6 obiecte, cu cate doua zone: baza (Pxa-1÷3) si obiectul in sine (Pxb1÷3), pentru fiecare zona realizandu-se cate trei masurari, a cate 30 sec.
- In general, bazele au mai mult Fe, Ti, Rb, Zr, uneori si K
- Obiectele au mai mult Ca si Sr
- Elemente comune: Al, Si, P, S, Ar, K, Ca, Ti, Mn, Fe, Ni, Rb, Sr, Rh, Pd, Pb, Zr, Nd (?)
- Dintre cele sase obiecte, P4b-3 are linii de Ca mult mai intense decat restul probelor, dar si cea mai mare intensitate a Rb
- Observatii din timpul analizelor:
 - P3b-2 – aparent mortar in partea de sus- ca si cand a fost asezat cu baza in sus
 - P4a-3, P4b-3 – pe mortar

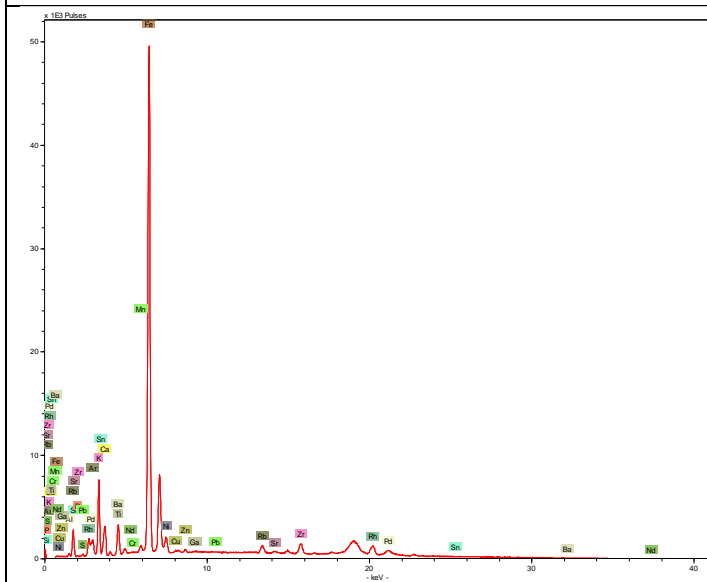




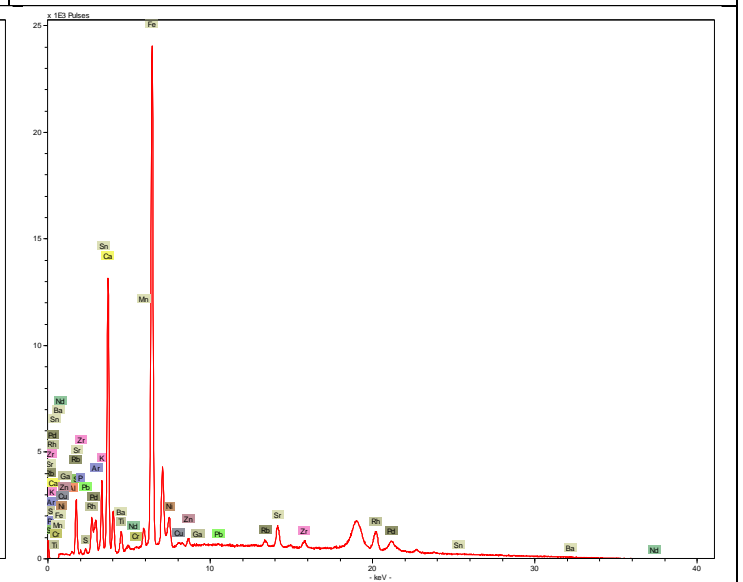
P2a-3



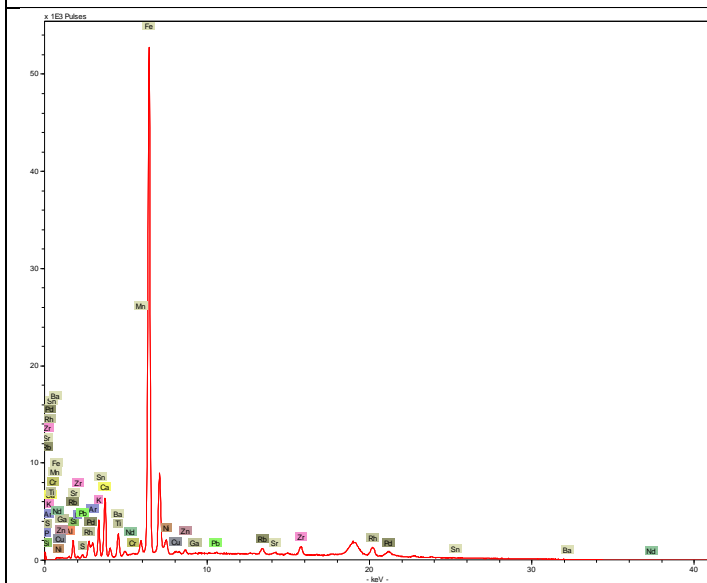
P2b-3



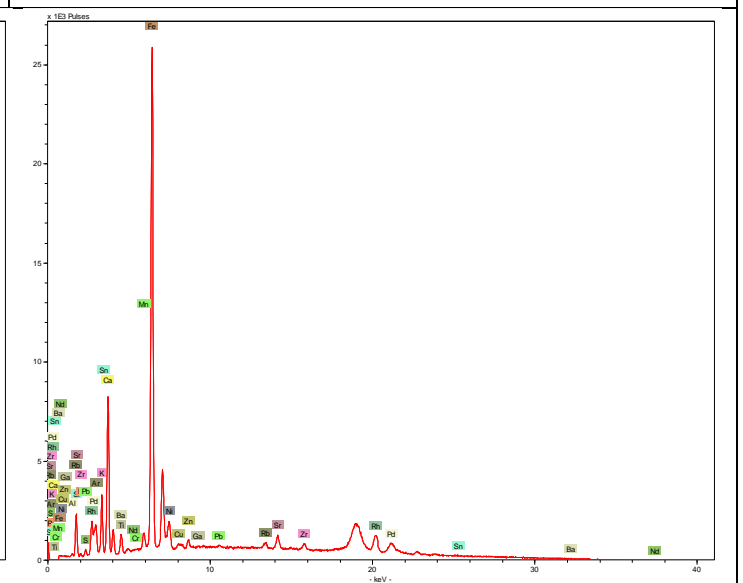
P3a-1



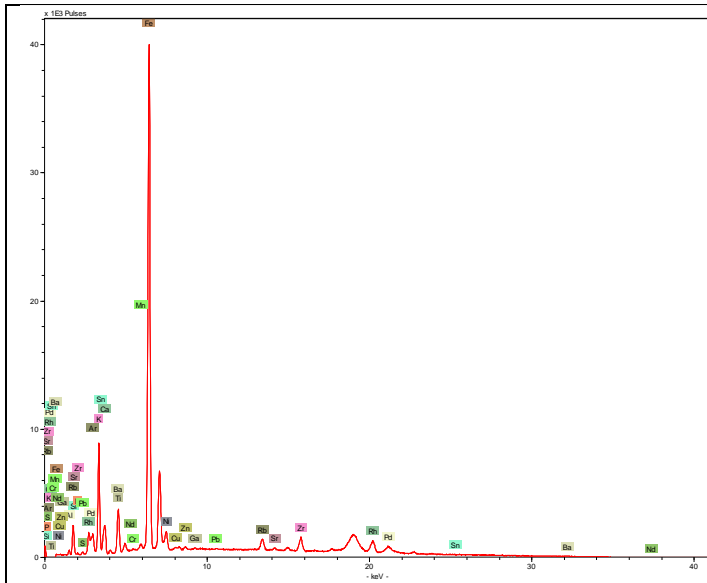
P3b-1



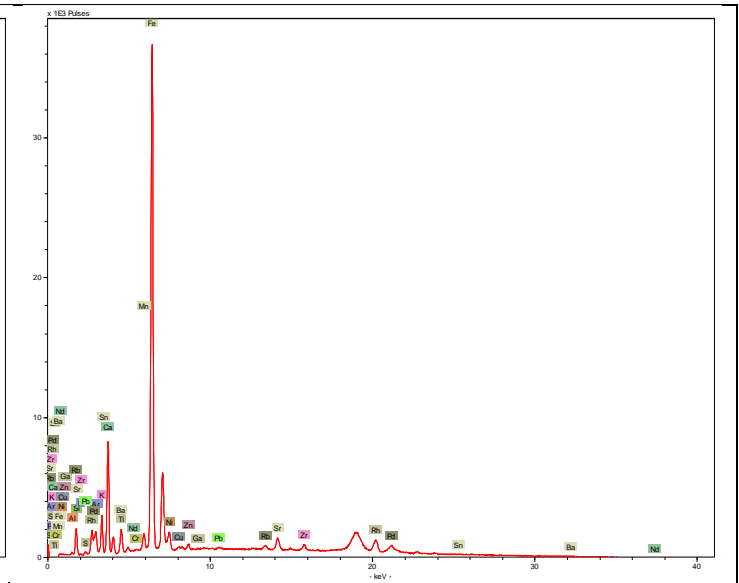
P3a-2



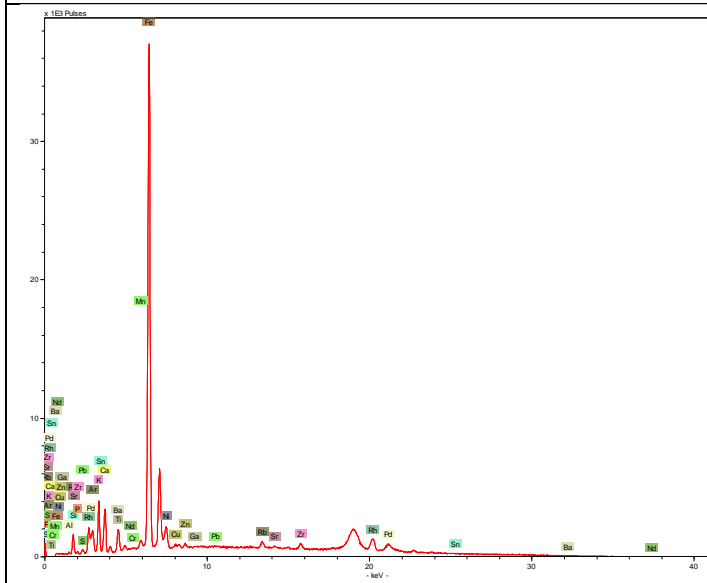
P3b-2



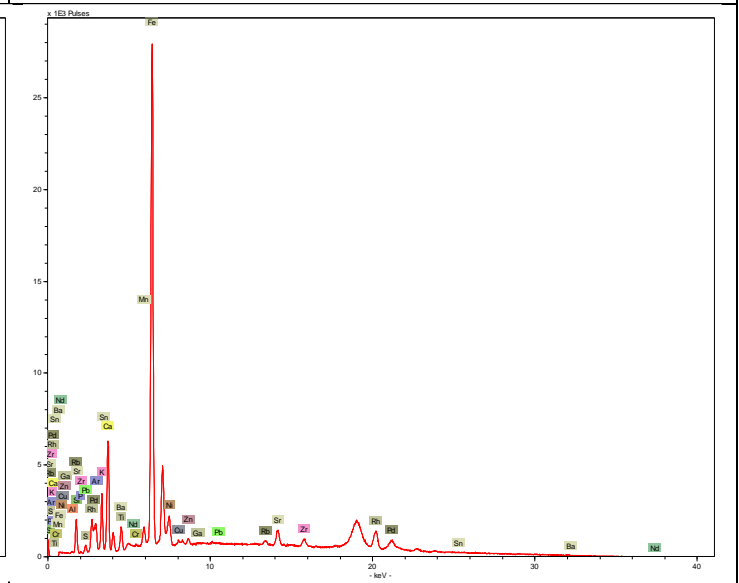
P3a-3



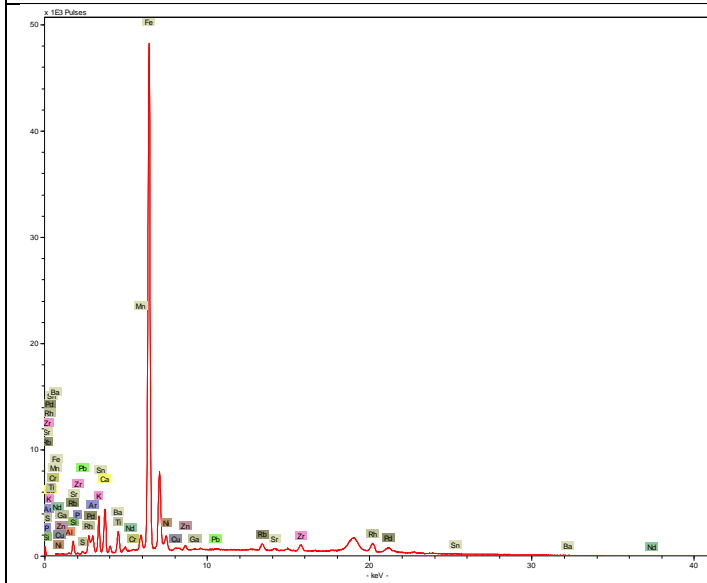
P3b-3



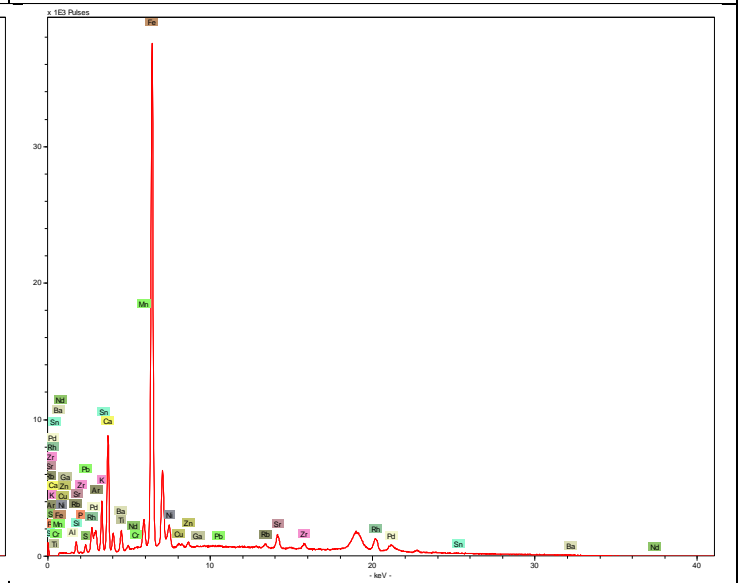
P4a-1



