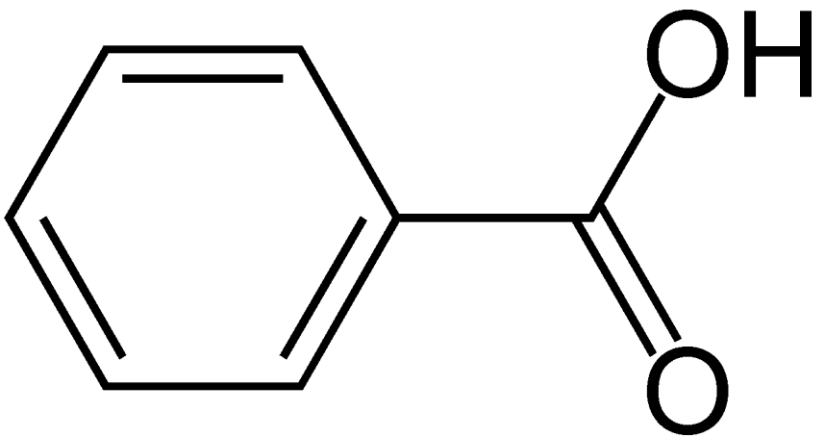
Instituto de Química de São Carlos
Universidade de São Paulo

# Espectrometria no Infravermelho (FTIR):

## diferentes técnicas para avaliação espectral do ácido benzoico

Disciplina: Análise Instrumental I

SQM0415



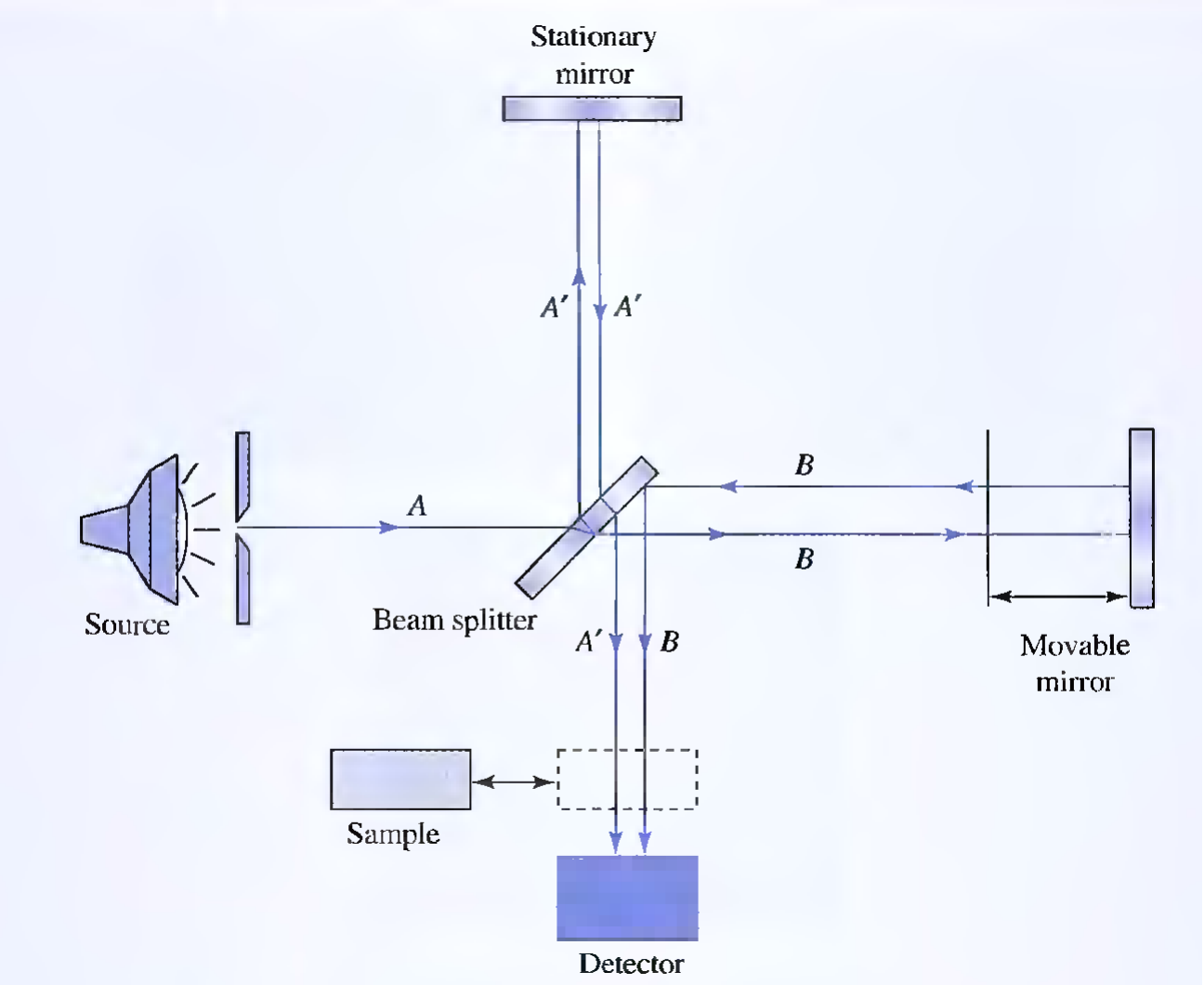

**Ácido benzoico:**

Usado como conservante em bebidas e alimentos.

