Comparison:
Total Decomposition versus XRF-Analysis

Franz Mutsch – Department of Forest Ecology and Soil
Gerhard Hobiger – Geological Survey of Austria

Meeting of the Head of Laboratories

Warsaw

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Total Decomposition versus XRF

XRF: Geological Survey of Austria
Decomposition: mean of 6th FSCC ring test

Al

mg / kg

Sample A | Sample B | Sample C | Sample D | Sample E

RFA | Decomp

Institut für Waldökologie und Boden
Total Decomposition *versus* XRF

**XRF:** Geological Survey of Austria

**Decomposition:** mean of 6th FSCC ring test

**Graph:**
- **Ca**
- **mg/kg**
- **Sample A**
- **Sample B**
- **Sample C**
- **Sample D**
- **Sample E**

**Legend:**
- **RFA**
- **Decomp**
Total Decomposition versus XRF

XRF: Geological Survey of Austria
Decomposition: mean of 6th FSCC ring test

Fe

mg/kg

Sample A    Sample B    Sample C    Sample D    Sample E

RFA      Decomp

0  10000  20000  30000  40000  50000  60000  70000
Total Decomposition versus XRF

XRF: Geological Survey of Austria
Decomposition: mean of 6th FSCC ring test

Minus value: determination limit of XRF
Total Decomposition *versus* XRF

XRF: Geological Survey of Austria
Decomposition: mean of 6th FSCC ring test

**Mg**

<table>
<thead>
<tr>
<th>Sample</th>
<th>RFA (mg/kg)</th>
<th>Decomp (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20,000</td>
<td>18,000</td>
</tr>
<tr>
<td>B</td>
<td>500</td>
<td>400</td>
</tr>
<tr>
<td>C</td>
<td>15,000</td>
<td>14,000</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Minus values: determination limit of XRF*
Total Decomposition *versus* XRF

**XRF:** Geological Survey of Austria  
**Decomposition:** mean of 6th FSCC ring test

**Mn**

<table>
<thead>
<tr>
<th>Sample</th>
<th>RFA (mg/kg)</th>
<th>Decomp (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample A</td>
<td>1700</td>
<td>1800</td>
</tr>
<tr>
<td>Sample B</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>Sample C</td>
<td>700</td>
<td>800</td>
</tr>
<tr>
<td>Sample D</td>
<td>1300</td>
<td>1400</td>
</tr>
<tr>
<td>Sample E</td>
<td>1500</td>
<td>1600</td>
</tr>
</tbody>
</table>

*Minus values: determination limit of XRF*
Total Decomposition *versus* XRF

**XRF:** Geological Survey of Austria  
**Decomposition:** mean of 6th FSCC ring test

![Bar chart showing Na concentrations for different samples.](chart.png)

- **Na concentrations in mg/kg:**
  - Sample A: 8000 mg/kg  
  - Sample B: 4000 mg/kg  
  - Sample C: 8000 mg/kg  
  - Sample D: 2000 mg/kg  
  - Sample E: 1000 mg/kg

**Minus values:** determination limit of XRF

RFA:  
Decomp:
Sample A (6th FSCC ring test) analysed by XRF

1 – SiO₂
2 – TiO₂
3 – Al₂O₃
4 – FeO
5 – MnO
6 – MgO
7 – CaO
8 – Na₂O
9 – K₂O
10 – H₂O
11 – H₂O⁺
12 – P₂O₅
13 – CO₂
14 – SO₃

Total chemical sample composition
(RFA, Leco CS, dry mass)
Sample B (6th FSCC ring test) analysed by XRF

1 – SiO₂
2 – TiO₂
3 – Al₂O₃
4 – FeO
5 – MnO
6 – MgO
7 – CaO
8 – Na₂O
9 – K₂O
10 – H₂O
11 – H₂O⁺
12 – P₂O₅
13 – CO₂
14 – SO₃

Total chemical sample composition
(RFA, Leco CS, dry mass)
Sample C (6th FSCC ring test) analysed by XRF

1 – SiO₂
2 – TiO₂
3 – Al₂O₃
4 – FeO
5 – MnO
6 – MgO
7 – CaO
8 – Na₂O
9 – K₂O
10 – H₂O
11 – H₂O+
12 – P₂O₅
13 – CO₂
14 – SO₃

Total chemical sample composition
(RFA, Leco CS, dry mass)
Conclusions

• For the most elements there is a quite good correlation between „total decomposition“ and XRF-analysis.
• For some elements (Na, Mg) the correlation is partly not satisfactory → further investigation are necessary to find out the reasons why.
• Determination limits of XRF for some elements are rather high (but this disadvantage affects mainly organic layers for which „total decomposition“ makes not much sense!).
• Advantages of XRF-analysis:
  – Not so toxic and dangerous as HF-decomposition and easy to handle.
  – Also other elements can be detected (Si, Ti, …)
  – The total sample composition can be estimated in principle if we include other routine analyses (total C/S and dry mass) also.
• For the analysis of („real“) total contents XRF should be also permitted as alternative method.
Thank You for Your Attention