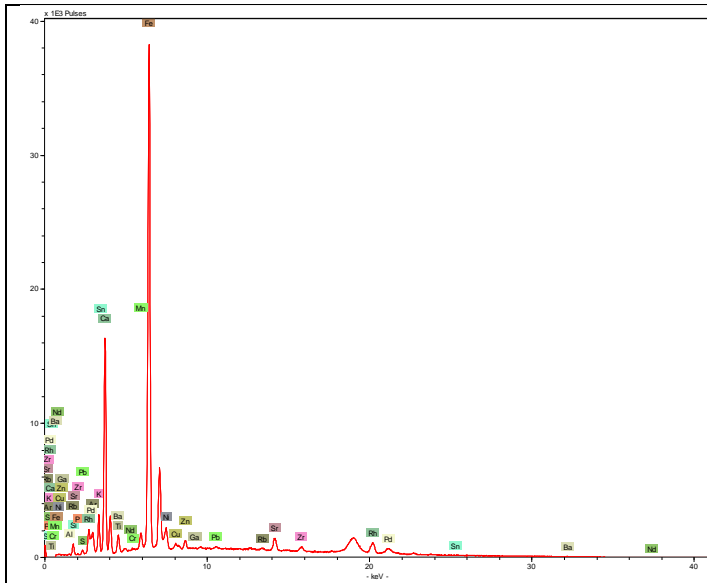
P4b-1



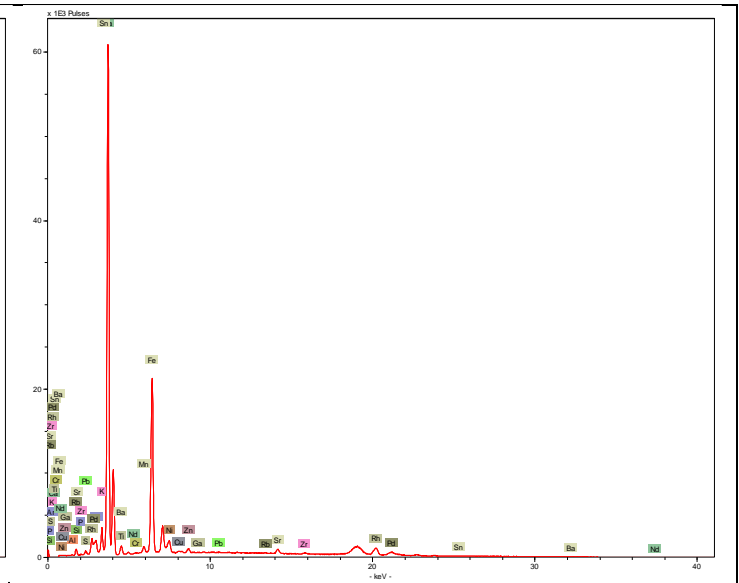
P4a-2



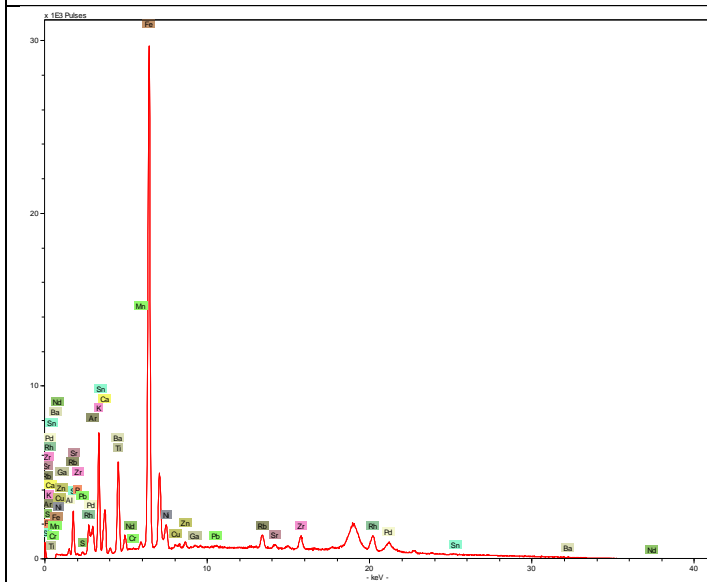
P4b-2



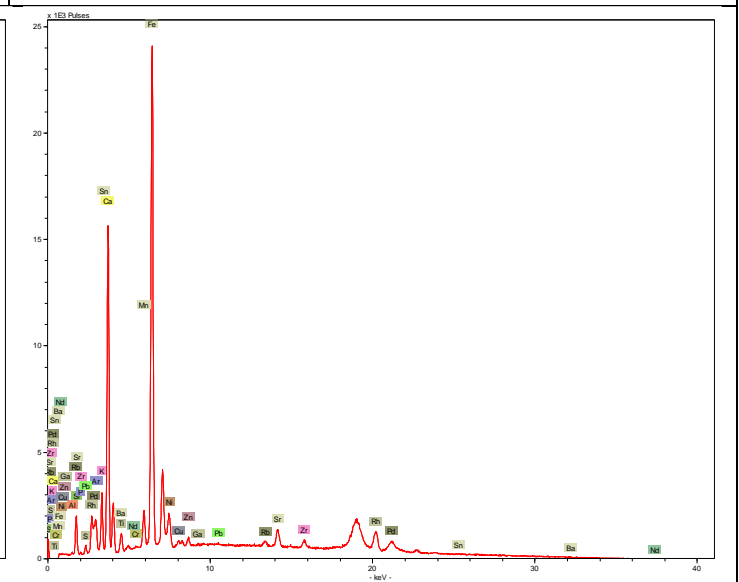
P4a-3



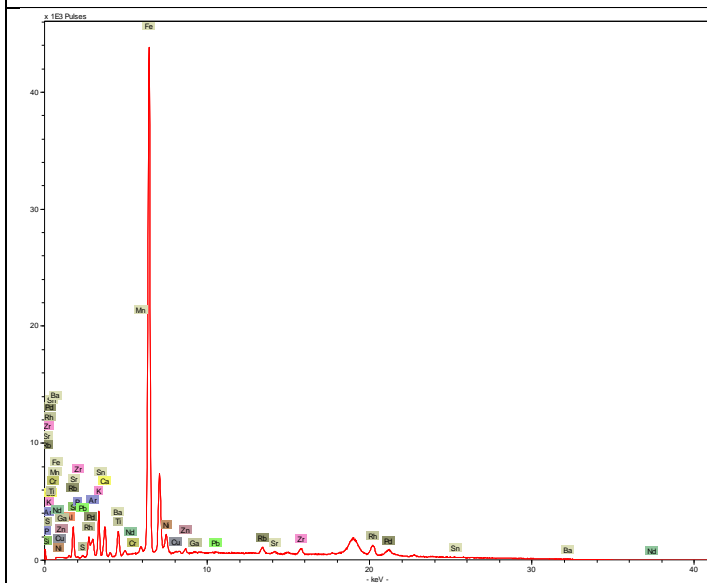
P4b-3



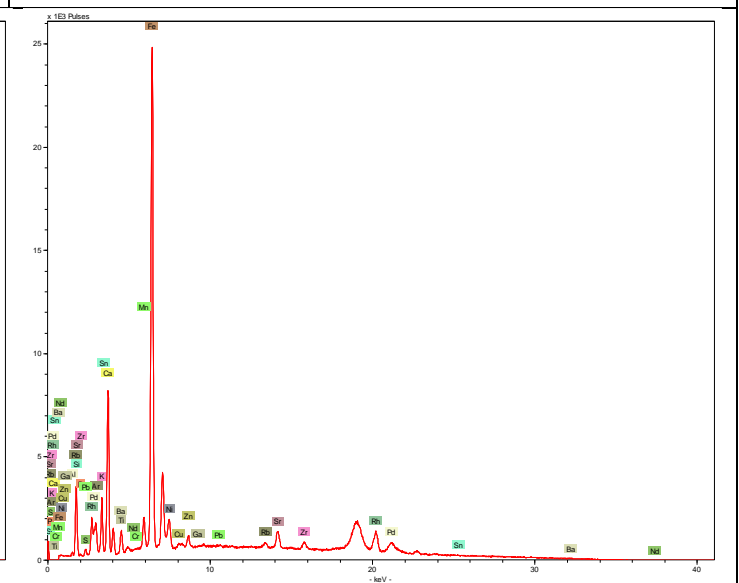
P5a-1



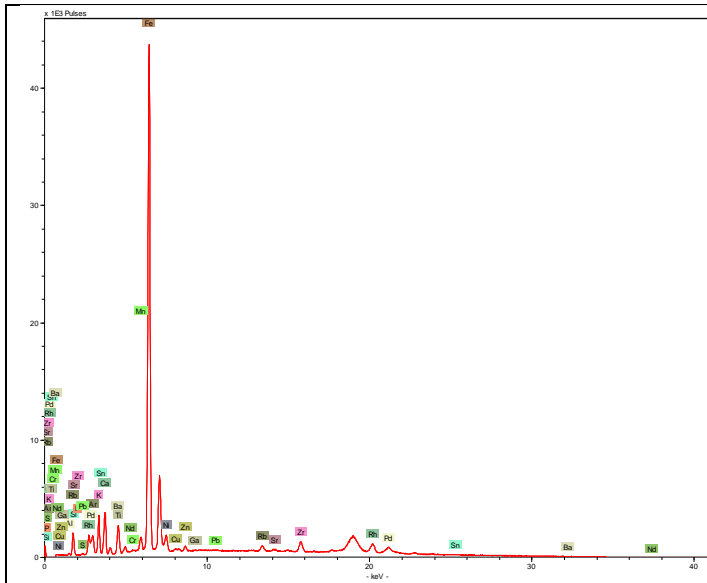
P5b-1



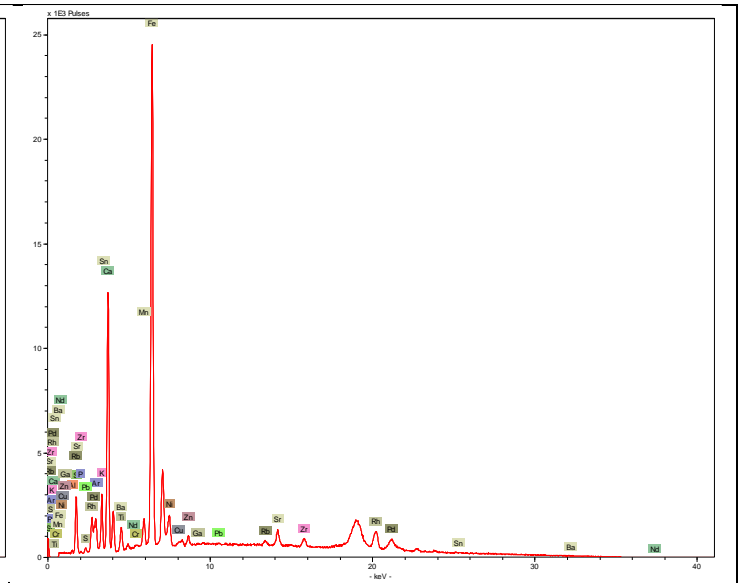
P5a-2



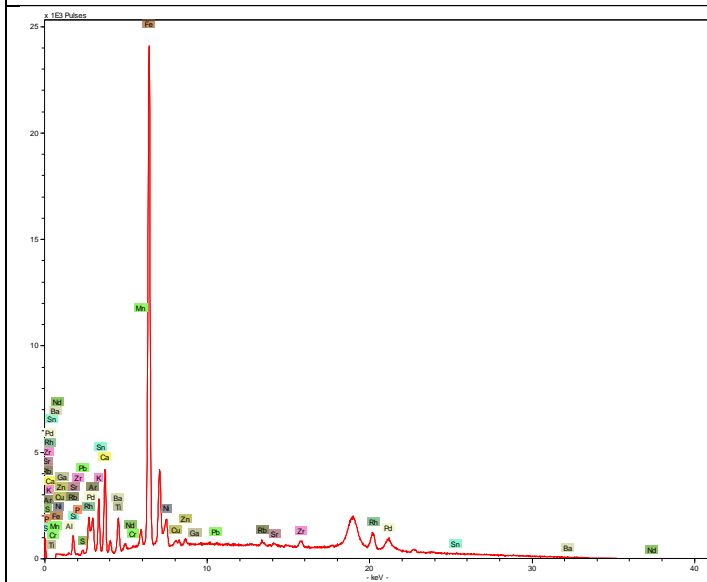
P5b-2



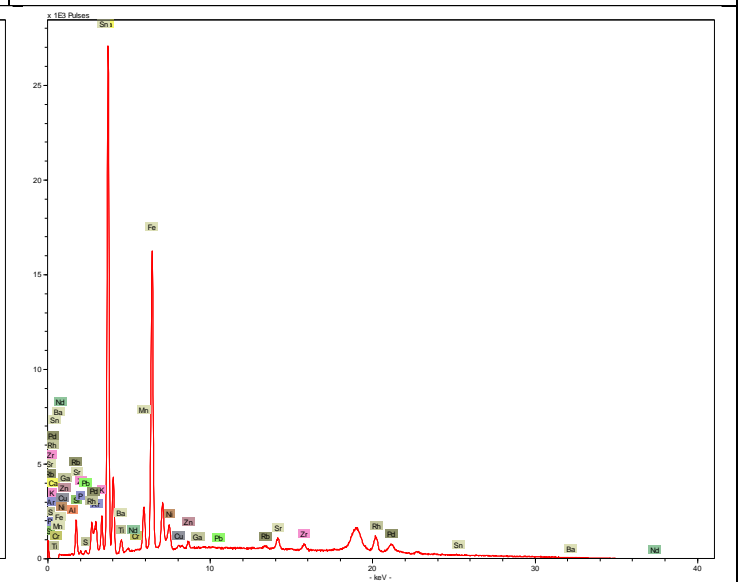
P5a-3



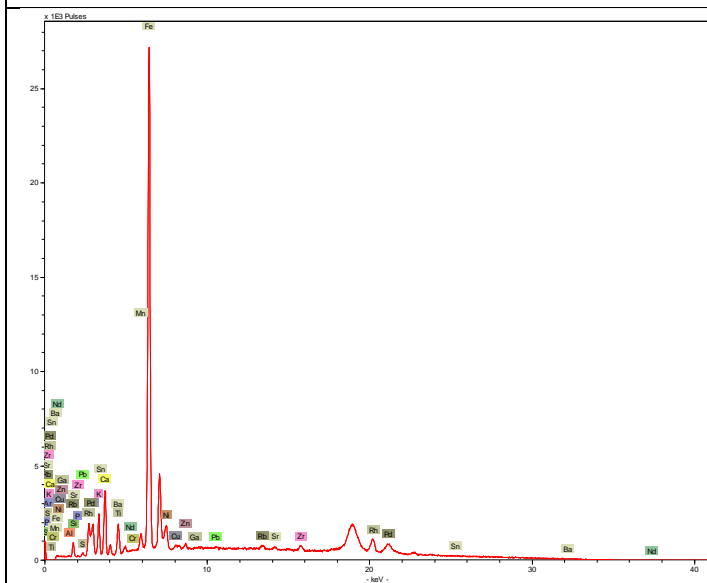
P5b-3



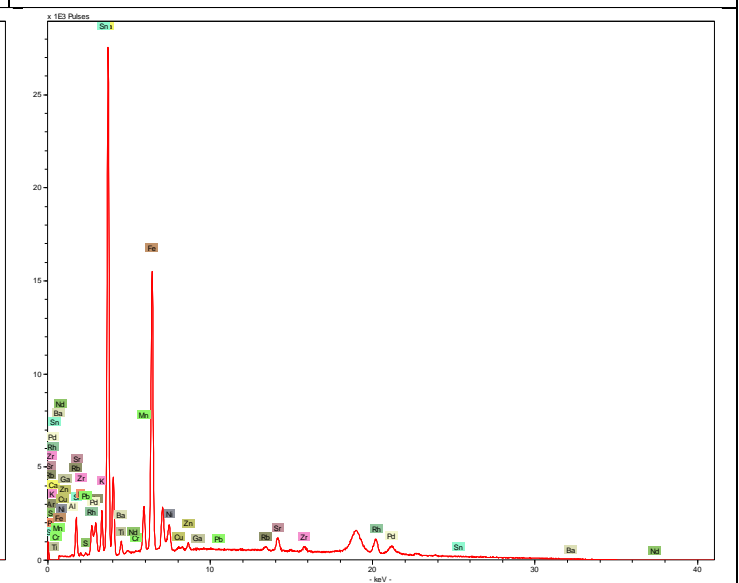
P6a-1



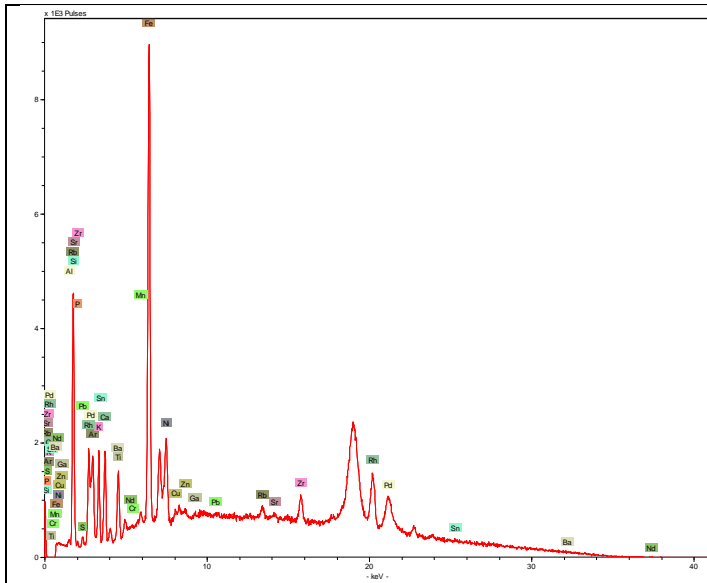
P6b-1



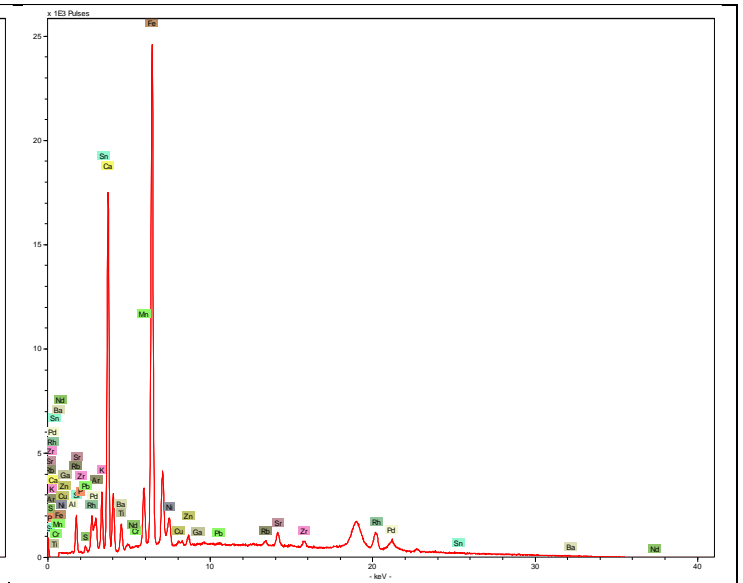
P6a-2



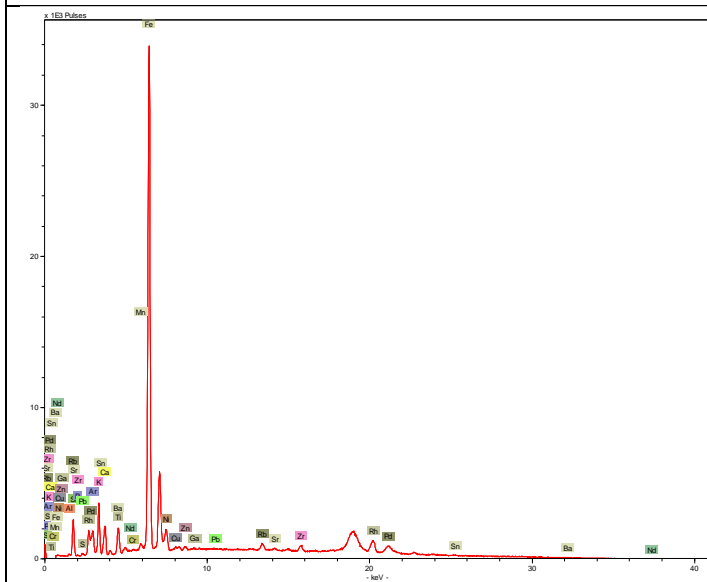
P6b-2



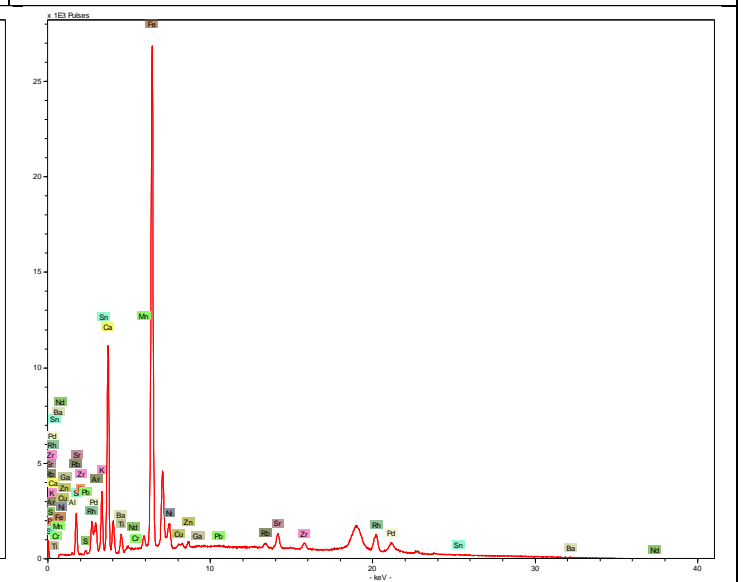
P6a-3



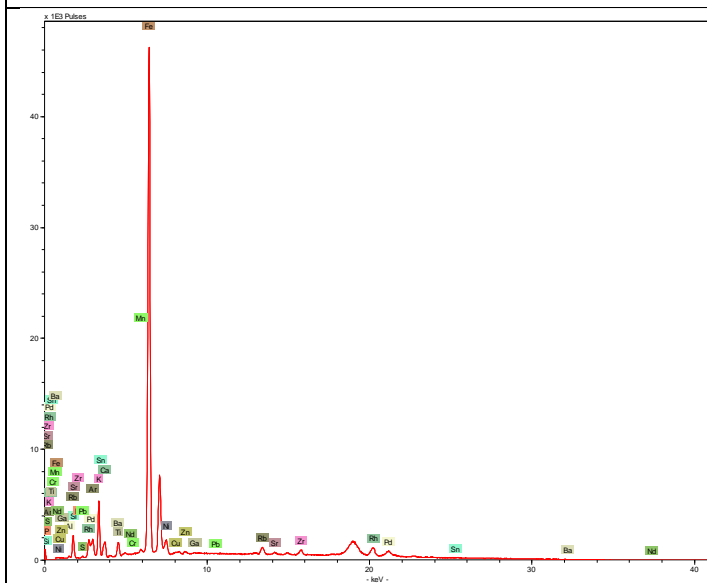
P6b-3



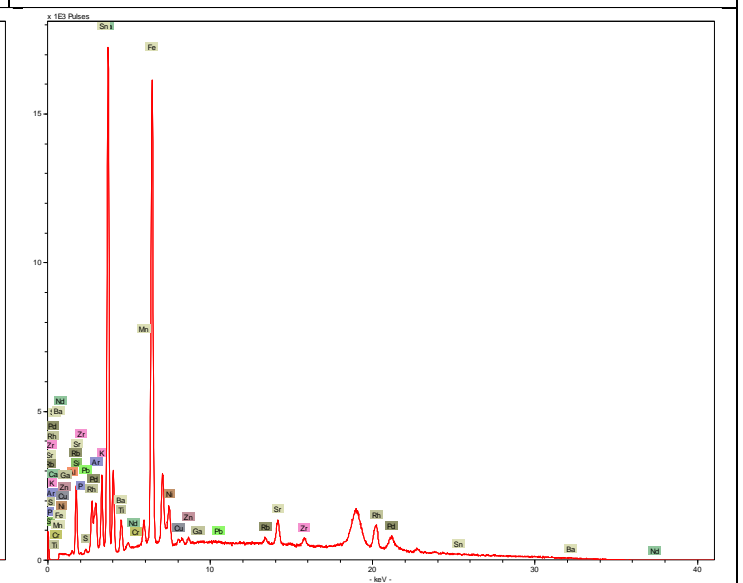
P7a-1



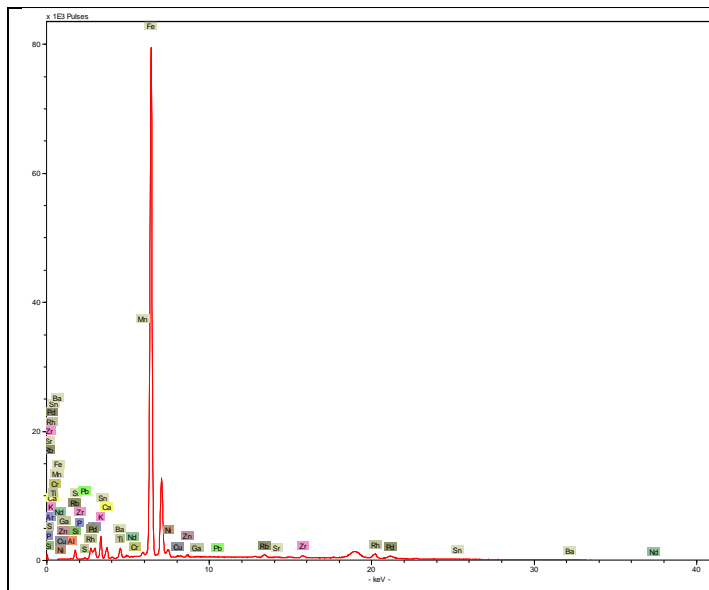
P7b-1



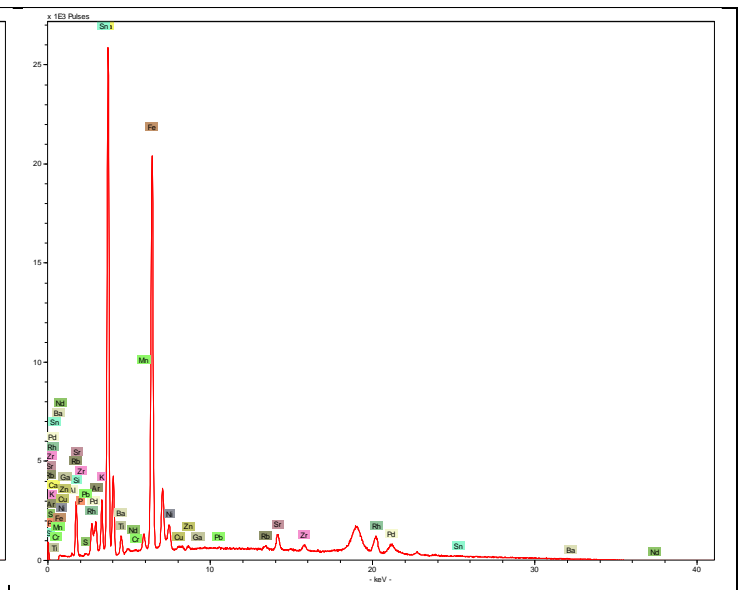
P7a-2



P7b-2



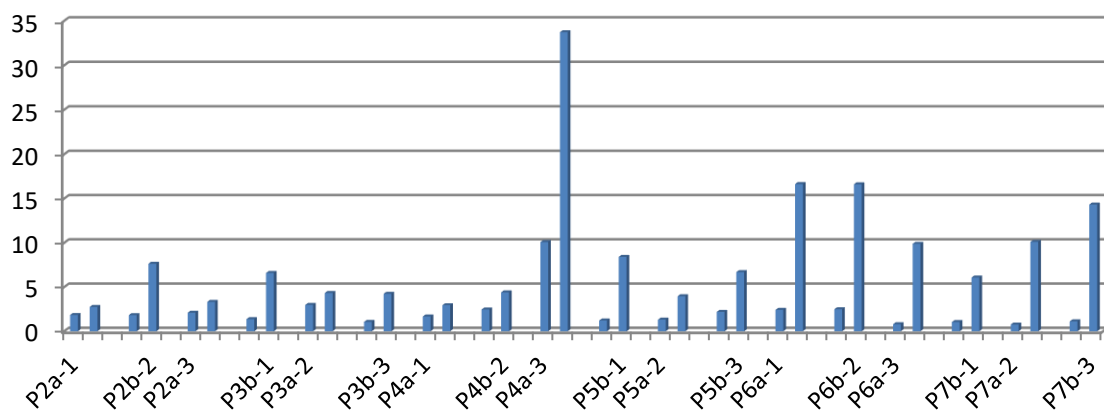
P7a-3



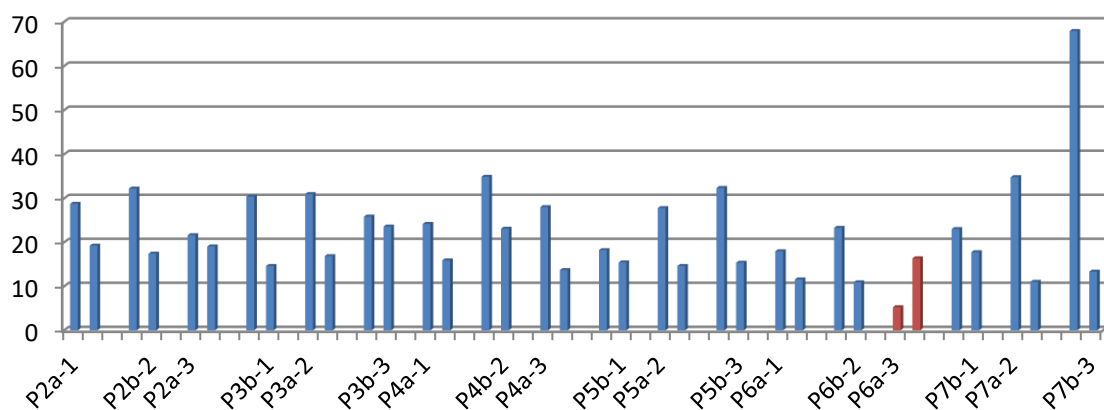
P7b-3

Grafice pe elemente