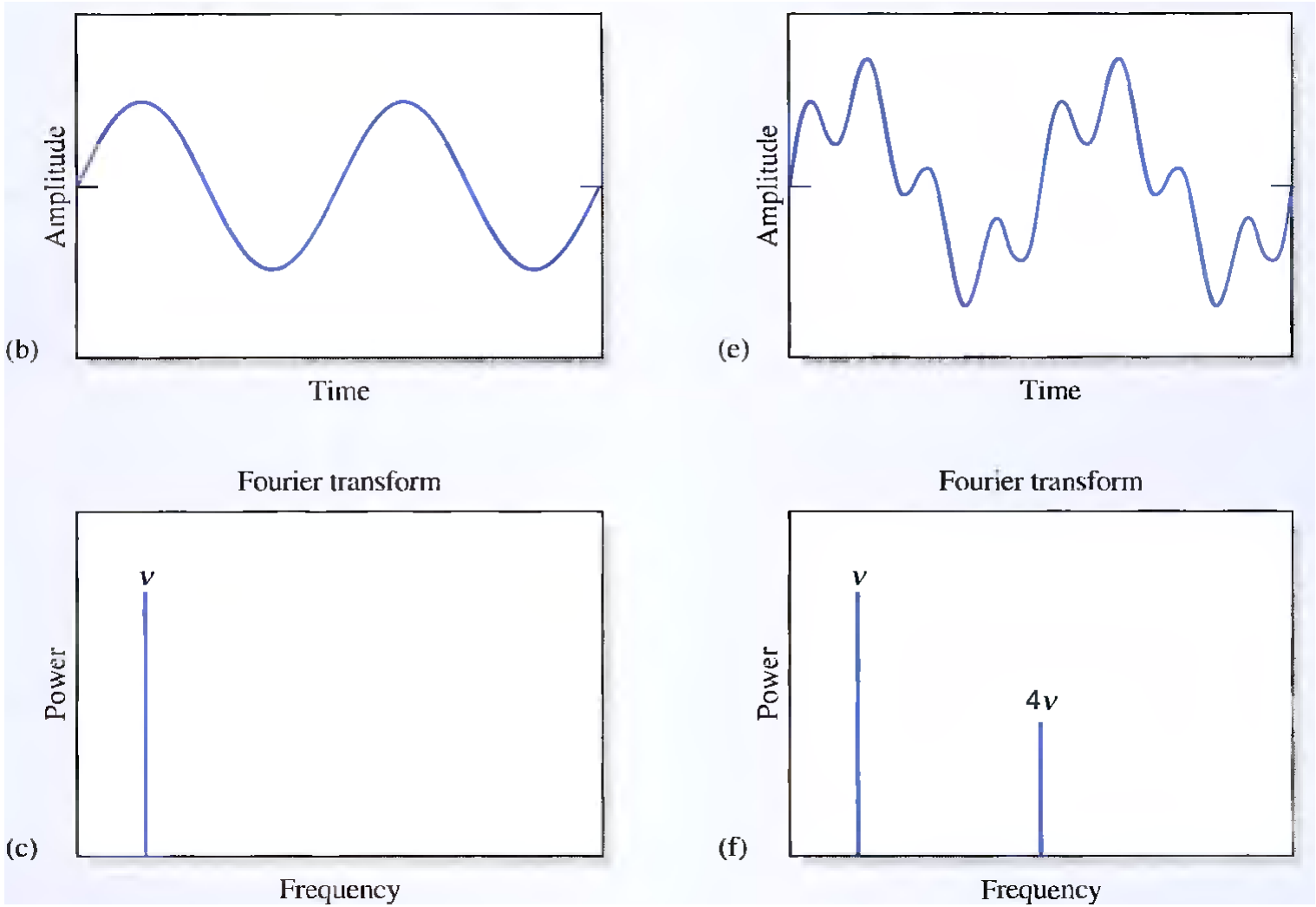

Fontes:

http://4.bp.blogspot.com/-VIQmuK4C7rs/TjFLjQBbaMI/AAAAAAAAA-c/6Ks803vjrVc/s320/2.jpg

http://upload.wikimedia.org/wikipedia/commons/1/18/Benzoid_acid.jpg




Fonte: SKOOG, D.A.; et al. Fundamentals of Analytical Chemistry, 8 ed.




Fonte: SKOOG, D.A.; et al. Fundamentals of Analytical Chemistry, 8 ed.