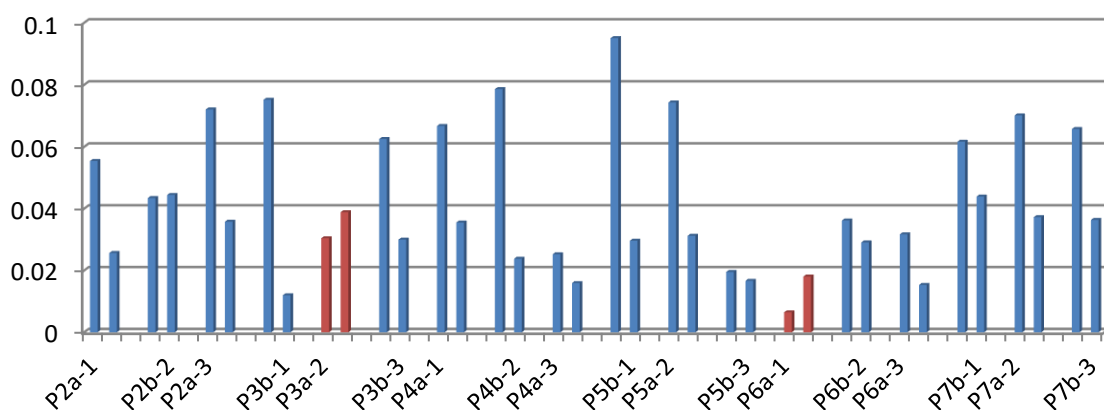
Ca K12



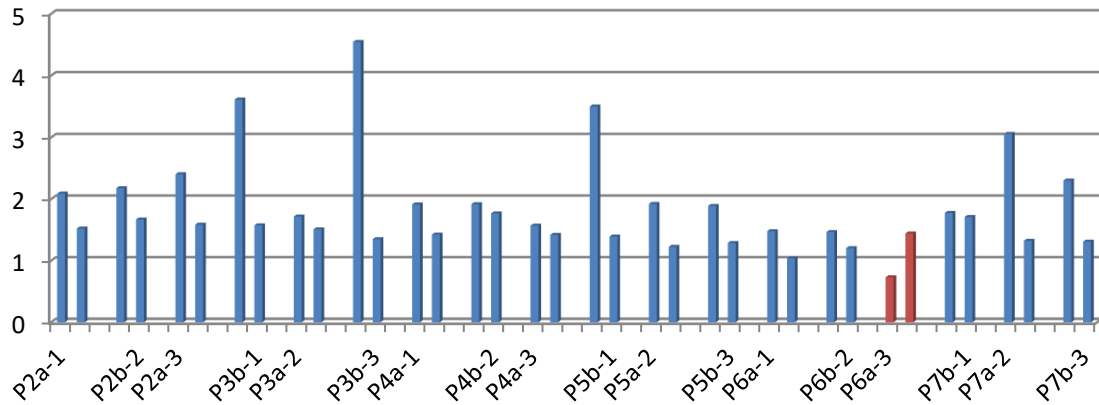
Fe K12



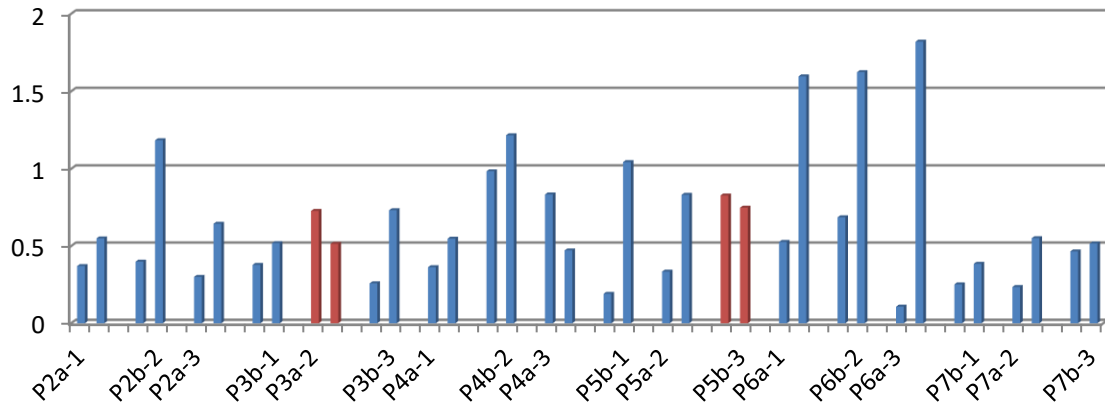
Ga K12



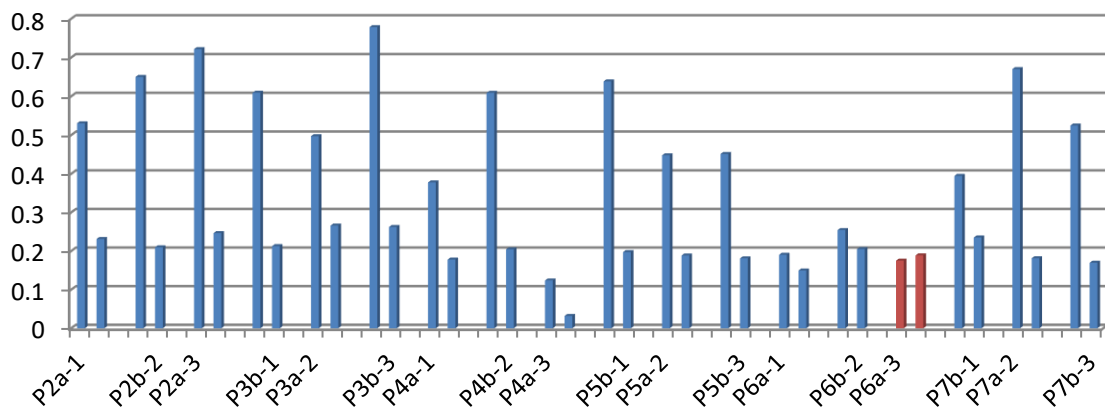
K K12



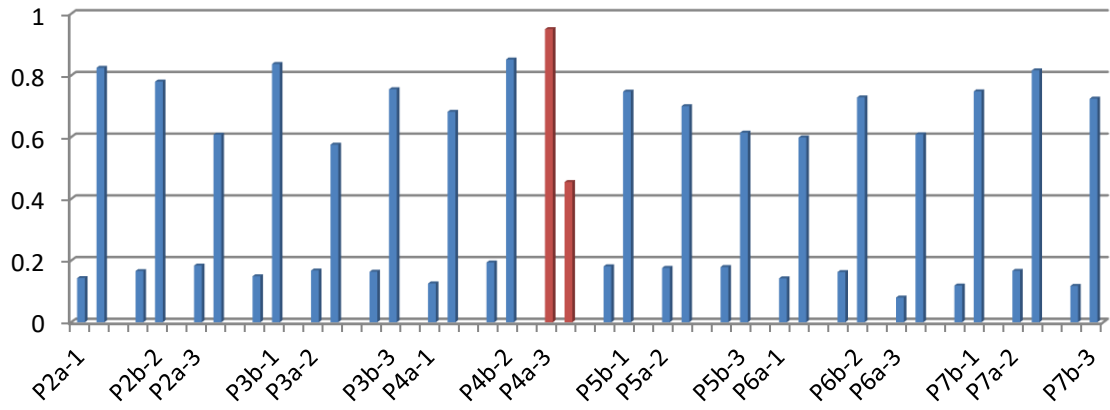
Mn K12



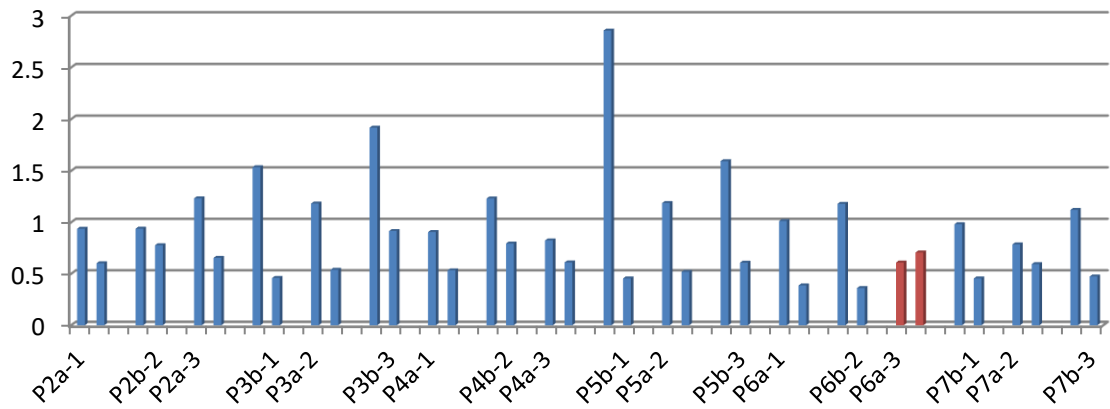
Rb K12



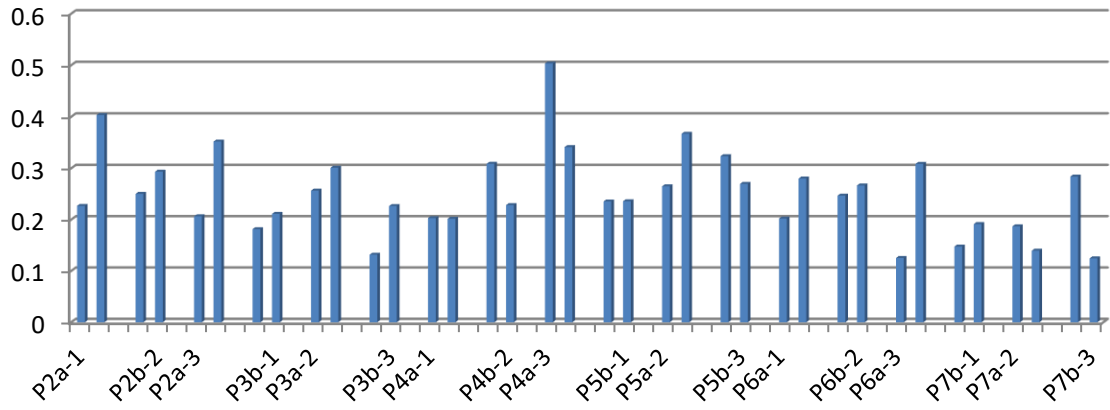
Sr K12



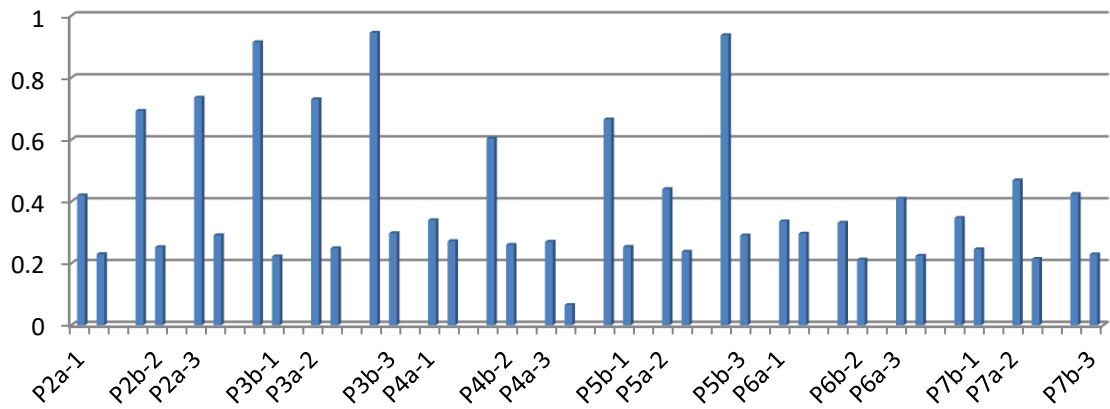
Ti K12



Zn K12

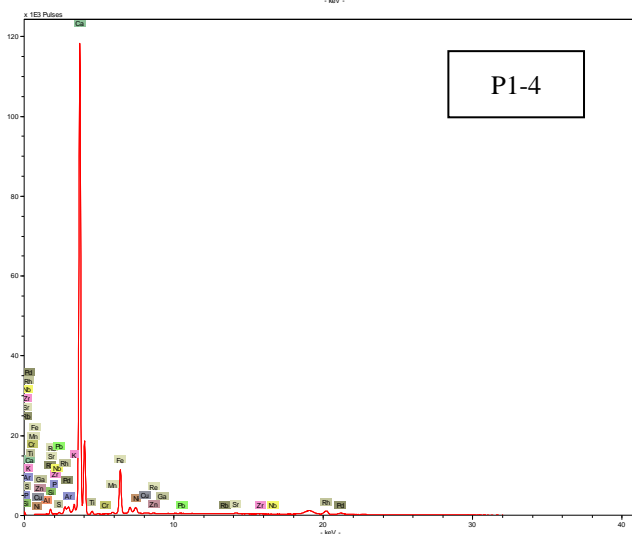
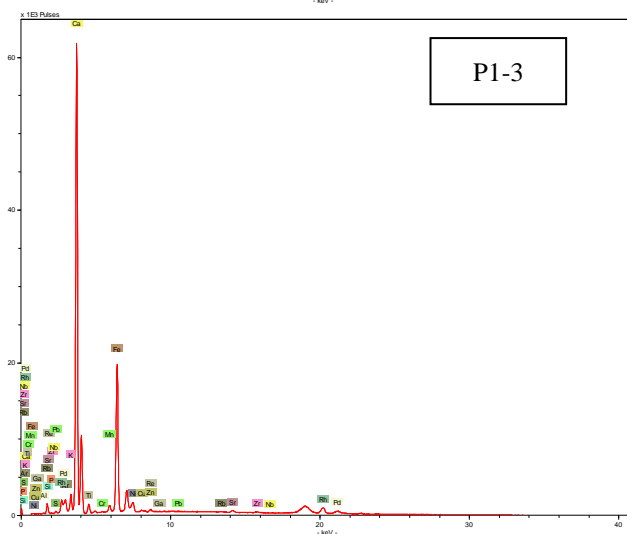
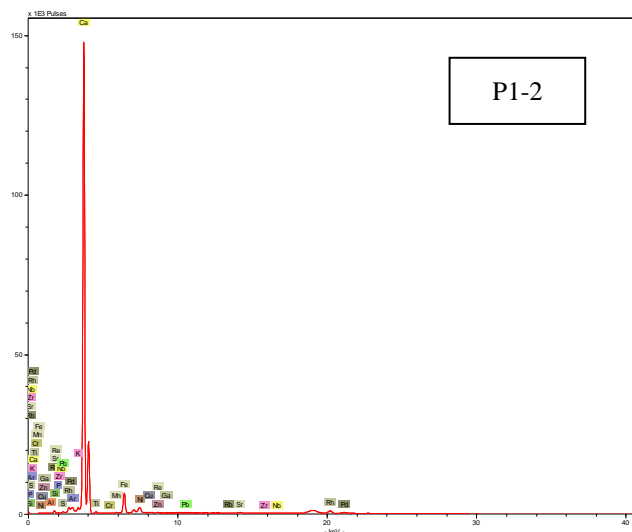
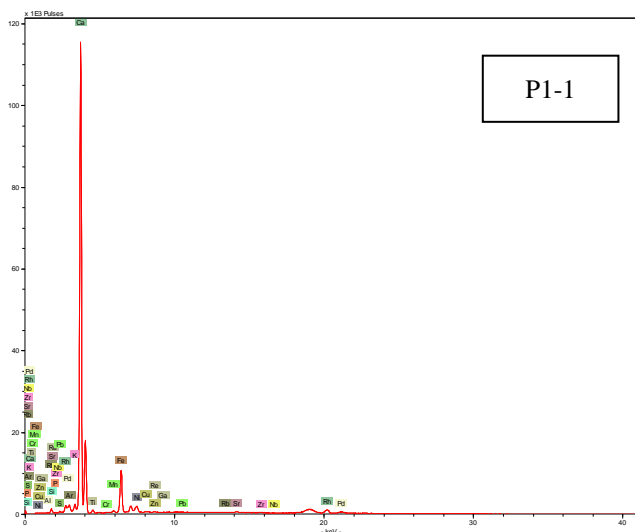


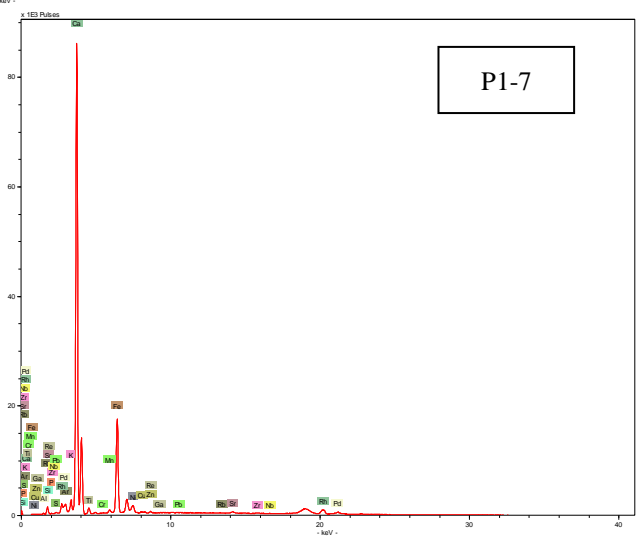
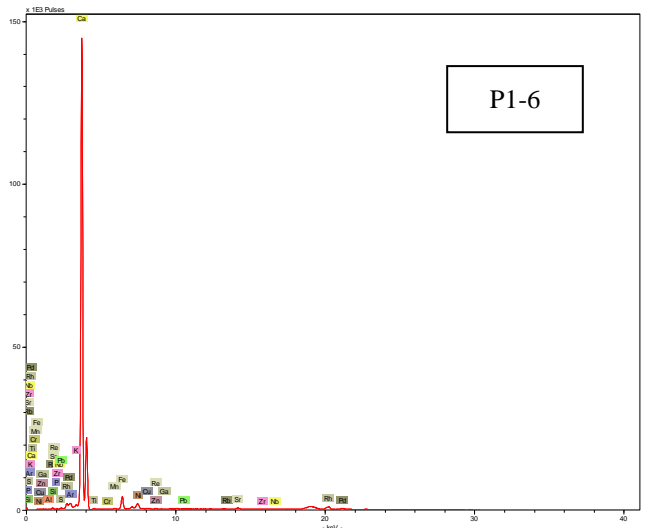
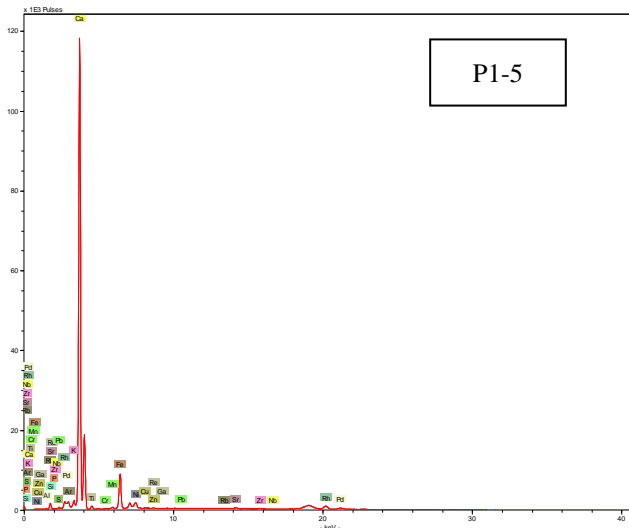
Zr K12



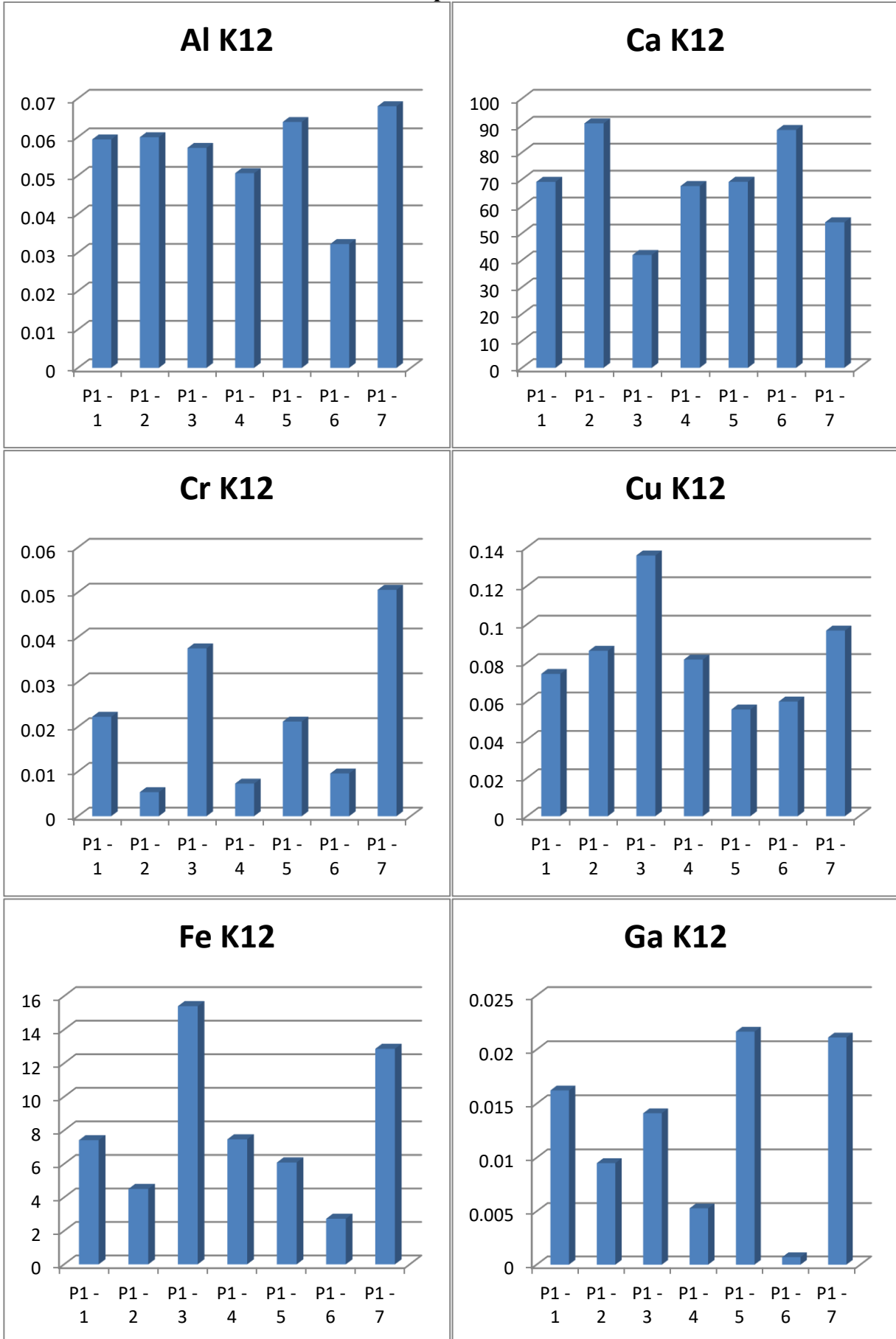
Gradina de piatra - masa -

- Pentru proba P1 au fost realizate sapte masurari separate, a cate 30sec, in puncte diferite (P1-1÷7); punctele P1-2 si P1-7 au fost masurate si timp de 60 sec.
- P1-1 si P1-2 nu prezinta linii de Rb
- P1-3 si P1-7 au cele mai mari valori de Cu, Fe, K, Mn, Cr, Ti, Zn, Rb, Re
- Pentru toate probele, Al, Ar, Sr sunt aproape constante

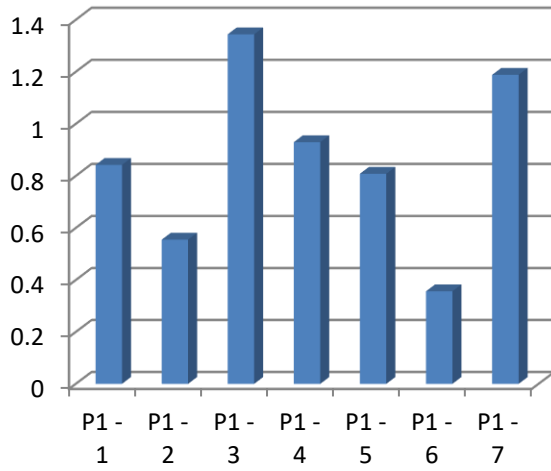




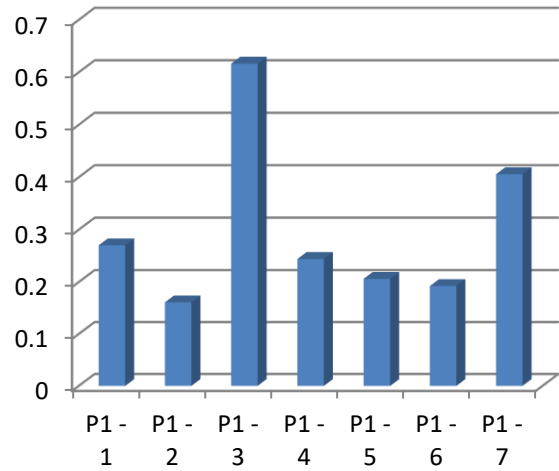
Grafice pe elemente



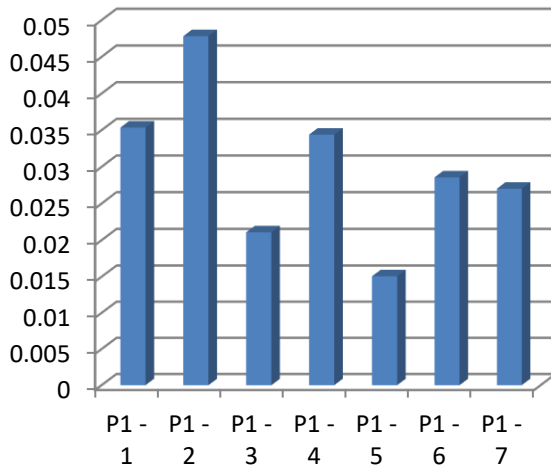
K K12



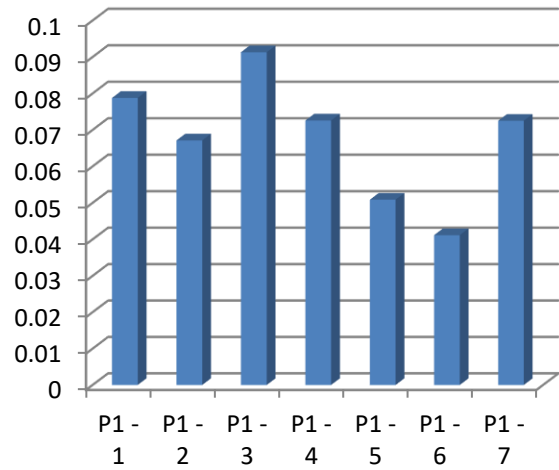
Mn K12



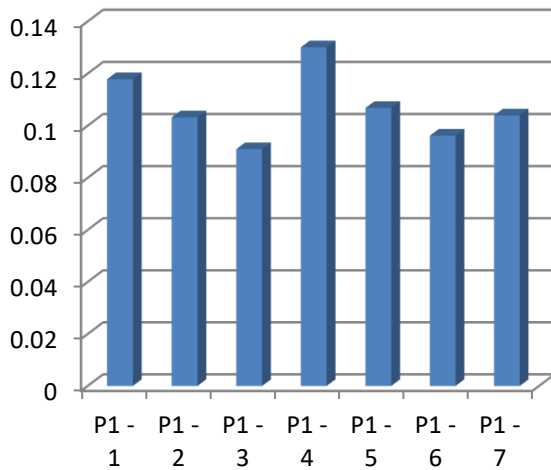
P K12



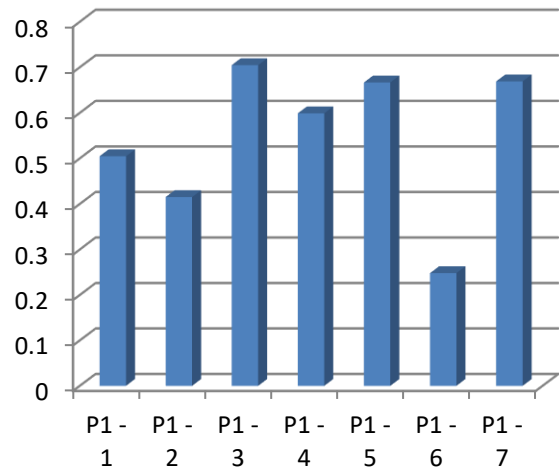
Re L1



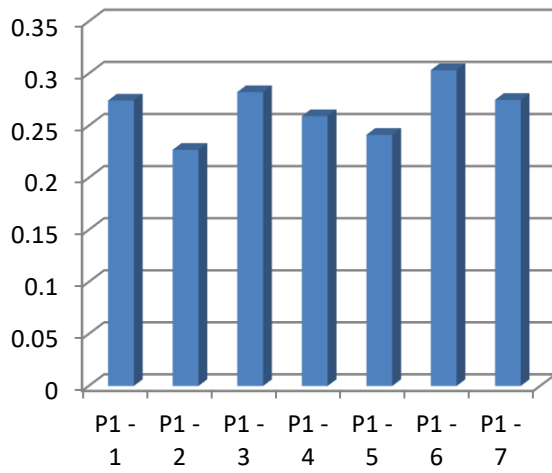
S K12



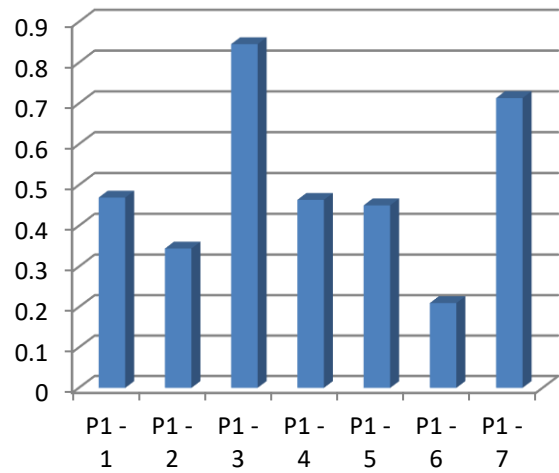
Si K12



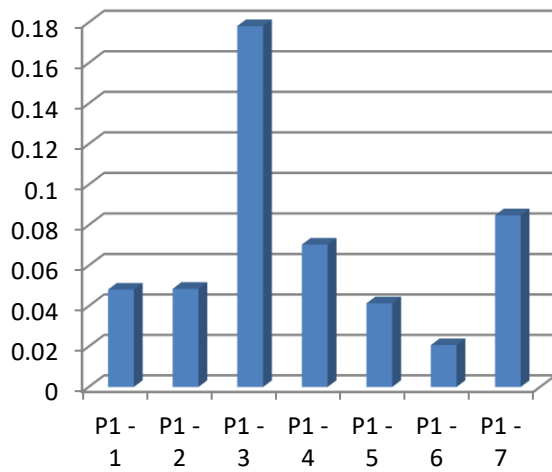
Sr K12



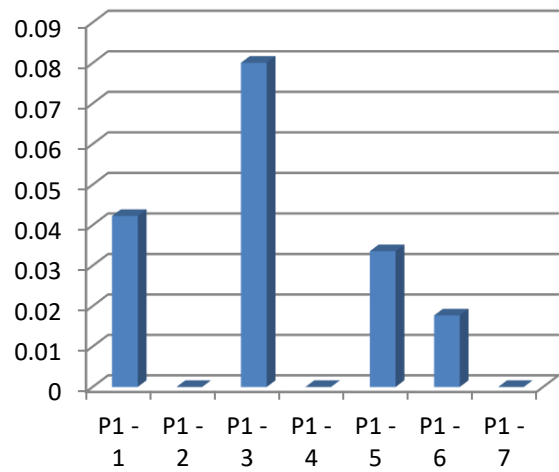
Ti K12



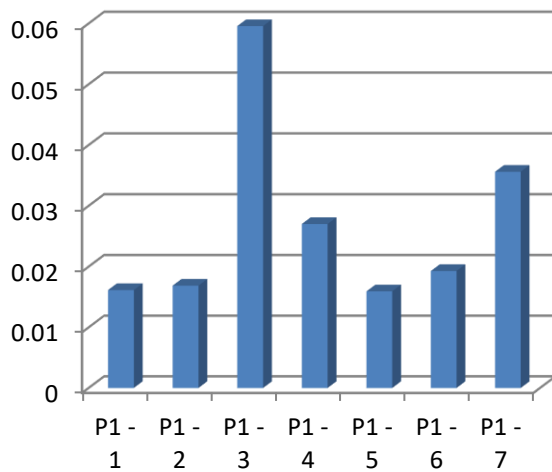
Zn K12



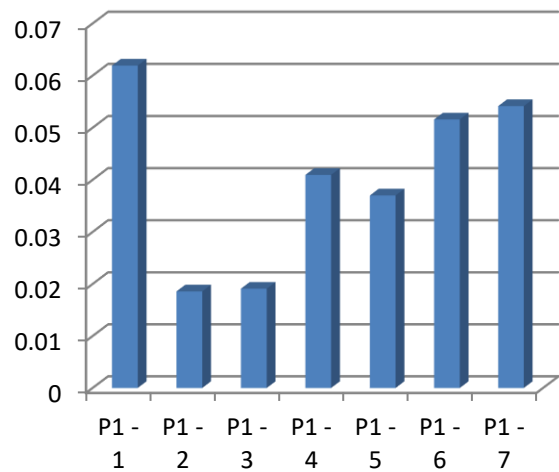
Zr K12



Rb K12

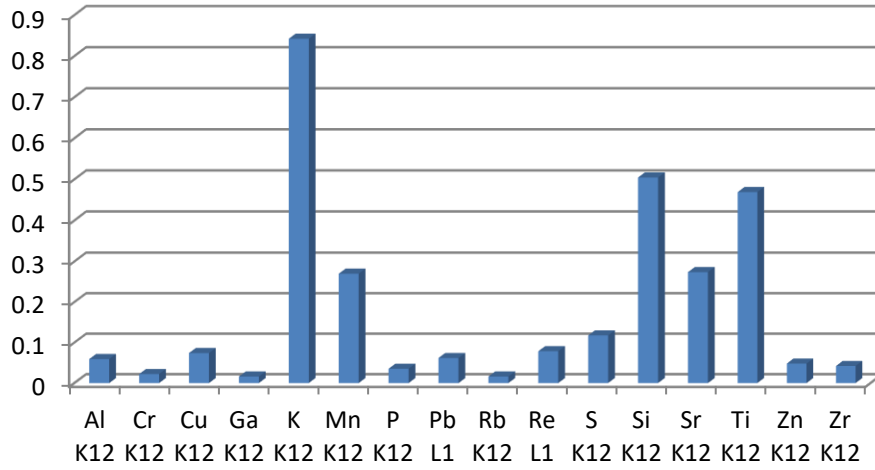


Pb L1

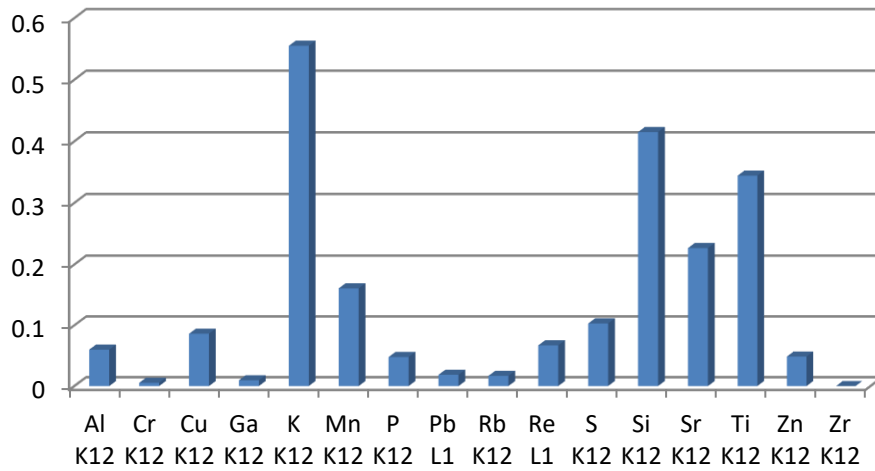


Grafice pentru fiecare punct de masurare*

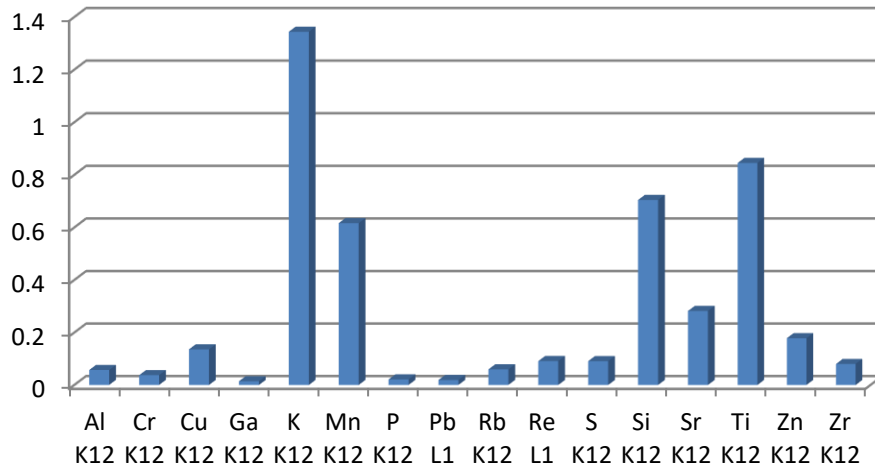
P1 - 1



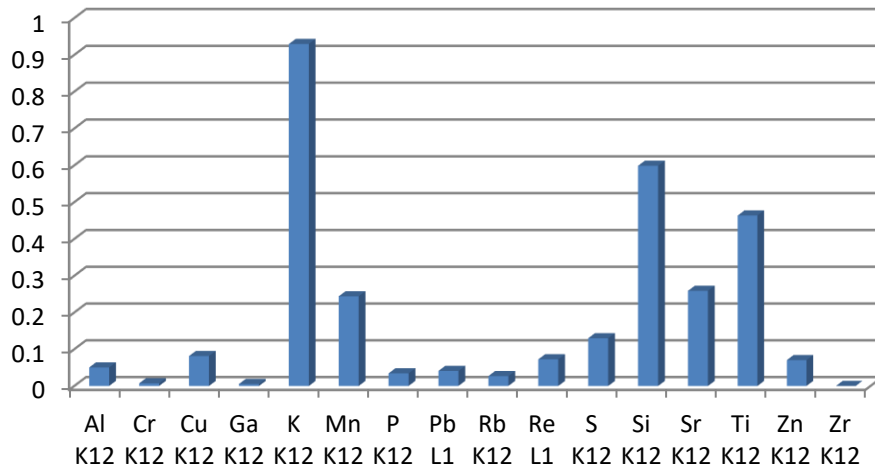
P1 - 2



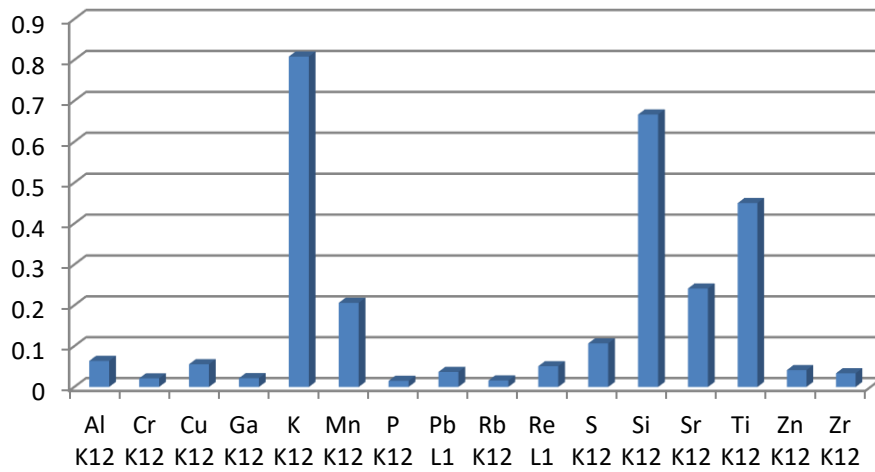
P1 - 3



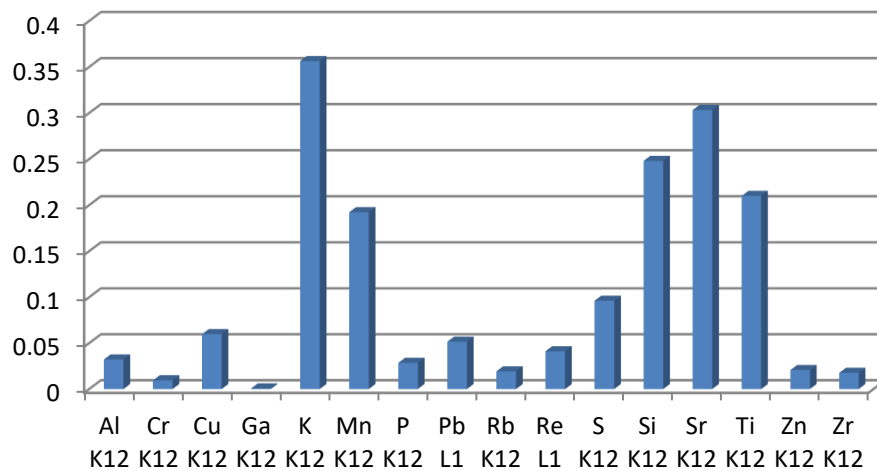
P1 - 4



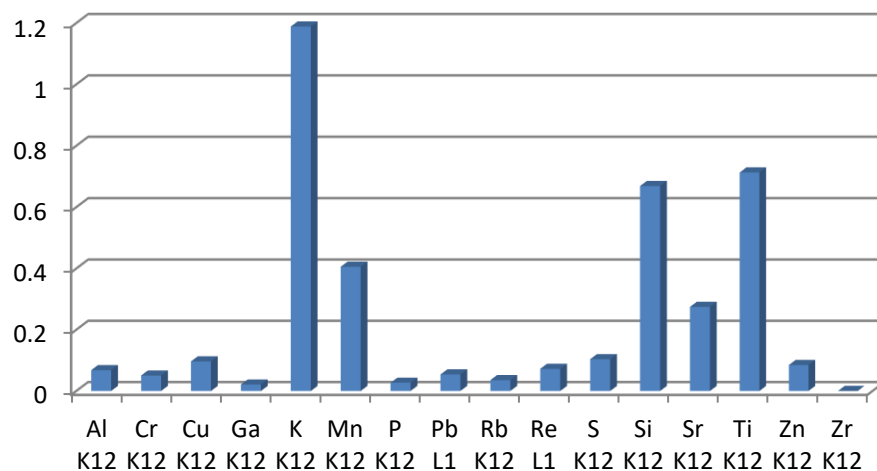
P1 - 5



P1 - 6



P1 - 7

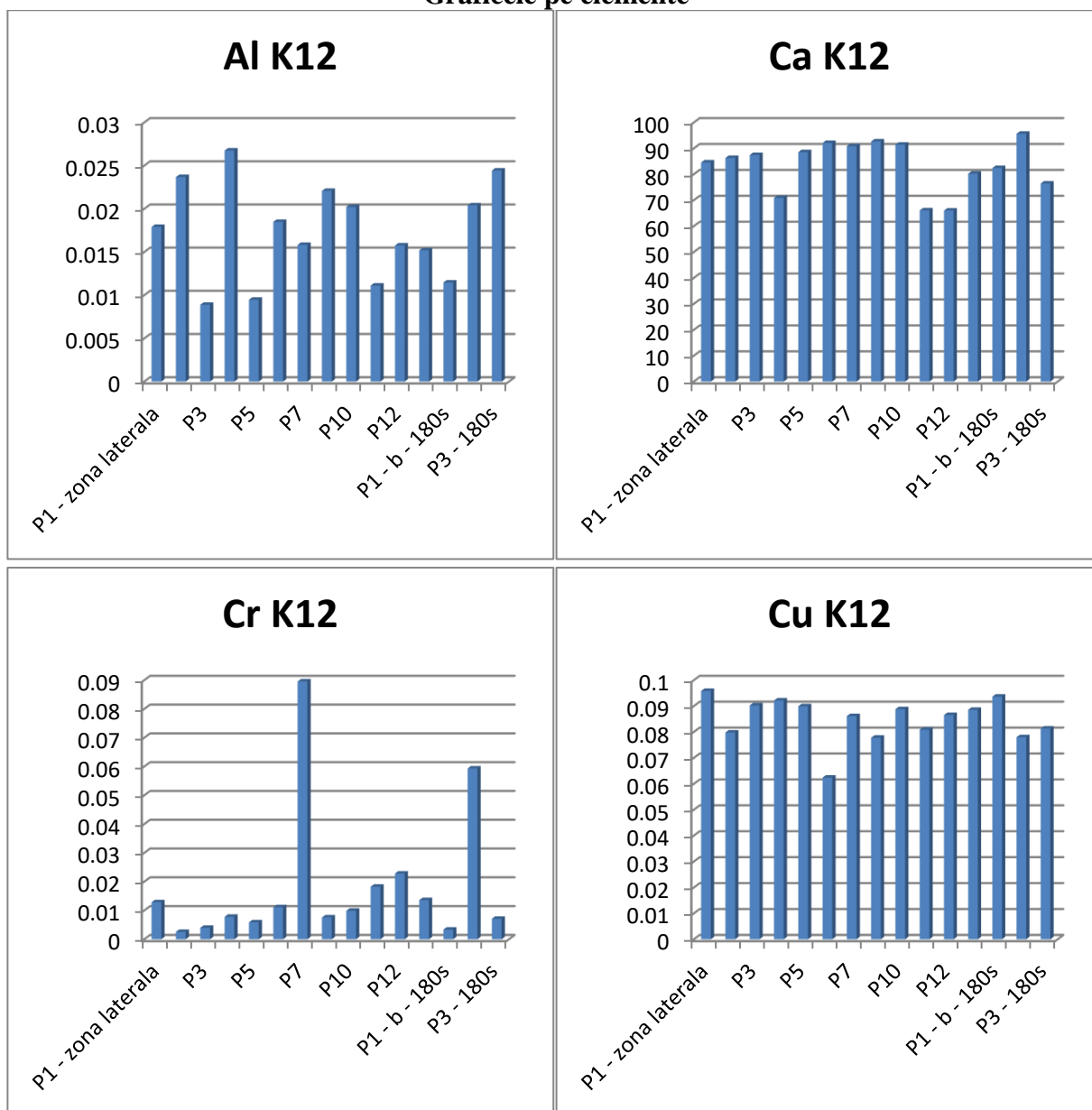


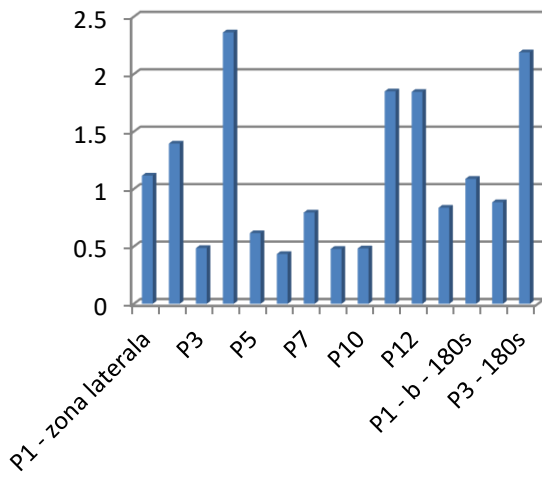
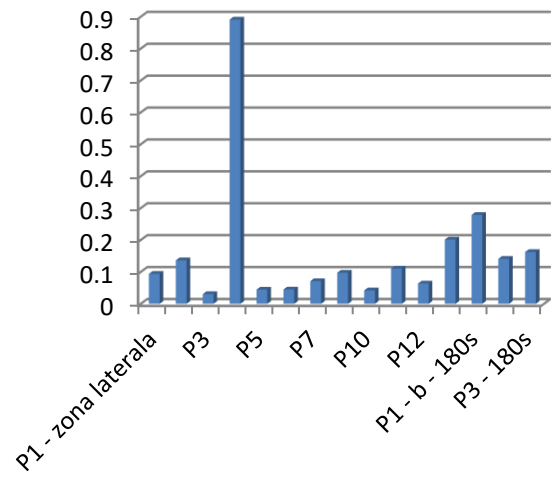
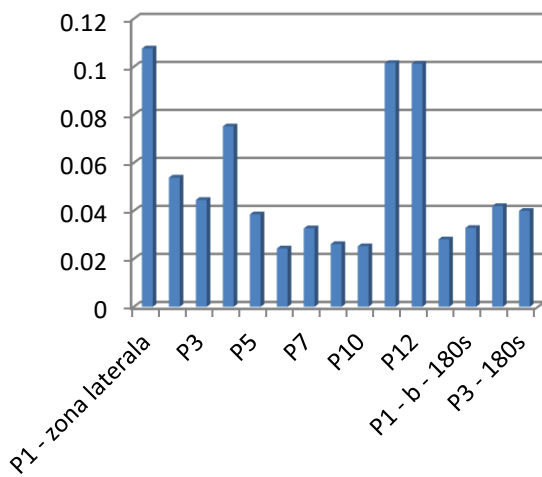
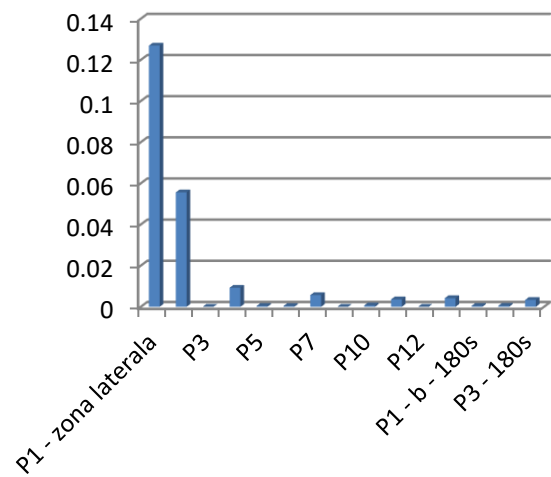
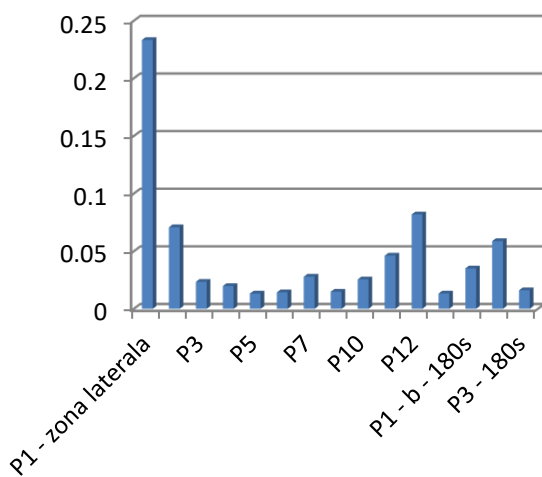
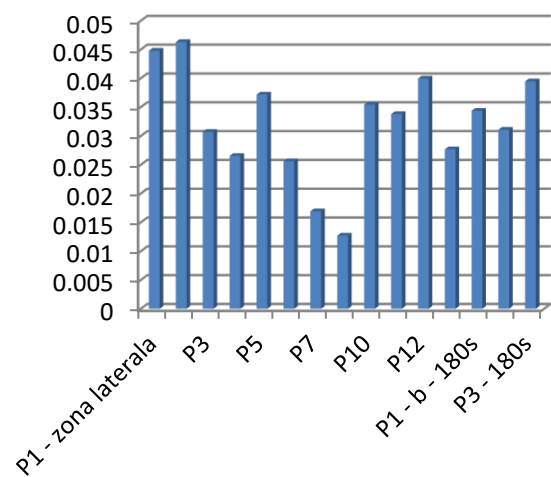
*au fost omise liniile de Ca si Fe, pentru a se putea evidientia contributia elementelor in urme