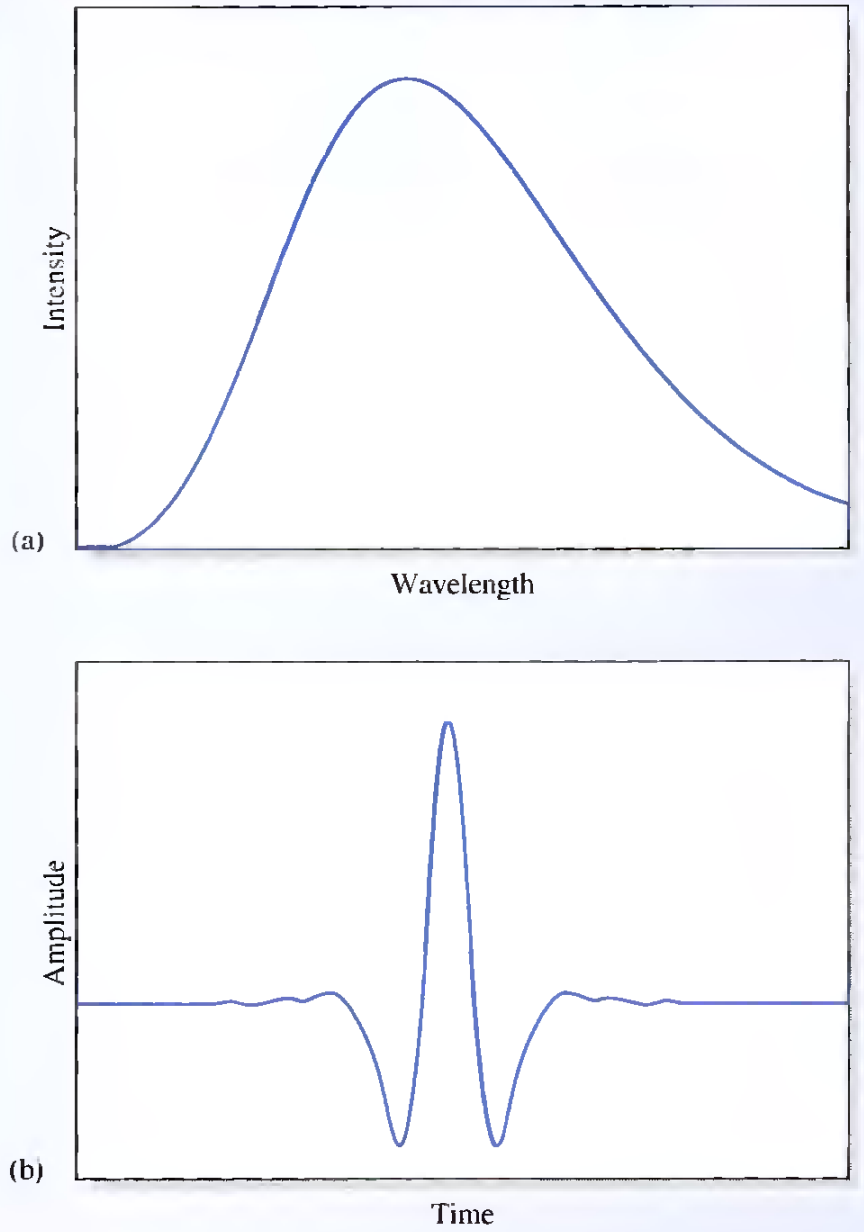