Poarta Sarutului

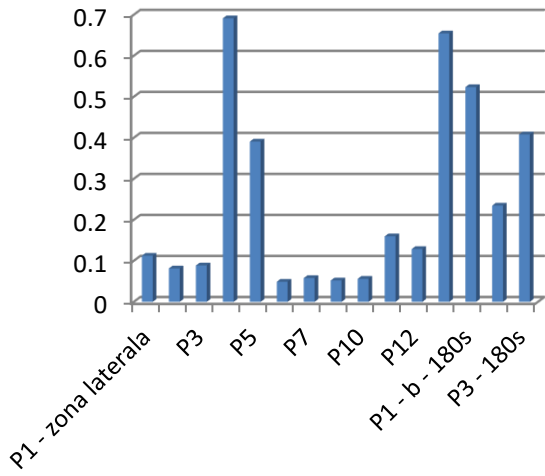
- Analize realizate in 15 puncte
- Ca si Fe sunt elementele dominante in spectre
- Exista diferente intre puncte la nivelul liniilor de Cr (la nivel de urme, dar mai intense in P7 si P2-180s), Fe (mai intens in P4, P3-180s, P11, P12, P2-zona laterala si P1-zona laterala), K (in urme, dar foarte vizibil in P4), Mn (cel mai intens in P1-zona laterala, P4, P11 si P12), P (vizibil in P1-zona laterala si P2-zona laterala, iar in restul probelor, nu), Pb (apare in P1-zona laterala si P2-zona laterala), S (cel mai intens in P4, P1-180s, P1-b-180s, P5, P3-180s si P2-180s), Si (in punctele P4, P2-zona laterala, P1-180s), Sr (cel mai intens in P4) si Zn (mai intens in P2-zona laterala si P1-zona laterala)

Graficele pe elemente

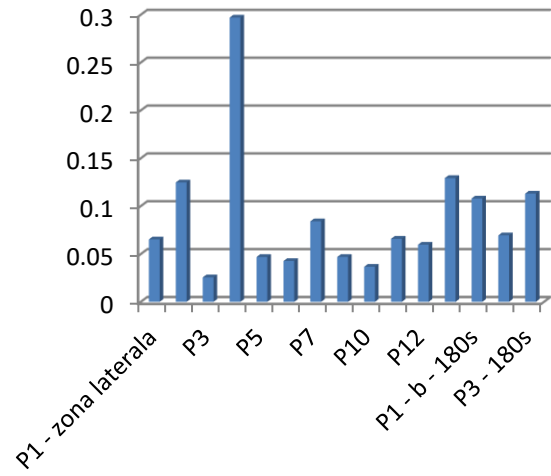


Fe K12**K K12****Mn K12****P K12****Pb L1****Re L1**

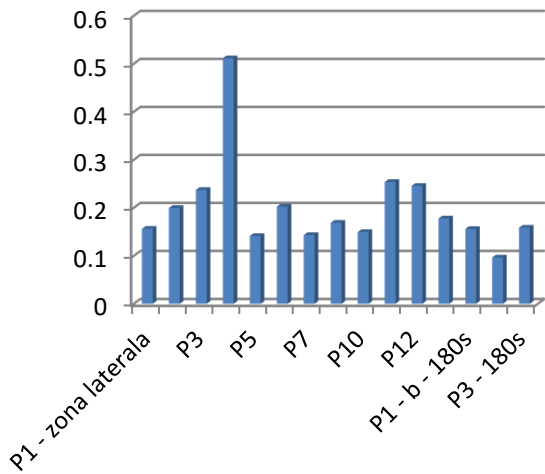
S K12



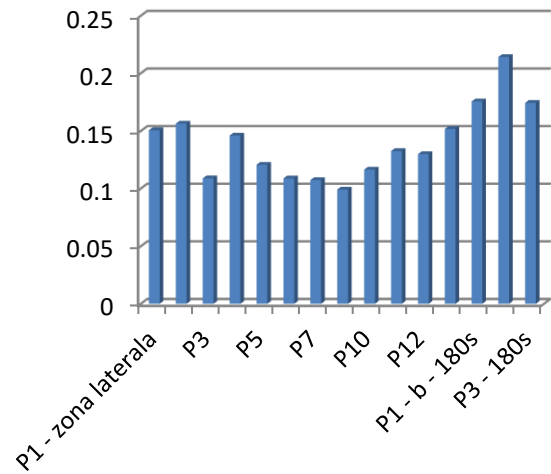
Si K12



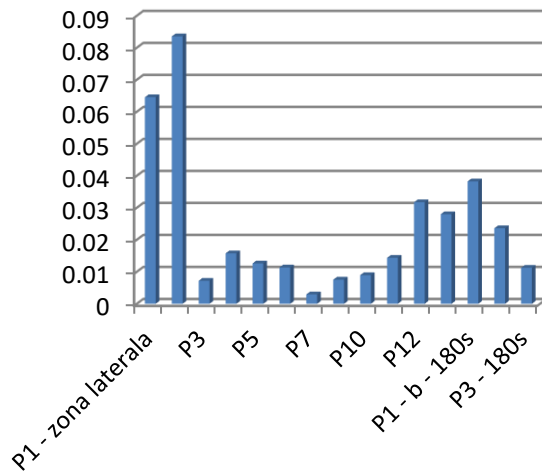
Sr K12



Ti K12

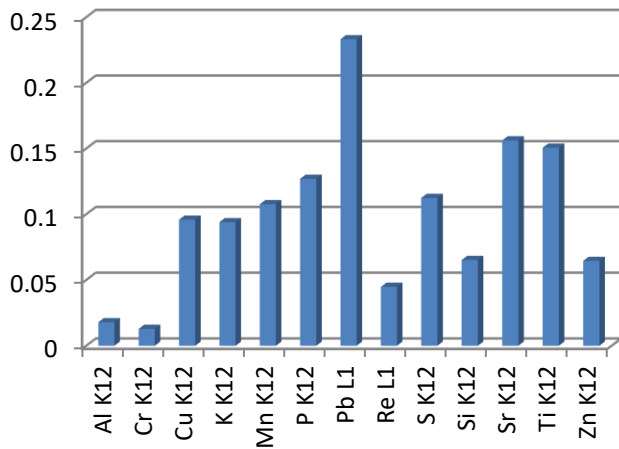


Zn K12

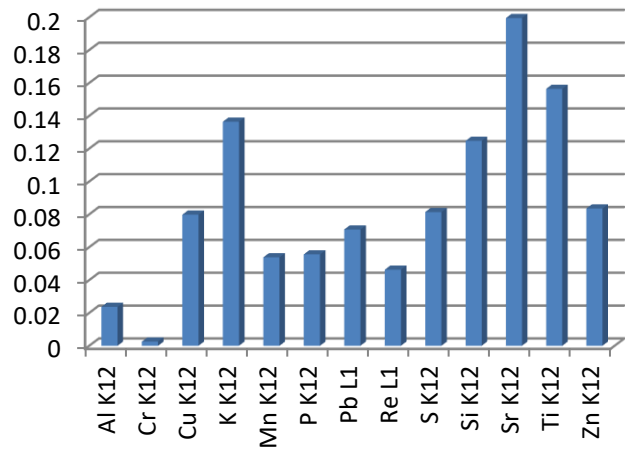


Grafice pentru fiecare punct de masurare*

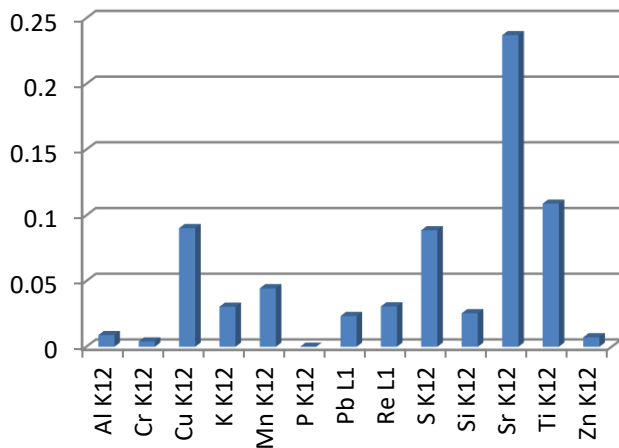
P1 - zona laterala



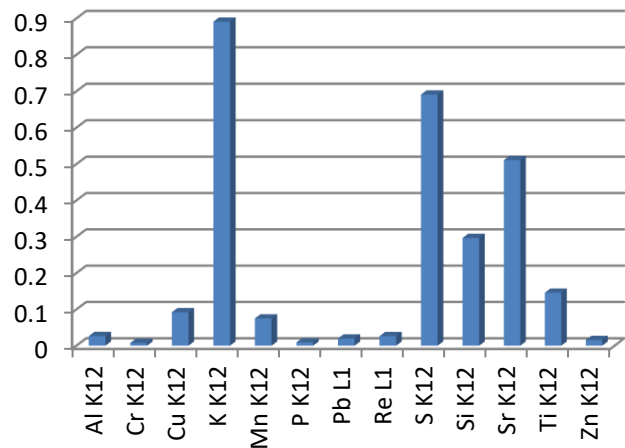
P2 - zona laterala



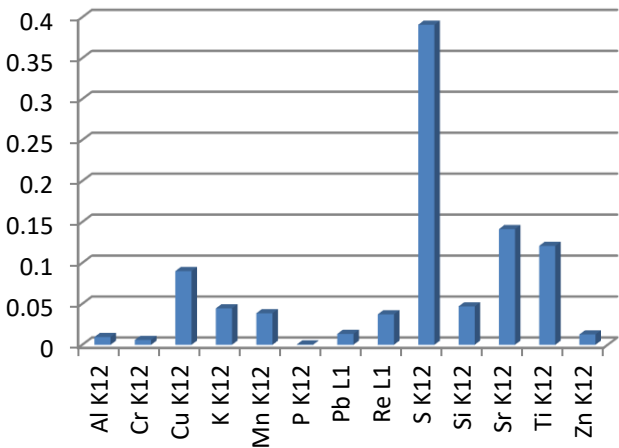
P3



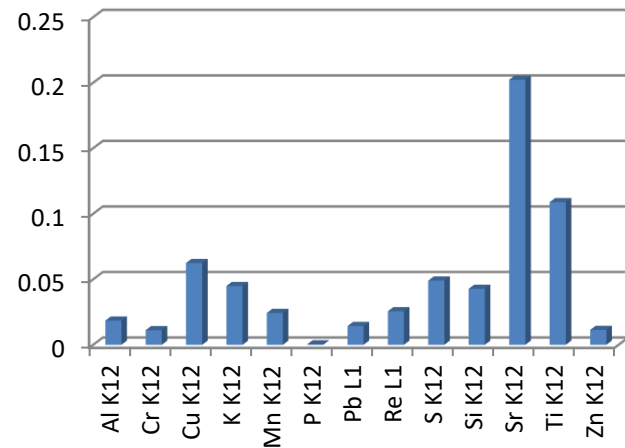
P4

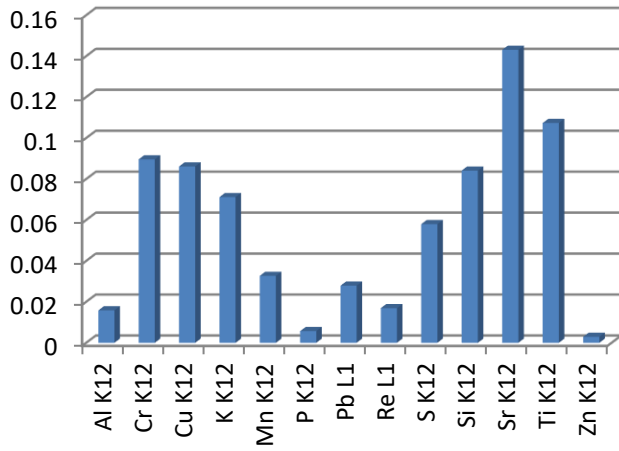
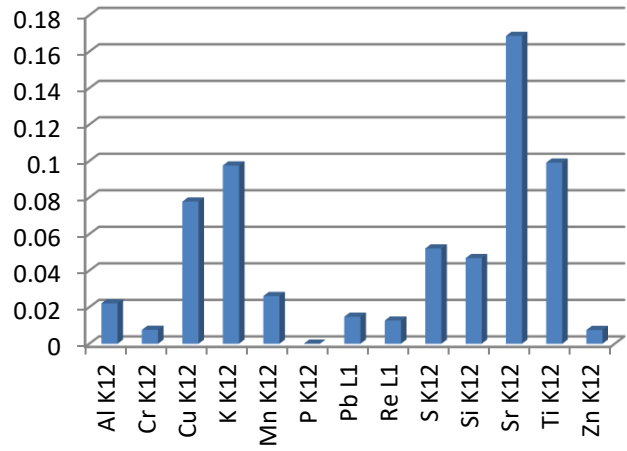
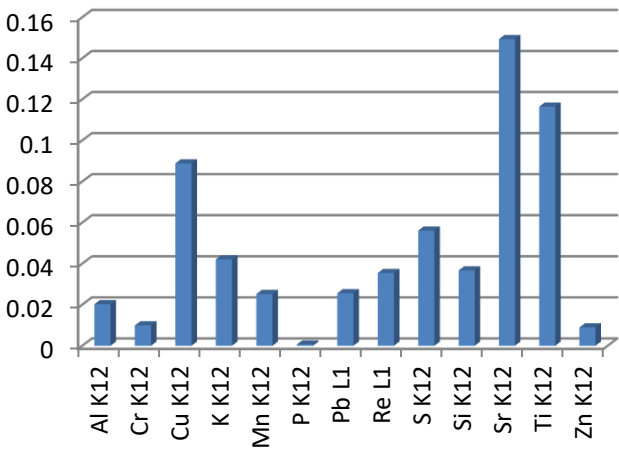
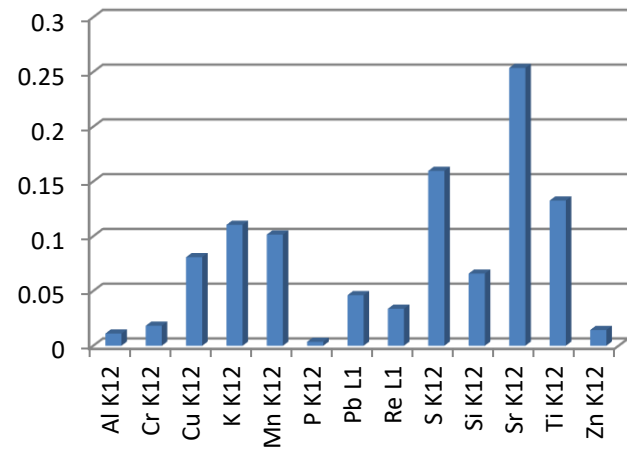
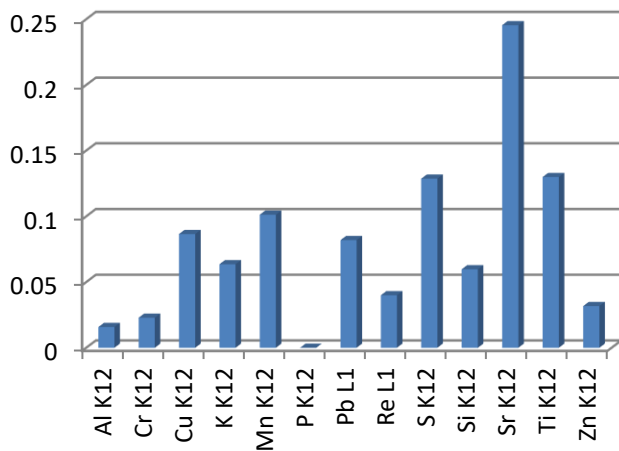
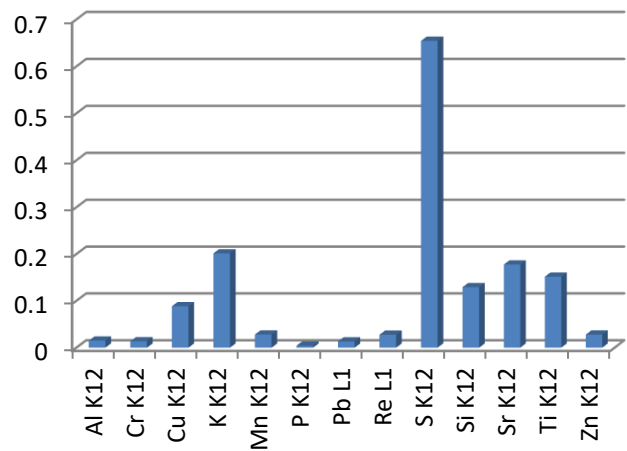


P5

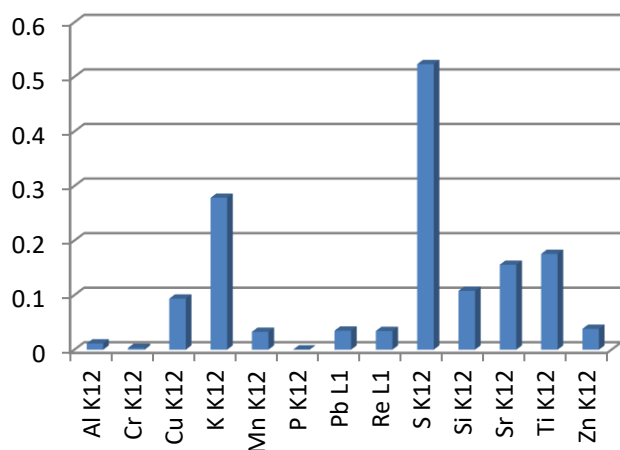


P6

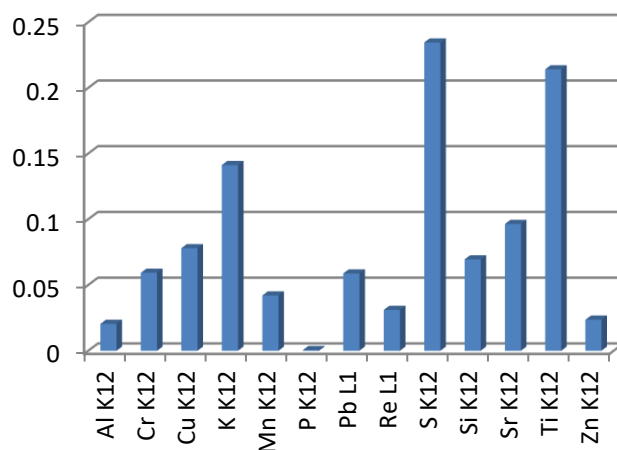


P7**P9****P10****P11****P12****P1 - 180s**

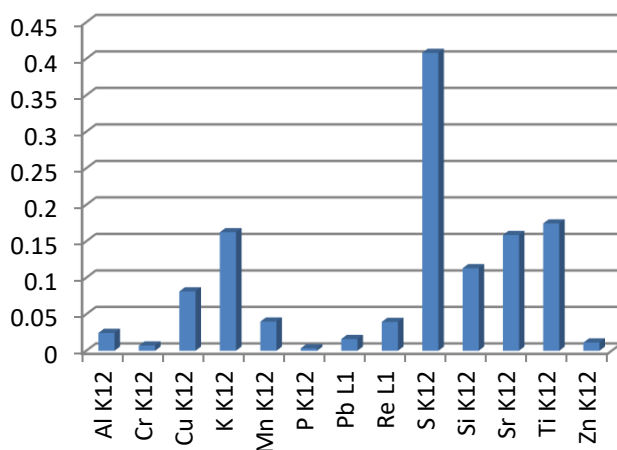
P1 - b - 180s



P2 - 180s



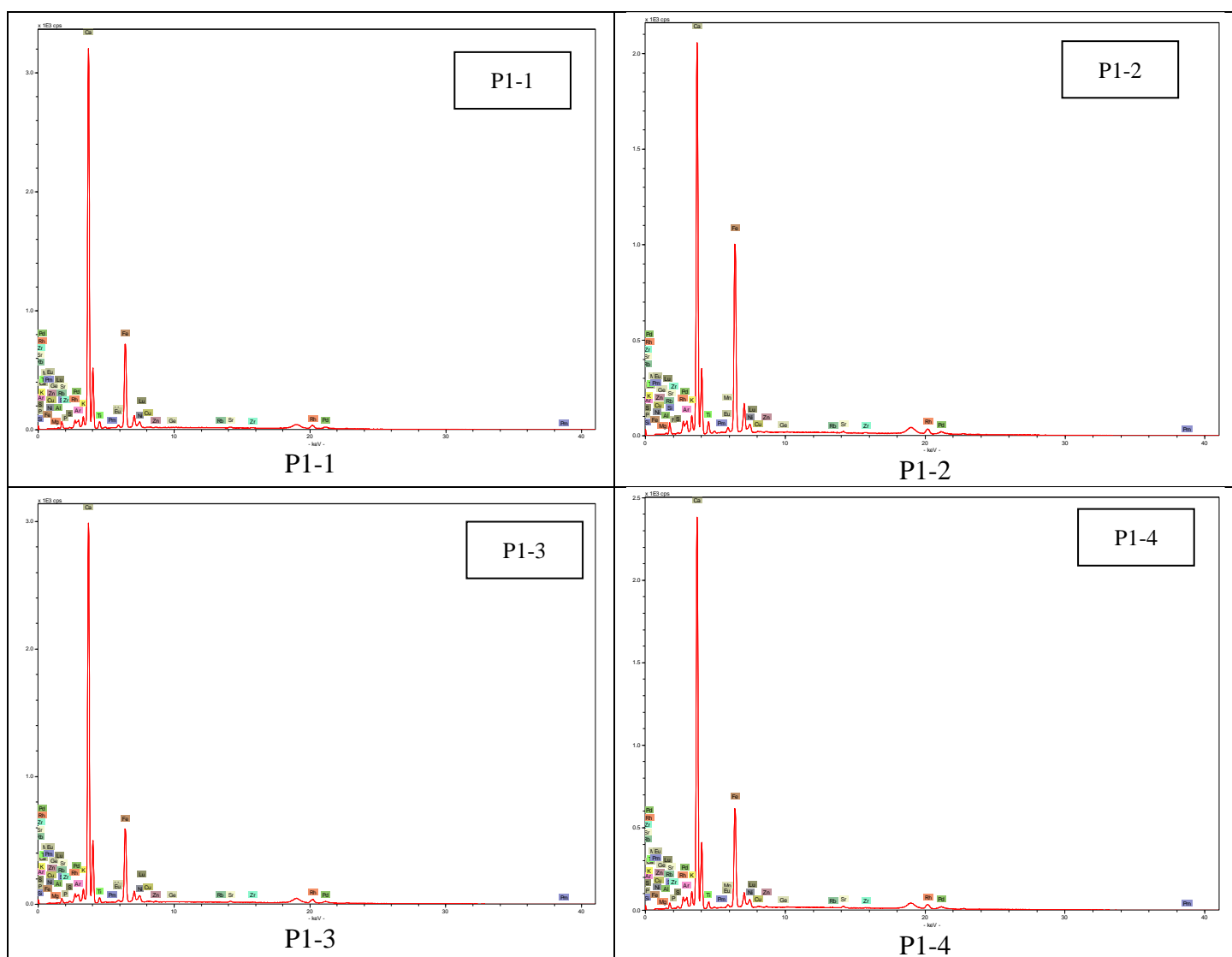
P3 - 180s

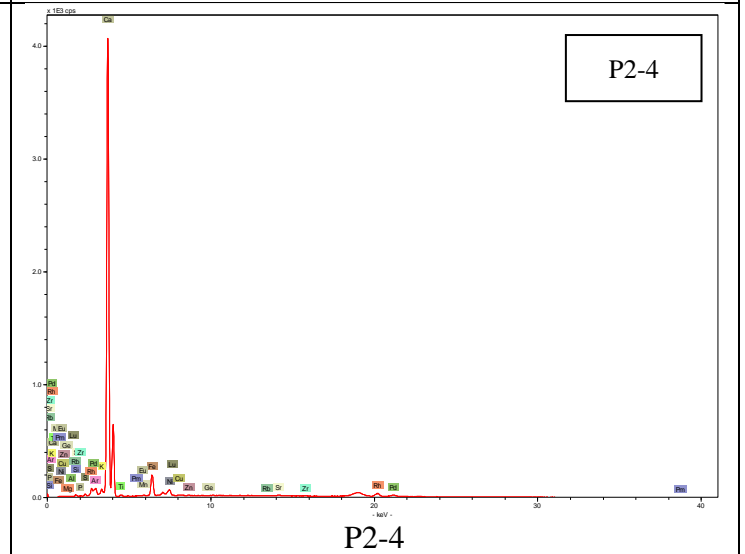
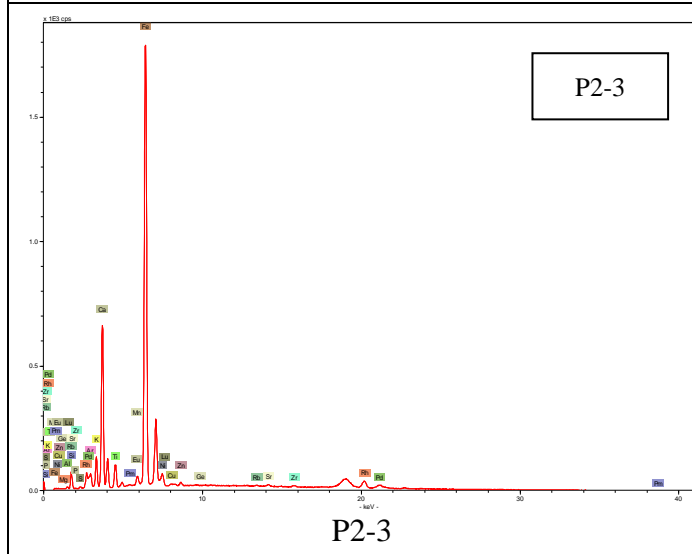
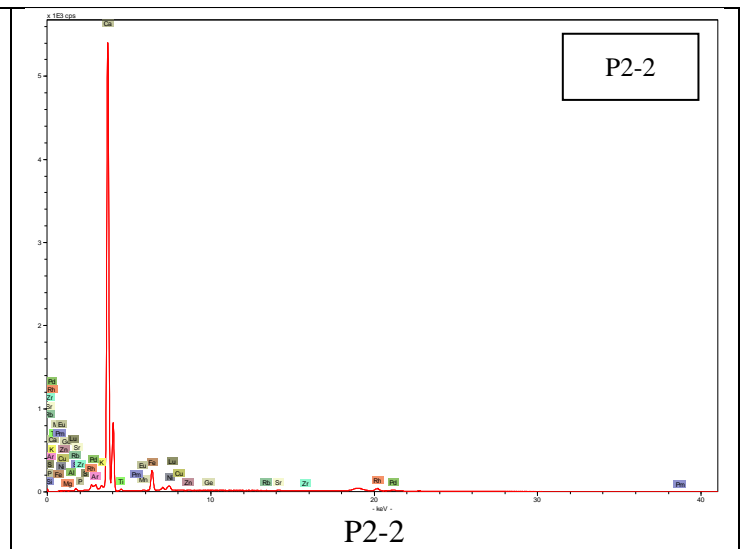
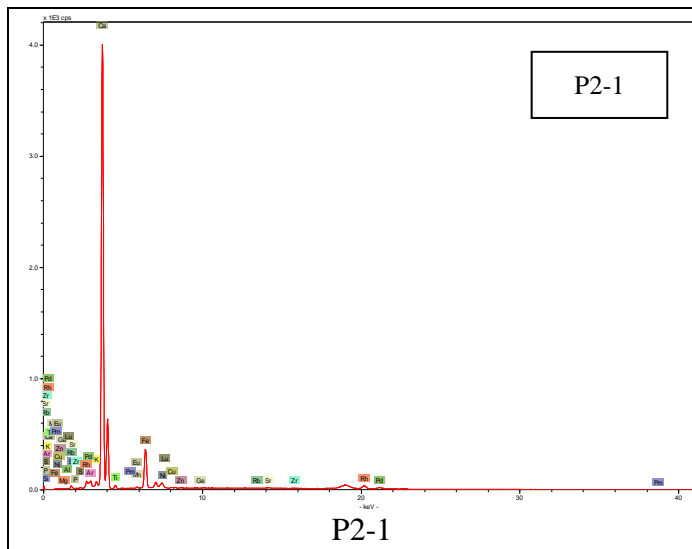


*au fost omise liniile de Ca si Fe, pentru a se putea evidientia contributia elementelor in urme

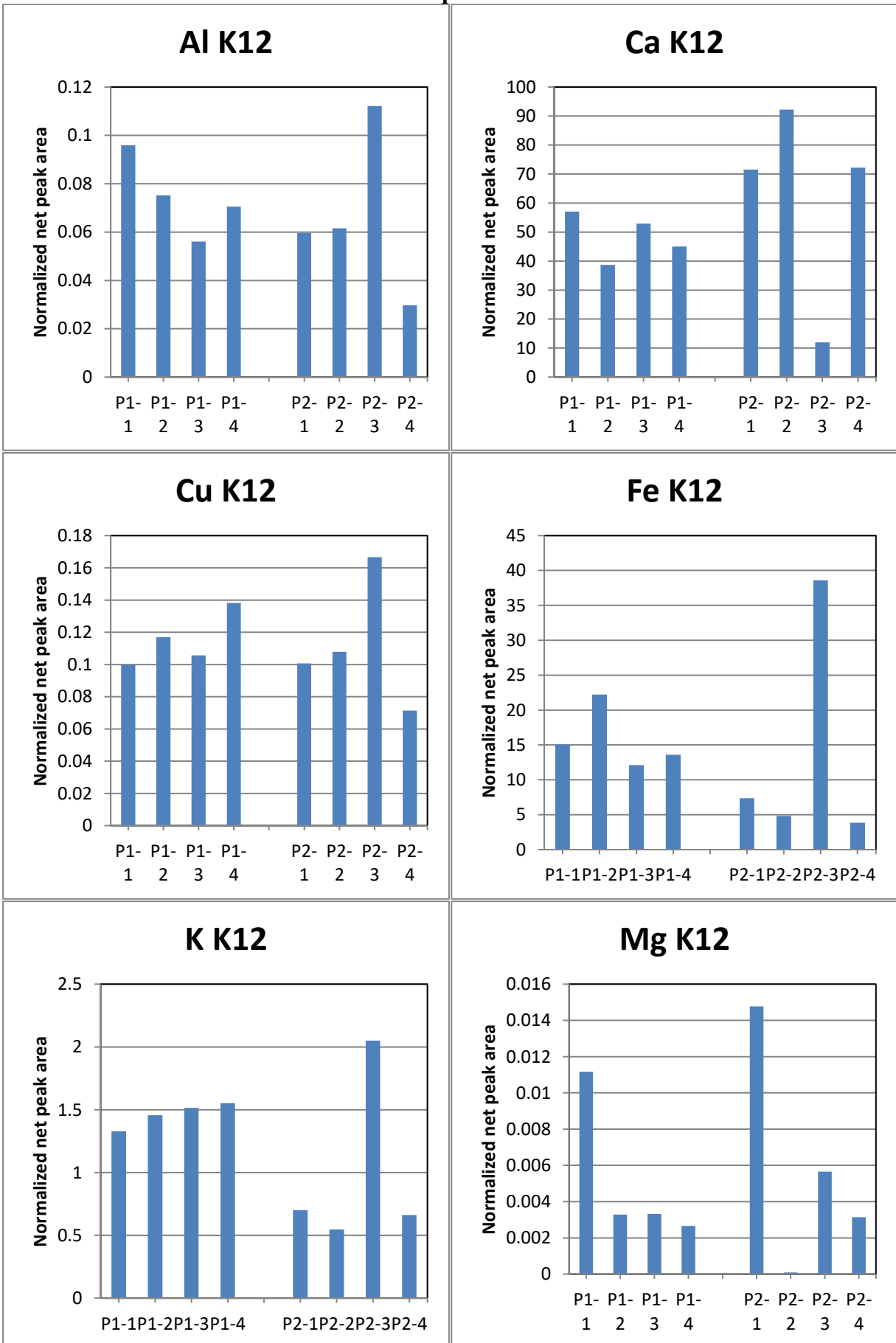
Blocurile de piatra

- Analize realizate pe 2 blocuri de piatra, cate patru puncte diferite pentru fiecare bloc
- Ca este elementul dominant in spectre, iar Fe este element minoritar. Elementele in urme evidentiata sunt: Al, Si, P, S, K, Ti, Mn, Cu, Zn, Rb, Sr, Zr
- Pentru blocul de piatra 2, punctul 3 pare a fi diferit de restul, in sensul ca prezinta intensitate mai mare a Fe decat a Ca. de asemenea, in acest punct s-au detectat intensitati mai mari ale Zn, Zr, Ti, SI, Rb, Mn, K, Cu fata de restul punctelor analizate

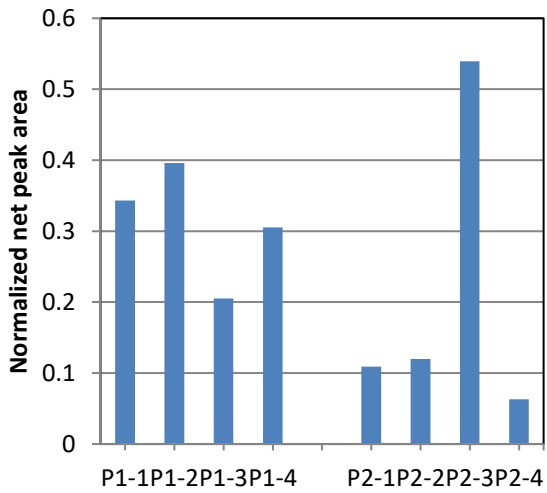




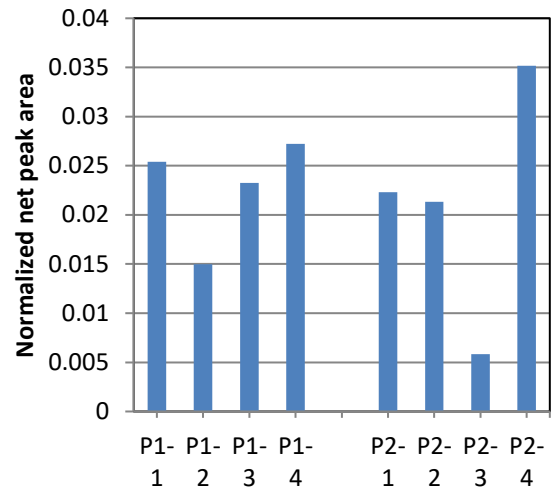
Graficele pe elemente



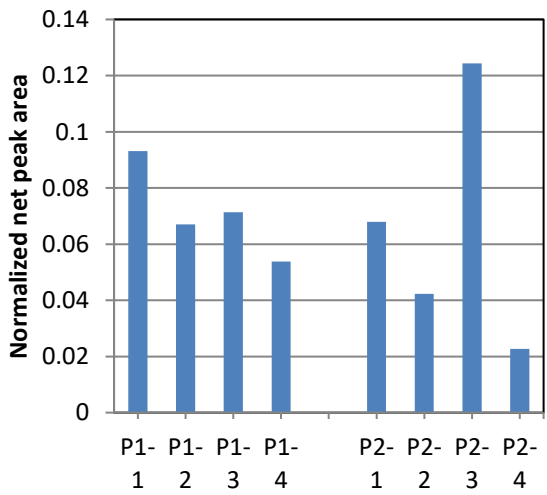
Mn K12



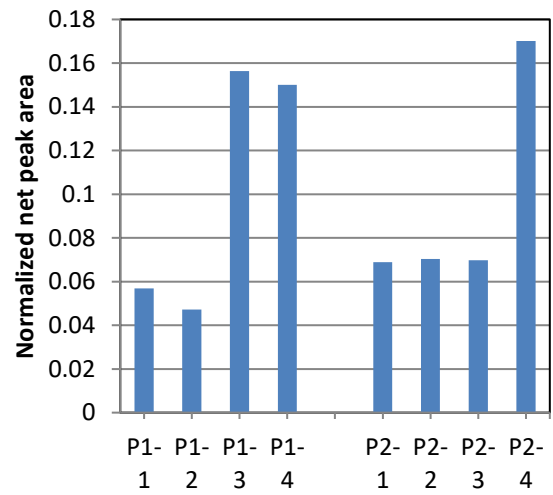
P K12



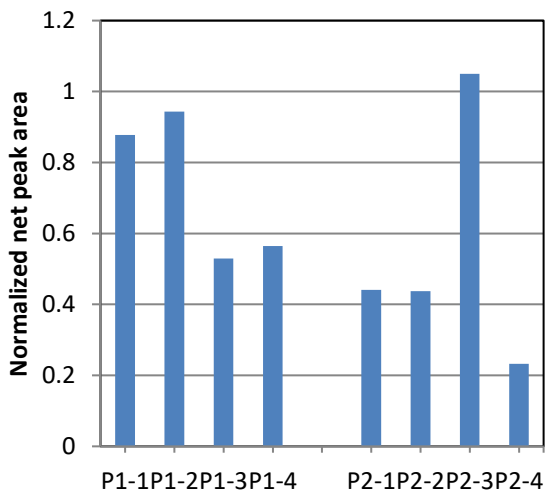
Rb K12



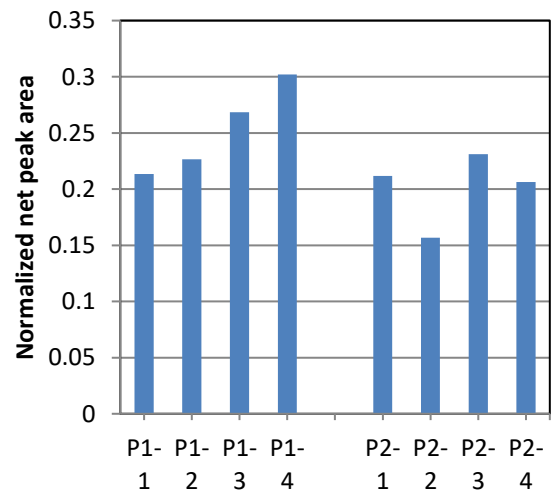
S K12

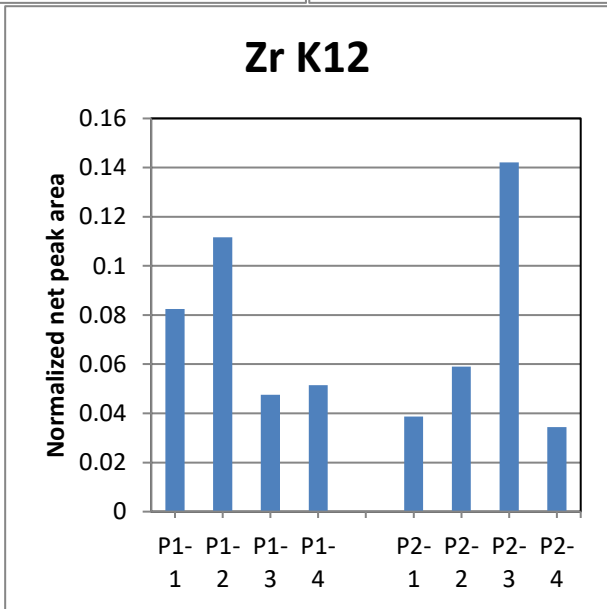
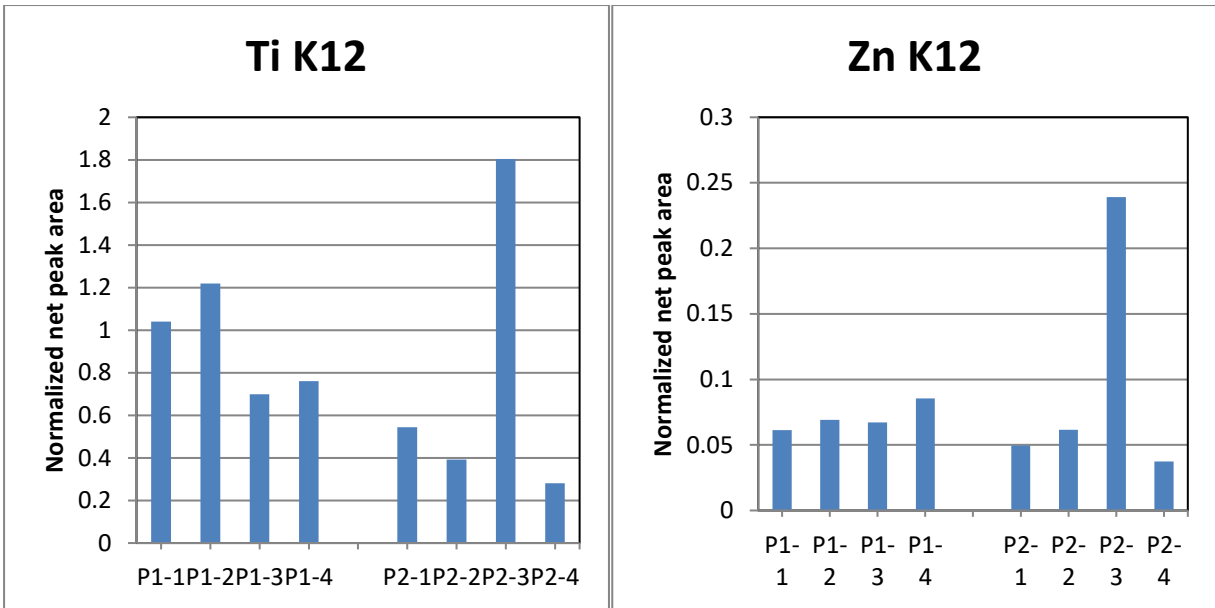


Si K12



Sr K12

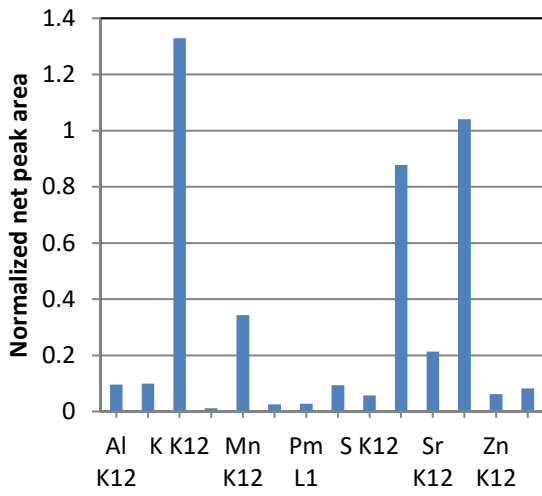




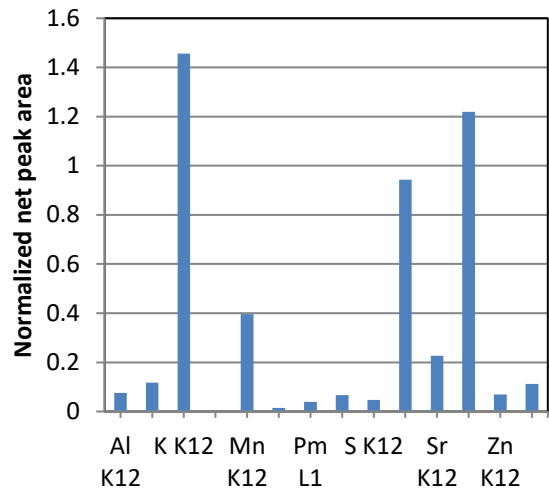
Grafice pentru fiecare punct de masurare*

*au fost omise liniile de Ca si Fe, pentru a se putea evidenta contributia elementelor in urme