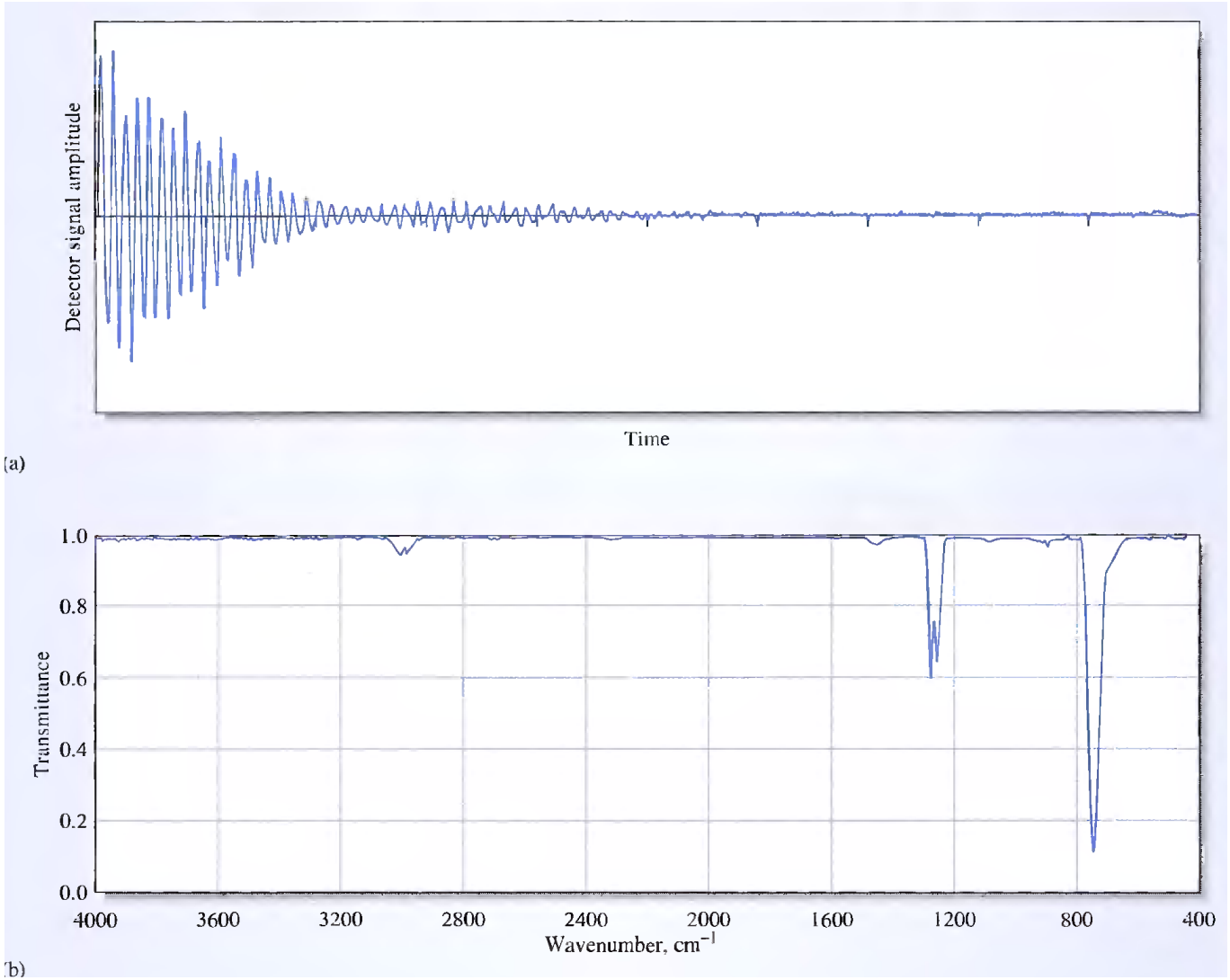