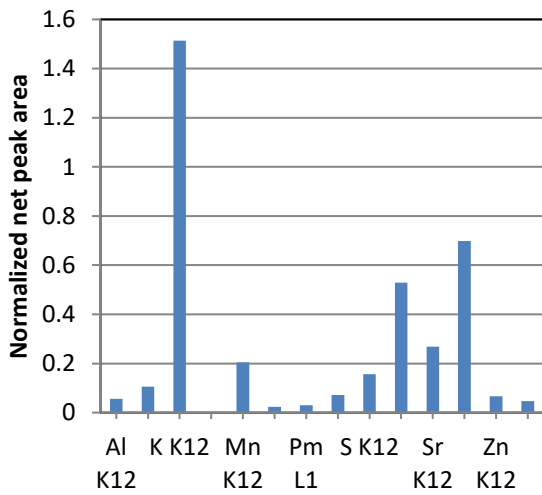
P1-1



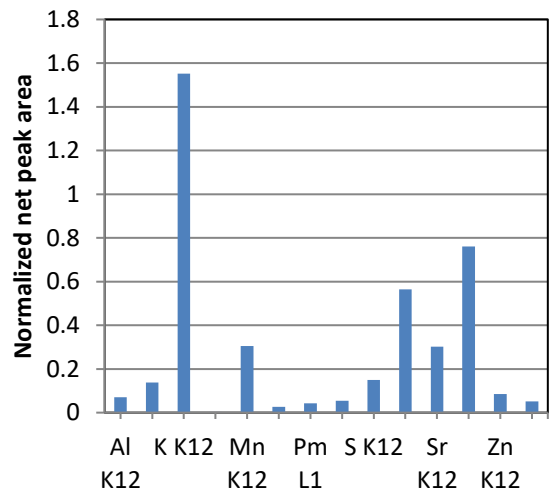
P1-2



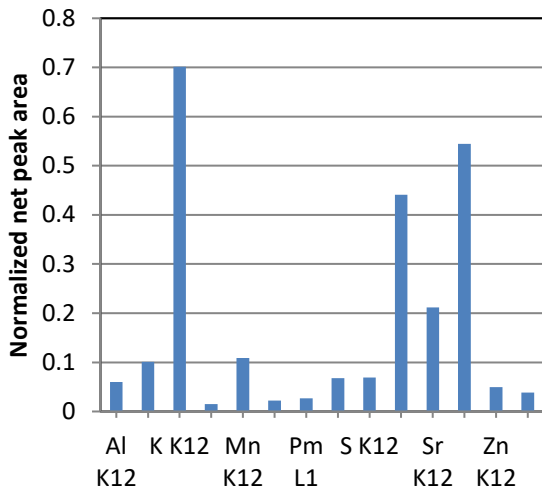
P1-3



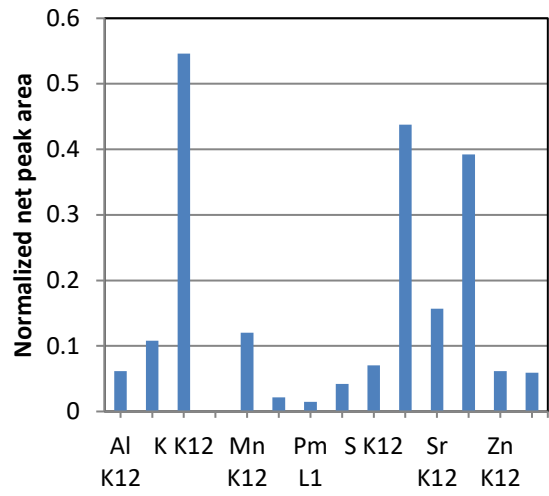
P1-4



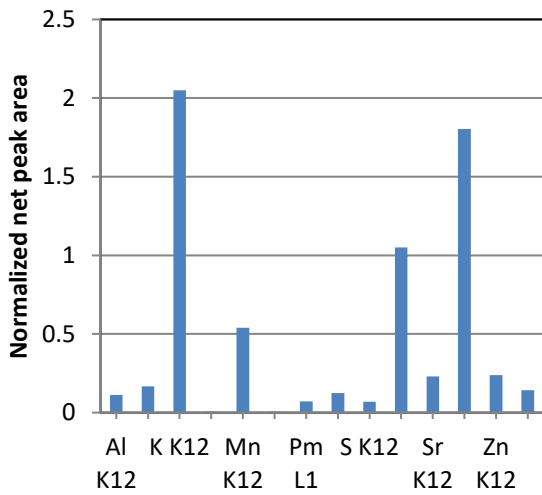
P2-1



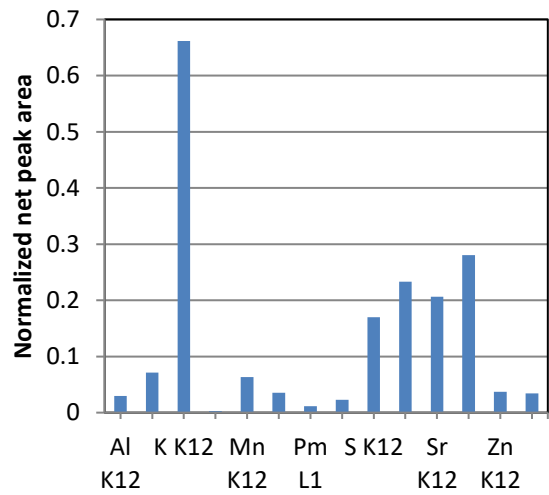
P2-2



P2-3

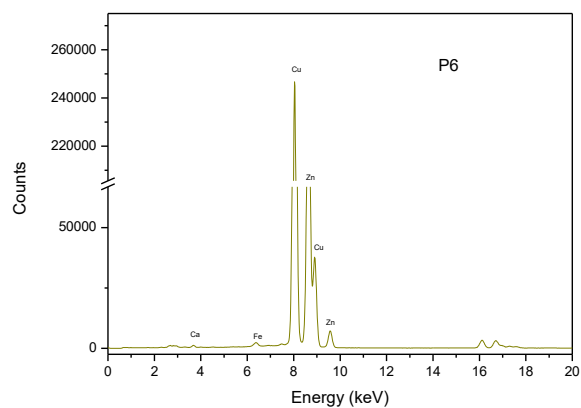
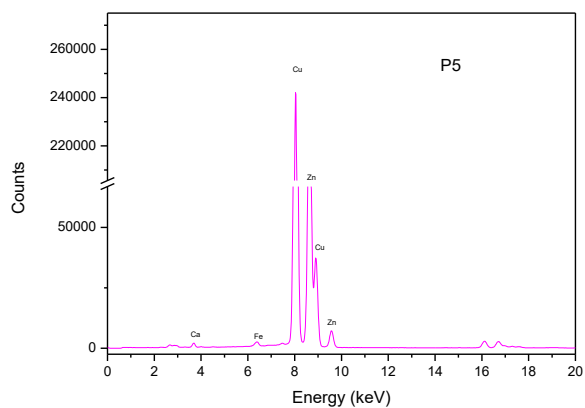
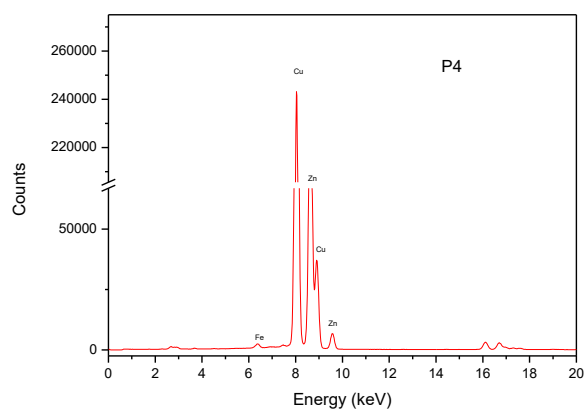
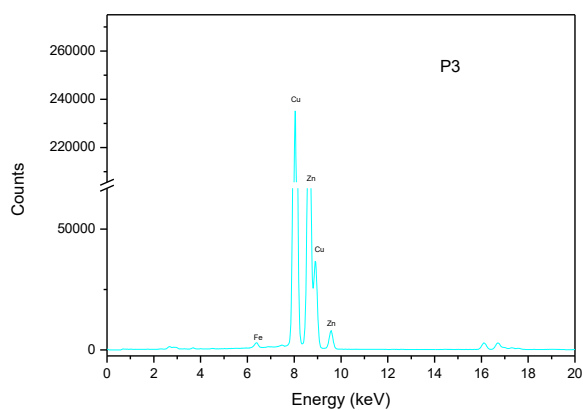
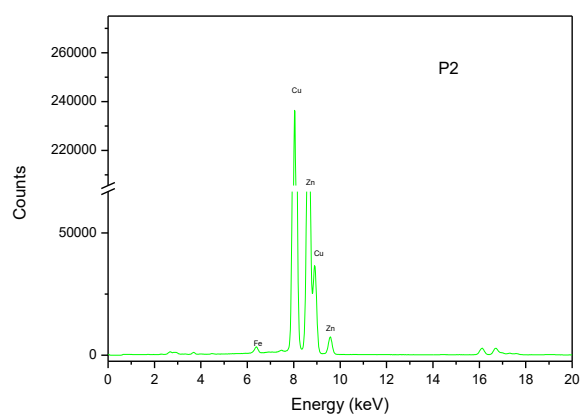
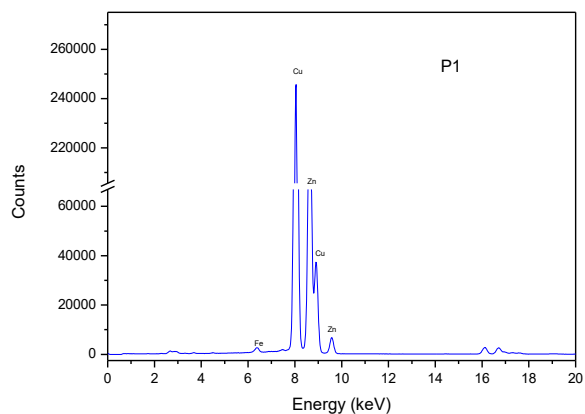


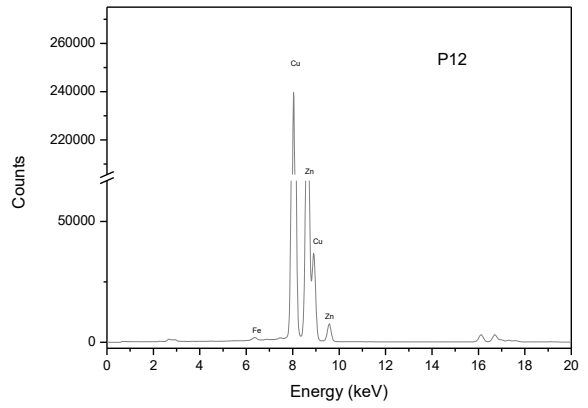
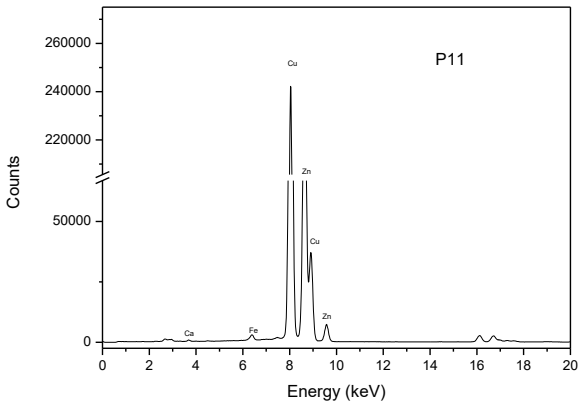
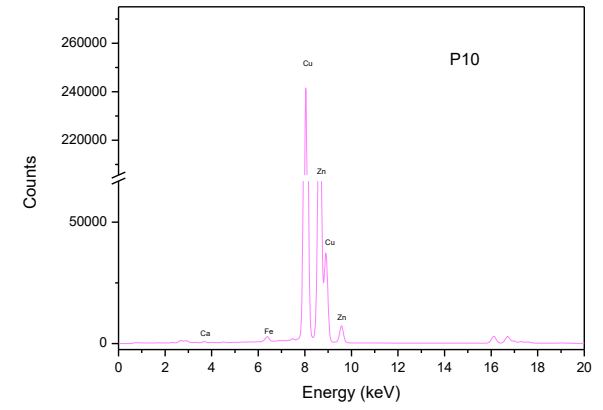
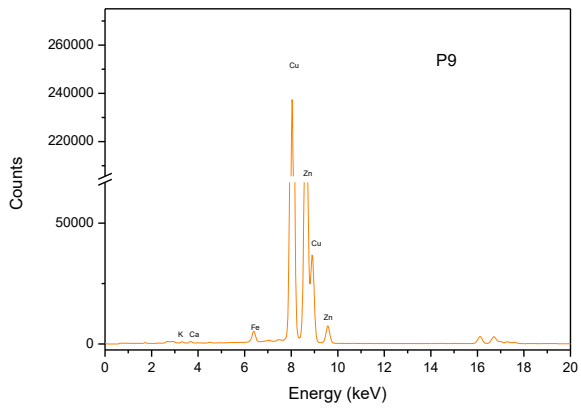
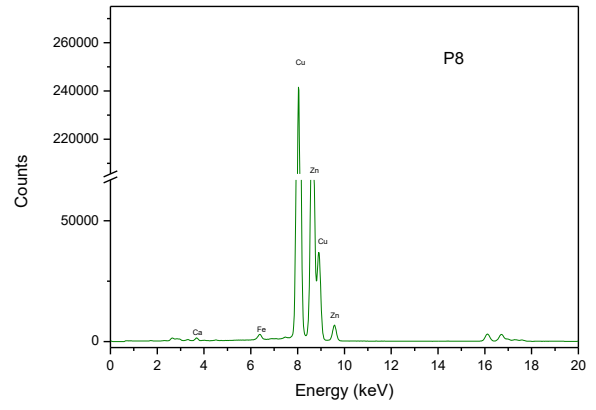
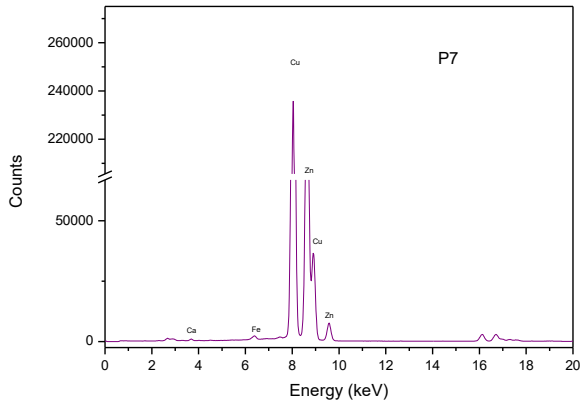
P2-4



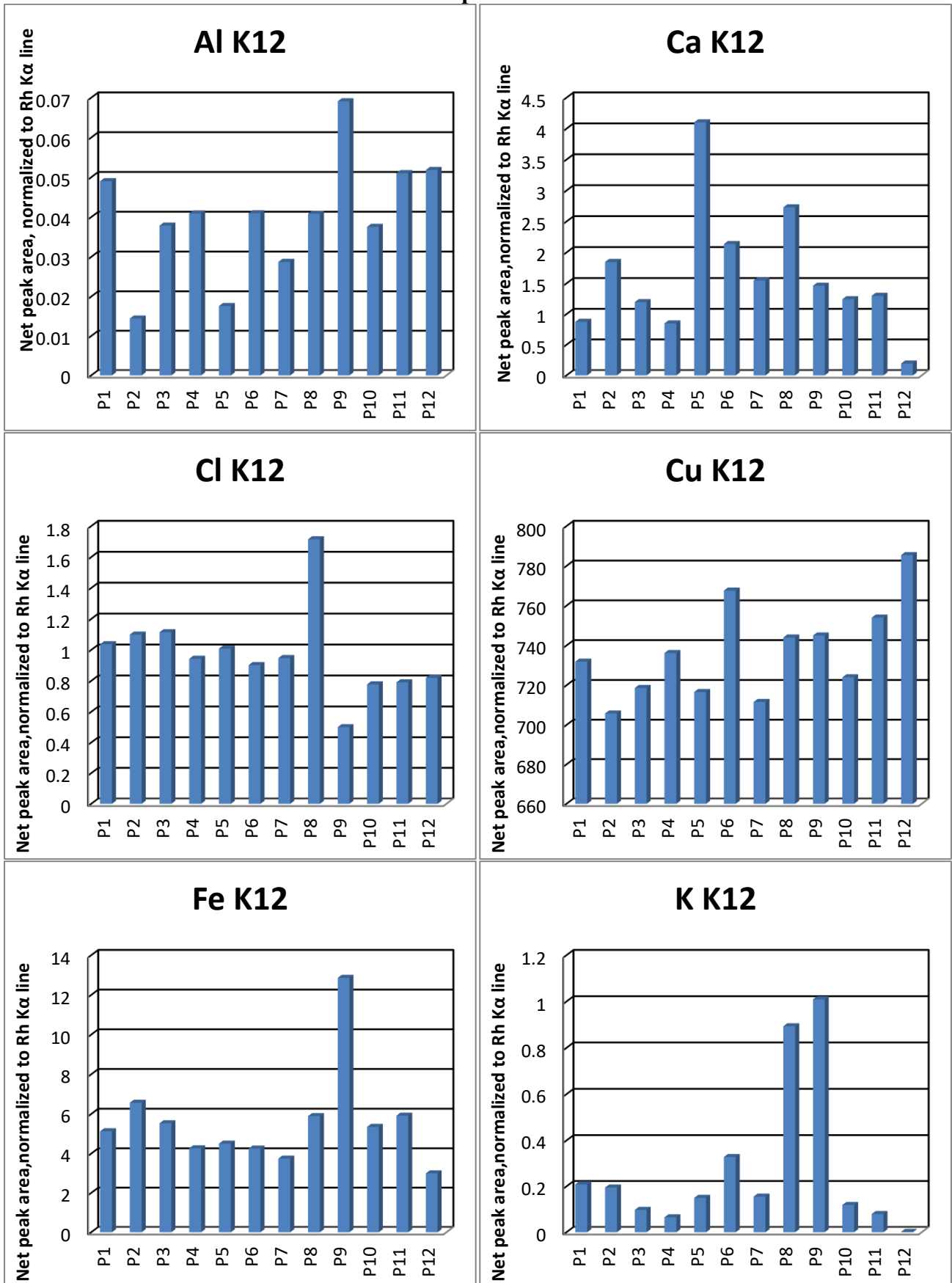
Coloana Infinitului

- Elemente comune: Cu, Zn (*ma*), Fe (*mi*), Al, Si, P, S, Cl, Ar, K, Ca, Ti, Cr, Mn, Ni, Rh, Pd, Pb, Bi, Nd (?), Sm (?) (*u*)
- Spectre similare, in principal aliaj de Cu, Zn, Fe, cu variatii de intensitate.
- Cumva in P9 e o zona cu mai multa rugina?
- Se evidentiaza prezenta Cl

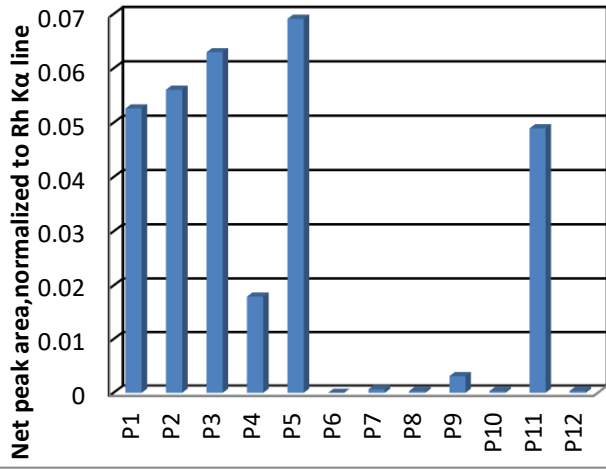




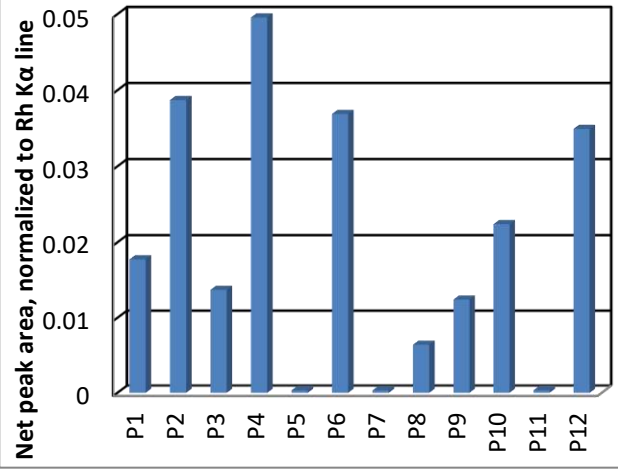
Grafice pe elemente



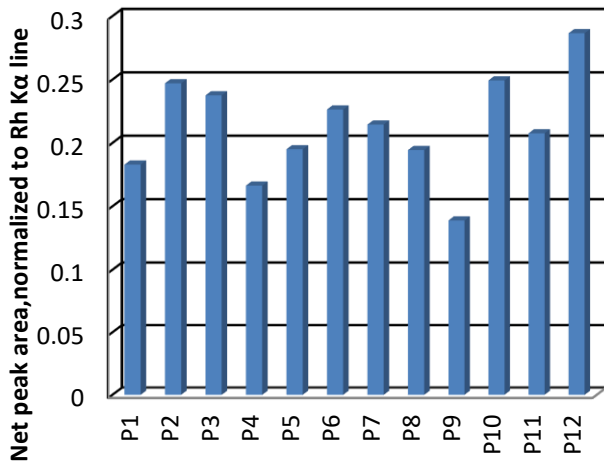
Mn K12



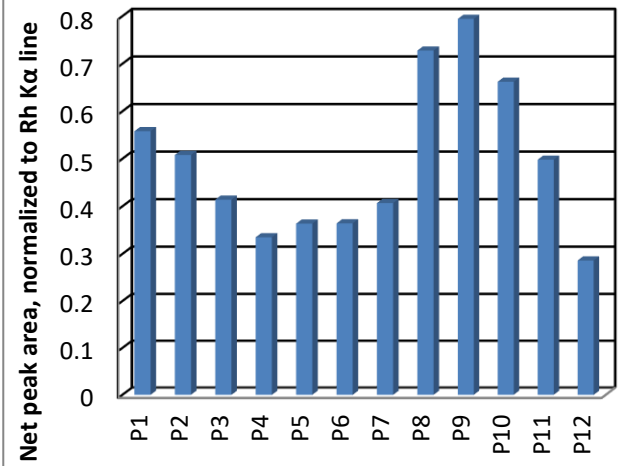
P K12



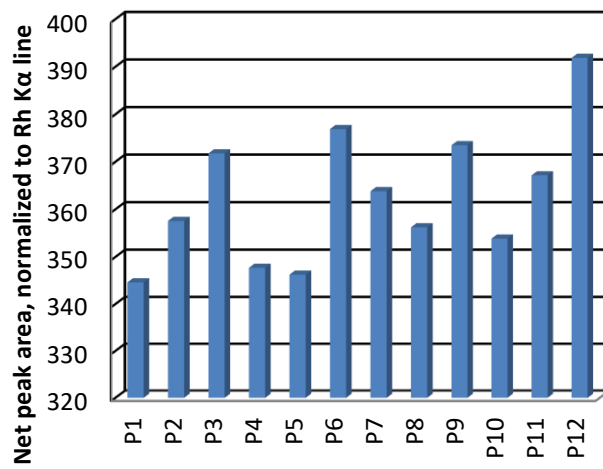
S K12



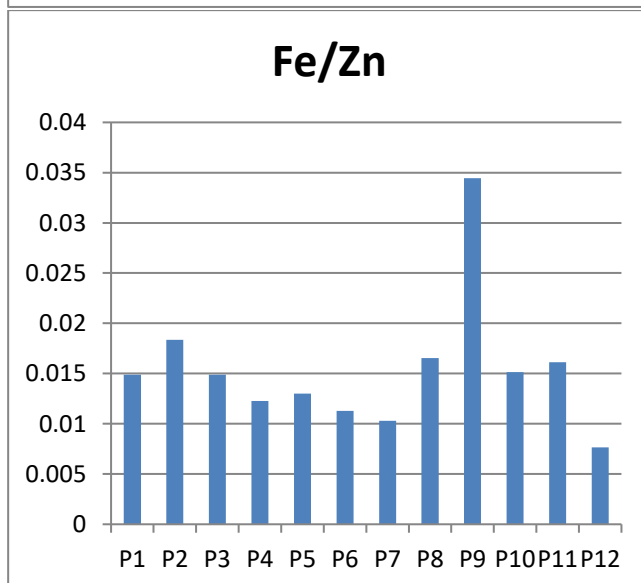
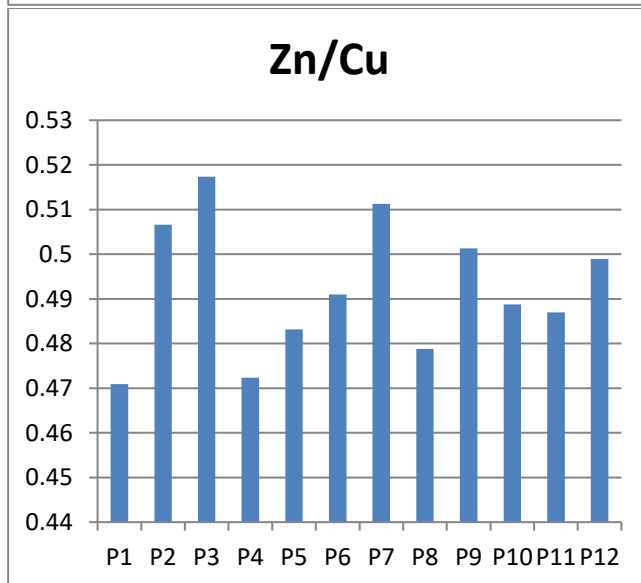
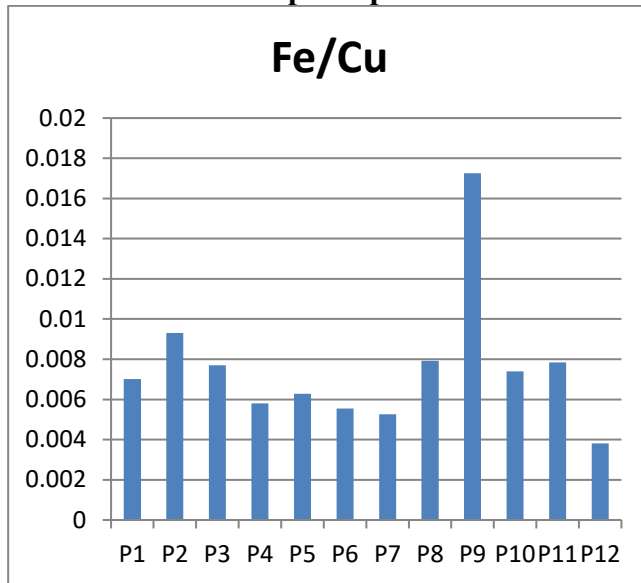
Ti K12