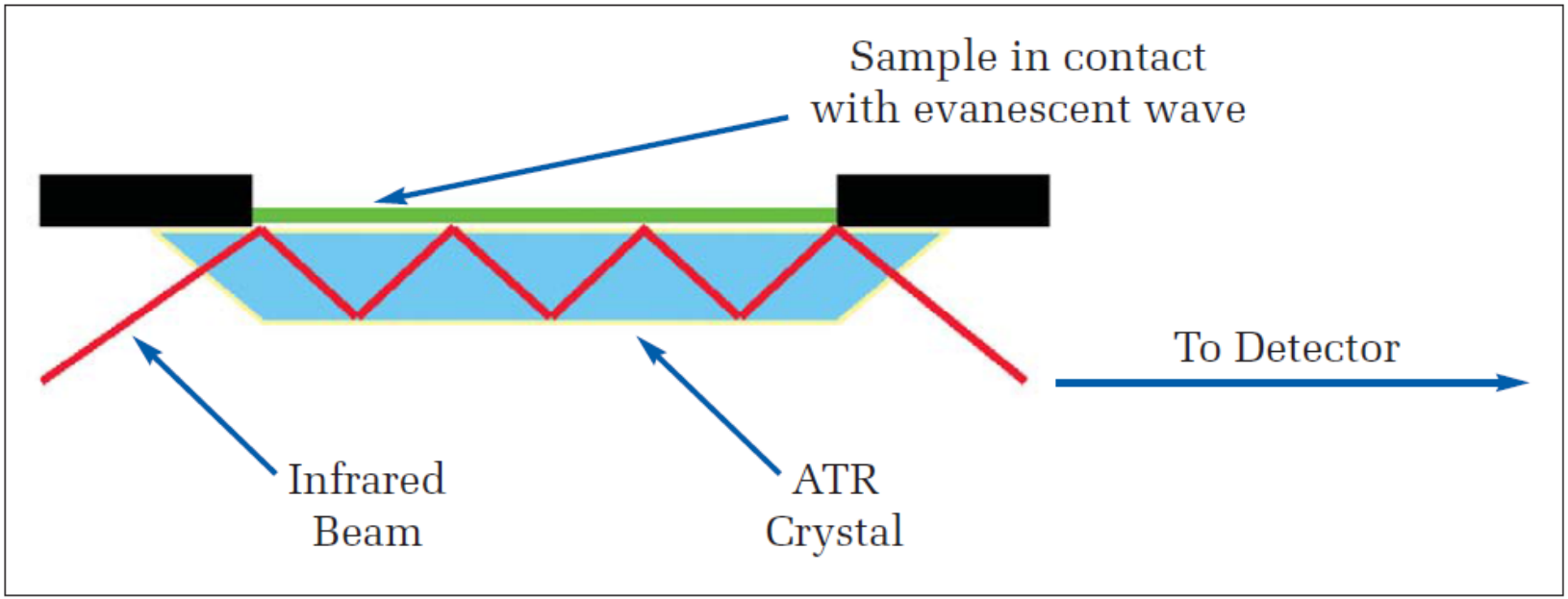

**Figure 25F-9** (a) Spectrum of a continuum light source. (b) Interferogram of the light source in (a) produced at the output of the Michelson interferometer.

Fonte: SKOOG, D.A.; et al. Fundamentals of Analytical Chemistry, 8 ed.




Fonte: SKOOG, D.A.; et al. Fundamentals of Analytical Chemistry, 8 ed.

# FT-IR Spectroscopy
## Attenuated Total Reflectance (ATR)




Fonte: Perkin Elmer, Technical Note, FTIR Spectroscopy.

# Outras técnicas para análise e preparo da amostra

- Absorção no IV e Espalhamento Raman

- Pastilhas de KBr, filme de Nujol

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# Fluorescência de Raio-X (XRF):

## análise de ligas metálicas em moedas brasileiras

Disciplina: Análise Instrumental I

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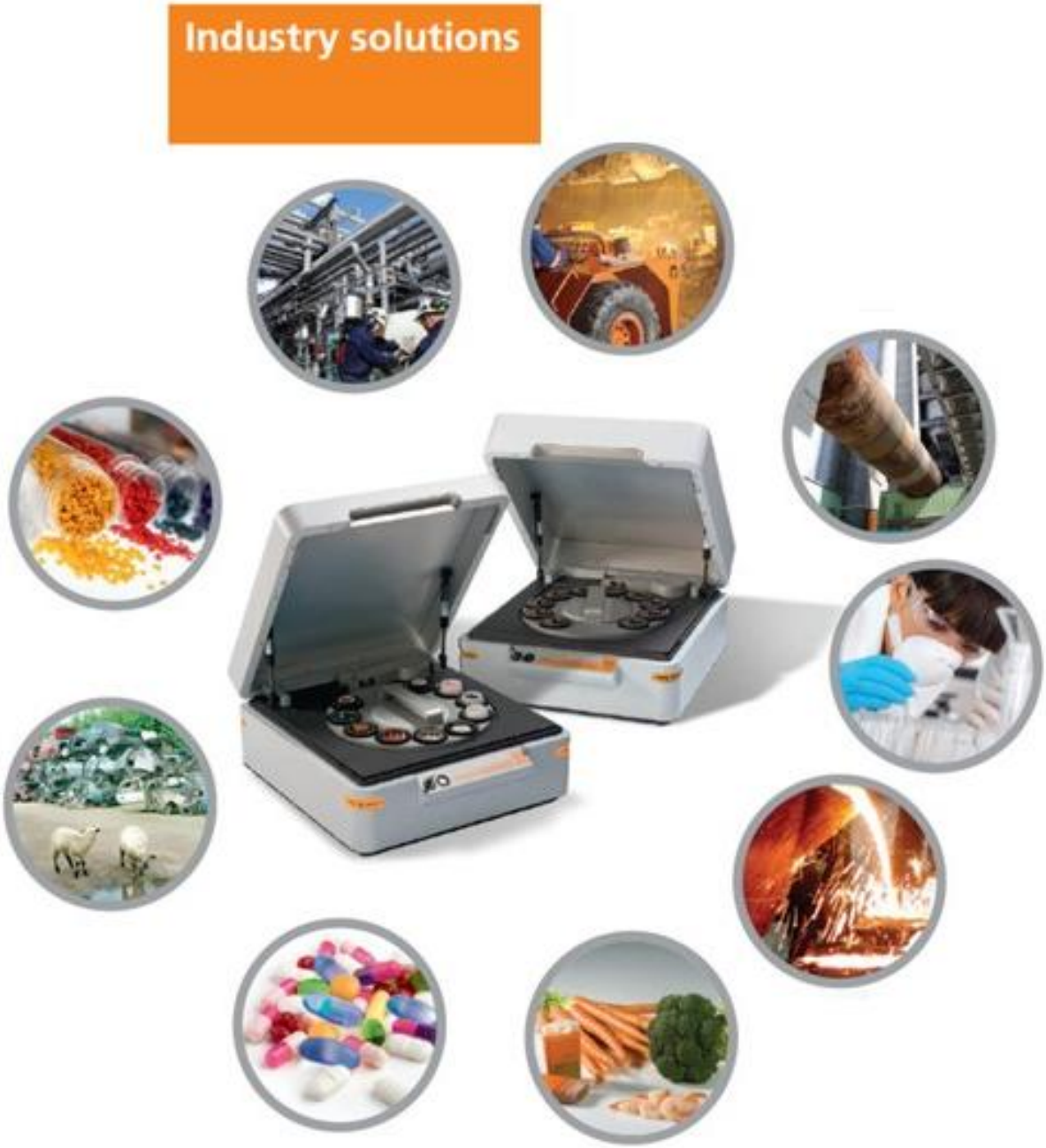
| Moedas brasileiras de diferentes décadas | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |  |
| 1908 | 1923 | 1930 | 1940 | 1956 | 1961 | 1970 | 1981 | 1993 | 2005 |