Zn K12



Grafice ale rapoartelor ariilor nete ale principalelor elemente determinate in spectre





Scanarea 3D a Portii Sarutului

Au fost efectuate :

- 17 inregistrari de la sol;
- 2 inregistrari pe monument;

- 4 inregistrari de la inaltime medie.

Au fost generate peste 40 GB de date brute.

Rezolutia unghiulara de scanare a fost cuprinsa intre 150-170 linii pe grad (pentru inregistrarile de la sol respectiv de la inaltime medie), respectiv 60 linii pe grad (pentru inregistrarile efectuate pe monument), rezultand un model unificat ce contine 3.097.828 vertecsi, 18.586.665 margini (edges) si 6.195.555 fete. O fata este alcatuita prin unirea a trei vertecsi legati intre ei de margini (edges). Un vertex reprezinta un punct special aflat la intersectia unor margini (edges). Modelul inregistrat are cotele: lungime 6699.303 mm, inaltime 5448.5371 mm si o latime de 2116.23 mm.



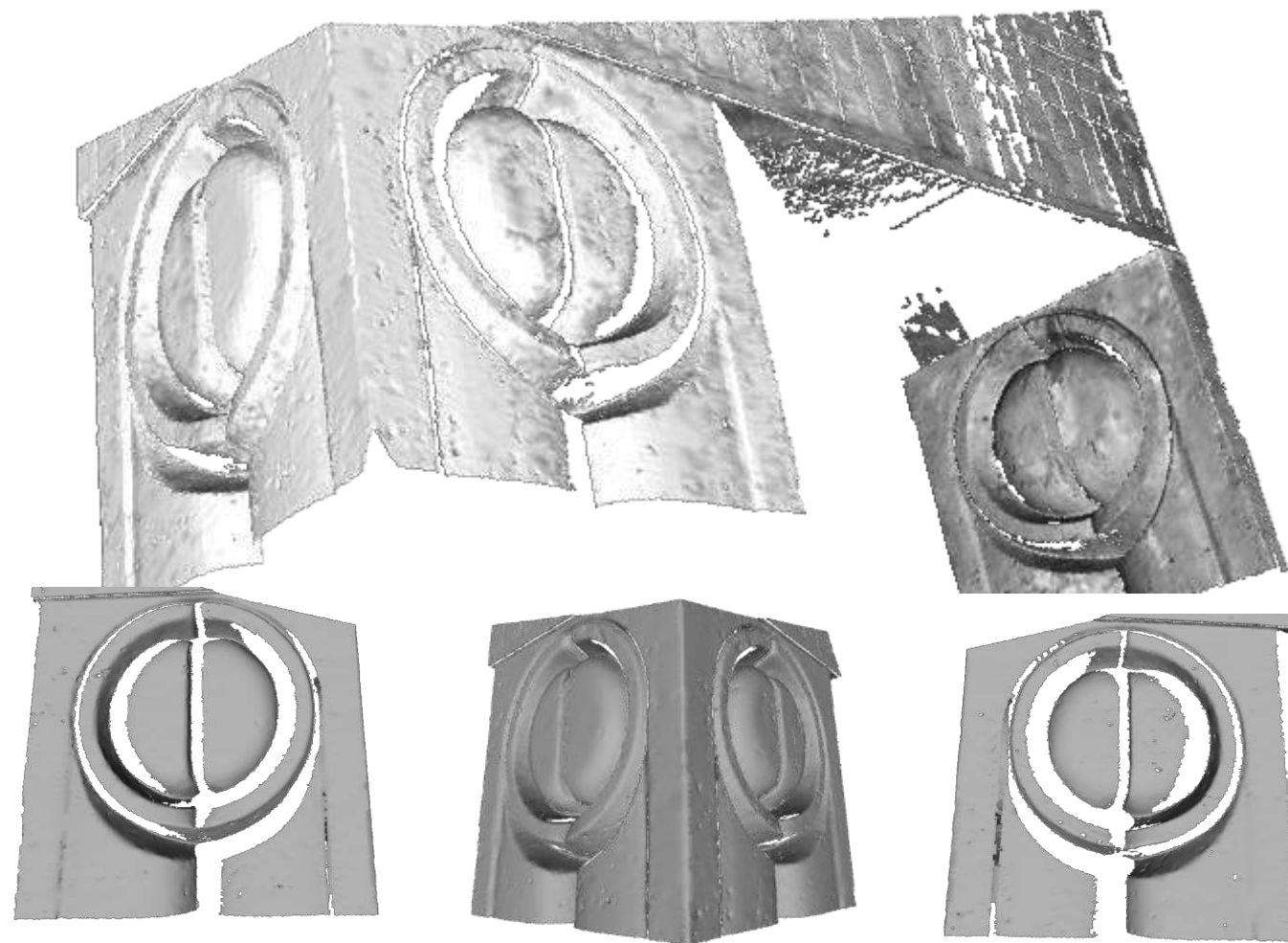
Parametrii pentru fotogrammetrie vor fi raportati la optimizarea modelului cu imagini inlocuite pentru detaliile cu erori. Subliniem ca acest produs nu a fost cuprins in planul

initial de masuratori si investigatii, dar este binevenit si foarte util.

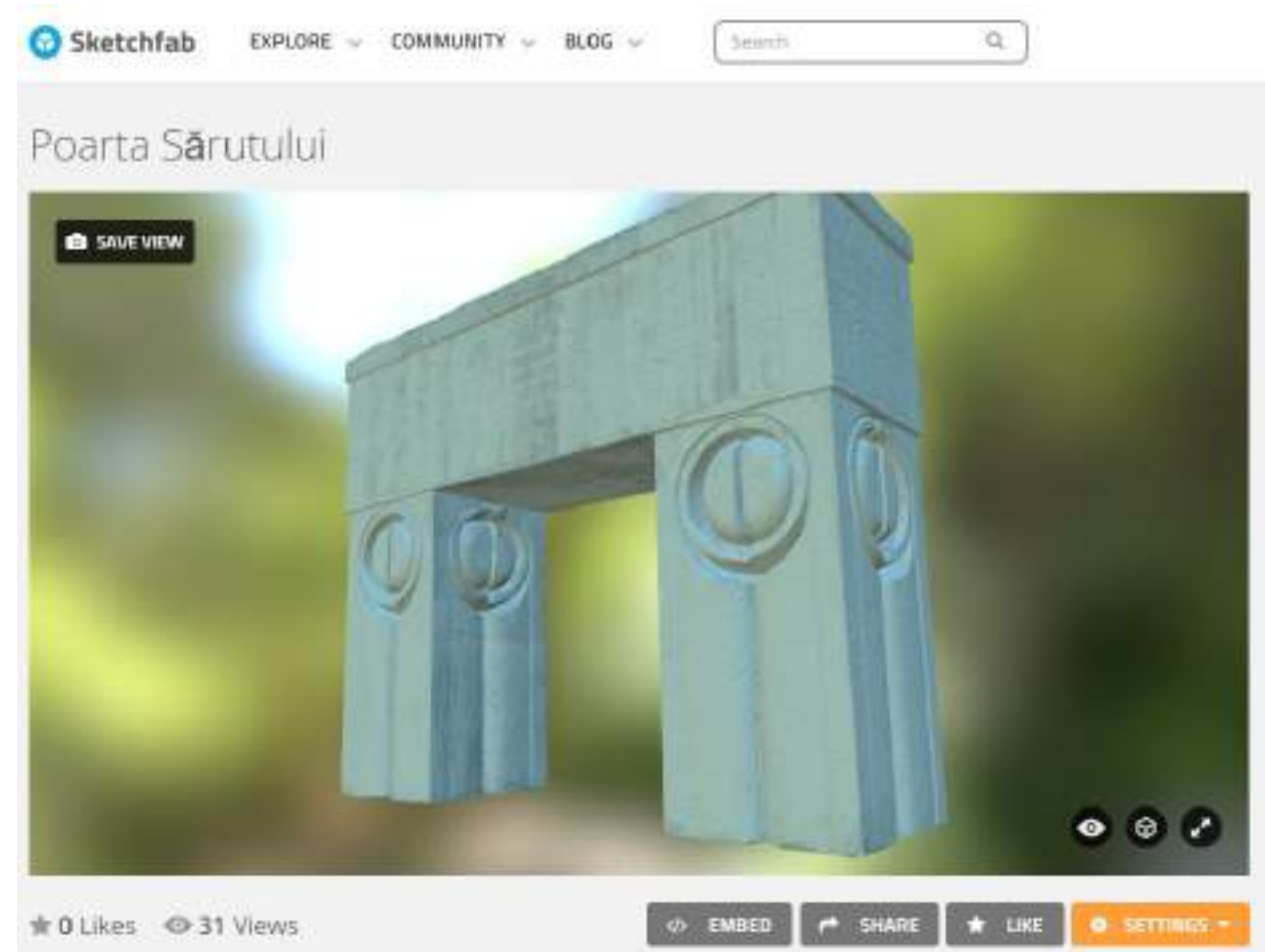
Scanarea 3D a Portii Sarutului

Captura modelului 3D a coltului sud-est a Portii Sarutului. Pentru acest detaliu sunt

- peste 99000 vertecsi
- peste 176800 fatete
- rezoluție < 2mm @30% esantionare



Adrese pentru vizualizarea on-line a modelelor:



- <https://sketchfab.com/models/6c090b2b7b27415ba0f17d5eb5bdac77>
- <https://sketchfab.com/models/2e41f8fa2397456f9554a56150c78c02>

Vibrometrie Doppler cu Laser (LDV)

Ca sursa excitatoare a fost folosita o boxa, cu un semnal de tip *ciripit de zgomot alb* @100 dB.

Banda de excitare a fost intre 0.01-1500 kHz, cu un filtru trece sus @ 100 Hz si o fereastră de detectie de tip rectangulară.

Scanarea a respectat un grid cu rezolutia spatială ~ cm.

Au fost efectuate 6 inregistrari, fiecare constand in minim 2k puncte.



Vibrometrie Doppler - parametrii folositi

Name: D:\poarta sarutului\ziua2\picior1-imbinare-scan1.svd

Created: Date: 7/17/2015 Time: 9:43:05 AM

File version: 9.00

Application version: 9.0.0.0

Scan Points

Total: 2071

Not Measured: 0 0.0 %

Valid: 0 0.0 %

Optimal: 2071 100.0 %

Overrange: 0 0.0 %

Invalidated: 0 0.0 %

Disabled: 0 0.0 %

Not Reachable: 0 0.0 %

Hidden: 0 0.0 %

VT Failed: 0 0.0 %

Hardware

Scanning Head : PSV-I-400 LR (OFV-505)

Firmware version: 1.20

Junction Box: PSV-E-401-H4

Firmware Version: 2.0

Acquisition Board: National Instruments PCI-4462

Channels Count: 4

Channels Count: 4

Acquisition Mode: FFT

Averaging: Complex

Averaging count: 3

Remeasure Automatically: Active

AutoRange: Not active

PCA (MIMO): Not active

Cosine correction X: Active

Cosine correction Y: Active

Bandwidth: 1.5625 kHz

Bandwidth from: 7.8125 Hz

Bandwidth to: 1.5625 kHz

FFT Lines: 200

Sample frequency: 4 kHz

Sample time: 128 ms

Resolution: 7.8125 Hz

Source: Internal

Edge: Positive slope

Pretrigger: 90 %

Phase from reference: Off

Channel Vibrometer (connected to Vibro 1)

Direction: +Z

Range: 10 V

Coupling: DC

Impedance: 1 MOhm

Calibration factor: 1 (m/s)/V

Filter Type: High Pass

Quality: Middle

Int/Diff Quantity: Velocity

Window: Rectangle

Signal Enhancement: Active

Reference: Active

Reference point index: 0

Direction: +Z Range:

10 V Coupling: DC

Impedance: 1 MOhm

Quantity: Voltage

Calibration factor: 1

Signal Delay: 0 s Filter

Type: No Filter

Window: Rectangle

Speckle Tracking: Active

Mode: Fast

High pass filter: 100 Hz

Signal: Burst Random

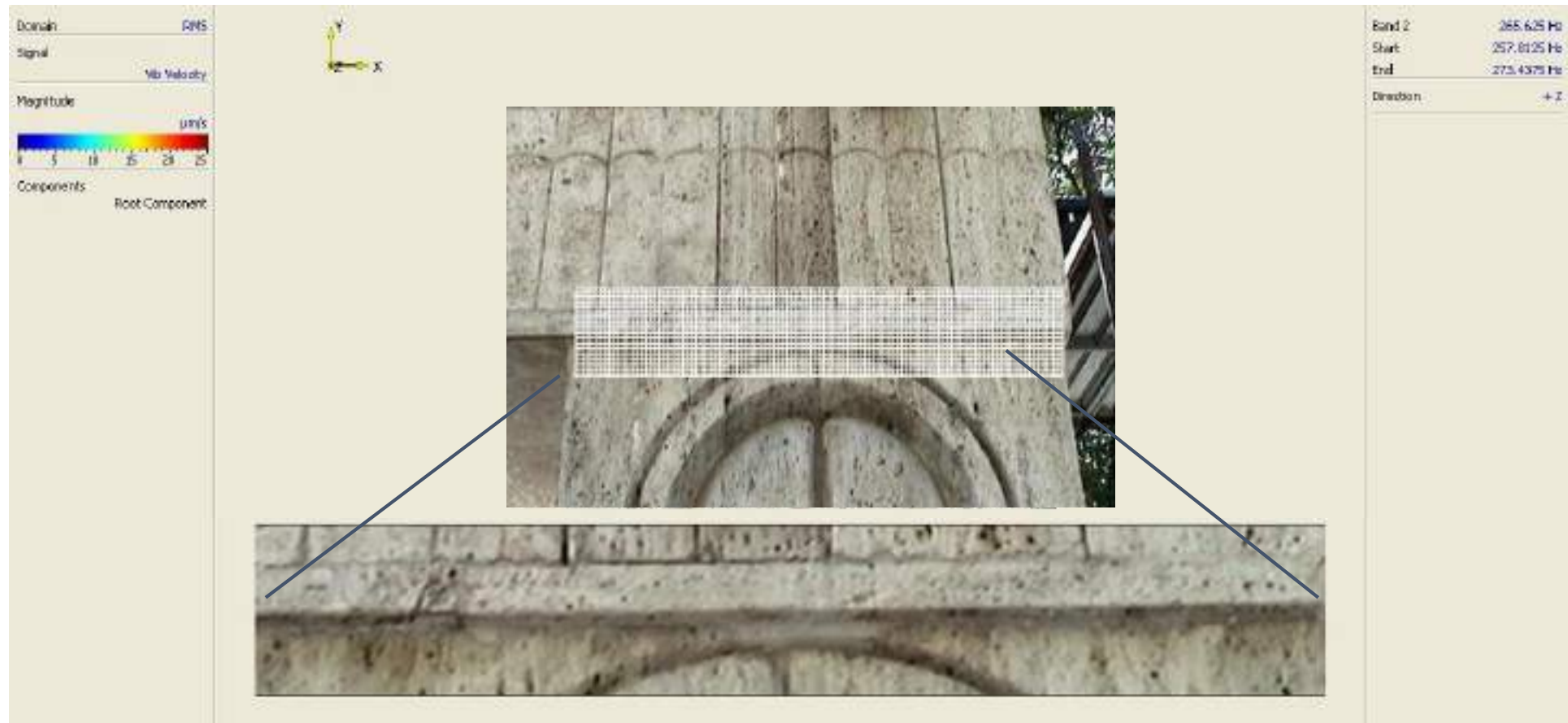
Amplitude: 5 V

Offset: 0 V

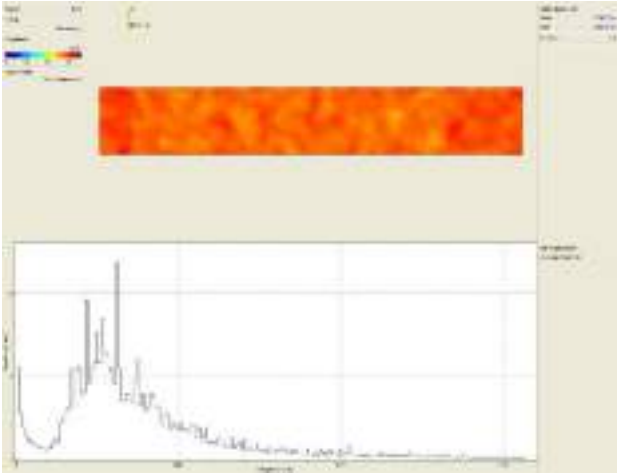
Burst start: 50 %

Burst length: 90 %

Vibrometrie Doppler



Vibrometrie Doppler



Documentare 3D Ansamblul Eroilor din Târgu Jiu Raport activitate ianuarie 2016

În perioada 24-25 Ianuarie 2016, în cadrul campaniei de iarnă, au fost efectuate o serie de înregistrări fotografice pentru documentarea 3D prin fotogrammetrie a mai multor elemente din cadrul Ansamblului Eroilor din Târgu Jiu.

Poarta Sărutului

Pentru realizarea modelului integral al Porții Sărutului a fost utilizată o mașină cu braț electric care a permis și fotografierea de la înălțime. Au fost înregistrate aproximativ **500 imagini** în format JPEG care au cuprins toate laturile, intradosul și dalele. Momentul fotografierii a fost special ales într-o zi înnorată pentru a evita înregistrarea de umbre sau iluminări inegale, nedorite în procesarea fotogrammetrică.

Echipamentul utilizat a fost o camera foto Canon EOS 600D cu obiectiv Canon 18-55 mm, la distanța focală de 18 mm. Parametrii de înregistrare au fost: diafragma f/5.6, timp de expunere 1/800 s iar sensibilitatea ISO a senzorului setată la 200. Rezoluția imaginilor a fost de 5184x3456 pixeli.

Masa Tăcerii

Au fost înregistrate **311 imagini** în format JPEG cu două camere foto separate: Nikon D810 + Nikkor 20mm (273 imagini) la focala de 20 mm f2 și Canon EOS 600D + Canon 18-55mm (38 imagini) la focala de 18 mm. Imaginile înregistrate au vizat atât masa în sine (lateral + capac) cât și fiecare scaun în parte precum și vederi generale din toate direcțiile.

Alea scaunelor

Fiecare scaun a fost documentat din aproximativ 30-40 fotografii în format JPEG de fiecare cu aparat foto Canon EOS 600D și obiectiv Canon 18-55 mm. Au fost înregistrate în total aproximativ **1000 fotografii pentru 30 de elemente**. Majoritatea imaginilor au fost fotografiate cu parametrii: diafragma f 5.6, ISO 200 și timp de expunere 1/60 s. Rezoluția utilizată a fost de 5184x3456 pixeli.

Statuia lui Tudor Vladimirescu

Pentru documentarea statuii a fost folosită mașina cu braț electric. Au fost înregistrate aproximativ **400 imagini** în format JPEG cu echipament foto Canon EOS 600D și obiectiv Canon 18-55 mm, la distanța focală de 46 mm. Parametrii de înregistrare au fost: diafragma f/5, timp de expunere 1/1250 s și sensibilitate ISO la 1600. Rezoluția fotografiilor a fost de 5184x3456 pixeli.

RECOMANDARI PENTRU APLICARE IMEDIATA

In urma campaniilor de masuratori realizate atat in vara anului 2015, cat si in ianuarie 2016, au fost constatate cateva greseli de conduita in preajma Ansamblului, greseli care pot aduce pe termen lung grave prejudicii operei.



Igienizarea spatiului din imediata vecinatate a pieselor sa NU fie facuta cu ajutorul suflatelor sau a altor metode care pun nisipul si pietrisul in miscare. Se creaza conditiile perfecte pentru sablare, evident un proces extrem de distructiv. Recomandam instruirea personalului in acest sens.



Limitarea accesului vizitatorilor la privirea pieselor si interzicerea contactului cu piesele. Subliniem ca au fost identificate resturi alimentare, monede si alte materiale straine lipite sau "inserate" in lacunele din material.

De asemenea, au fost identificate pete (cafea/vin/cola) care provin din stropi de la distanta.

Recomandam masuri adecvate de protectie impotriva acestor