Fonte: Práticas de Análise Instrumental I, São Carlos: IQSC, 2014




Fonte: PANanalytical, Epsilon 3$^{x}$ spectrometers, PN9286.pdf

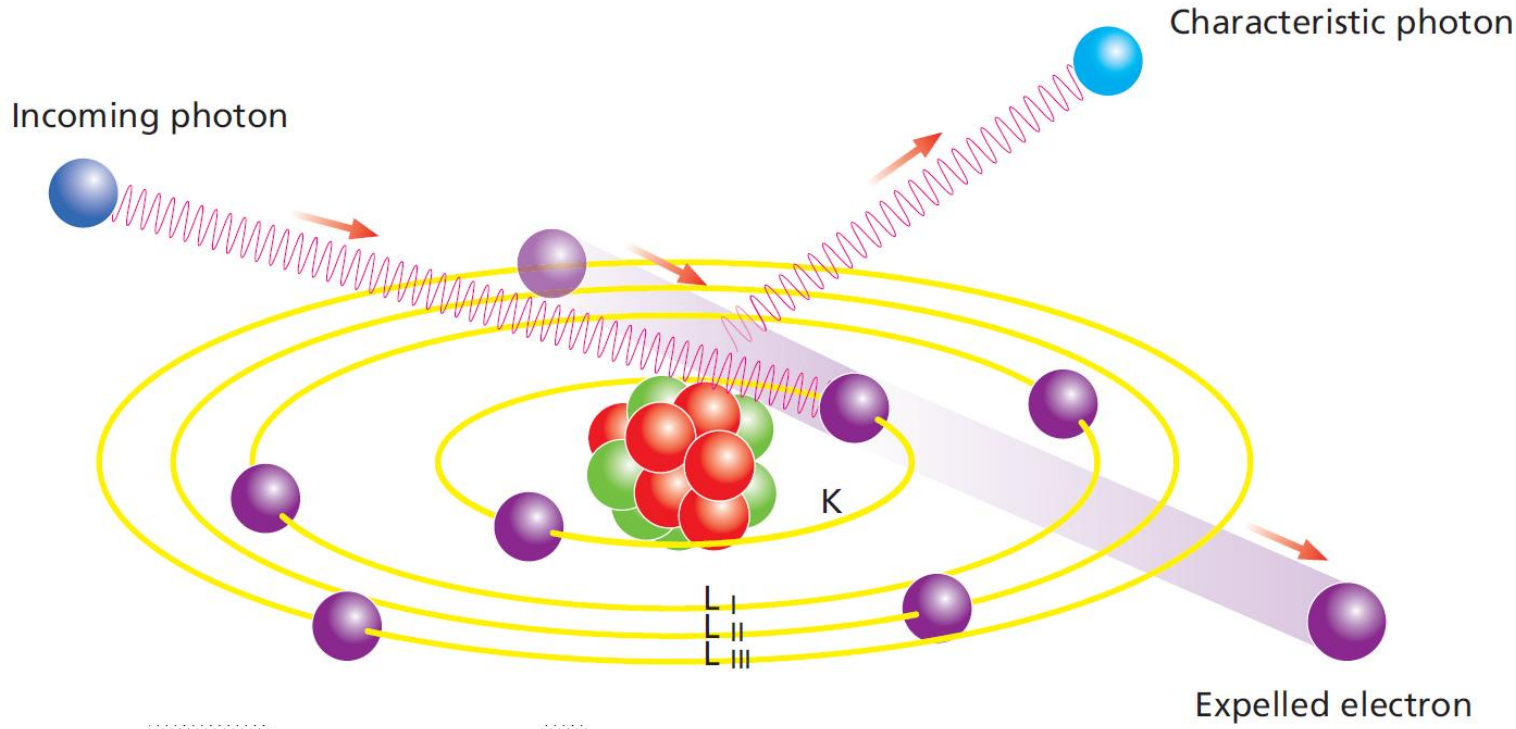



*Figure 4. Production of characteristic radiation*

Fonte: Peter Brouer, Theory of XRF, PANanalytical

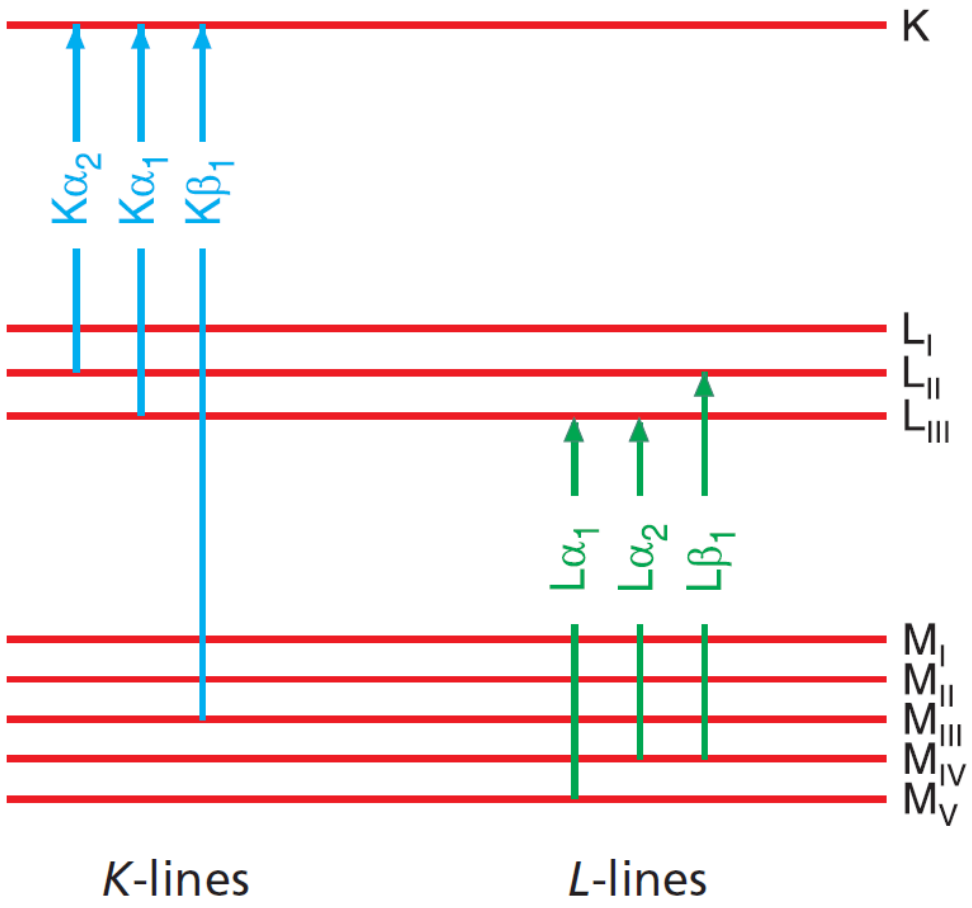
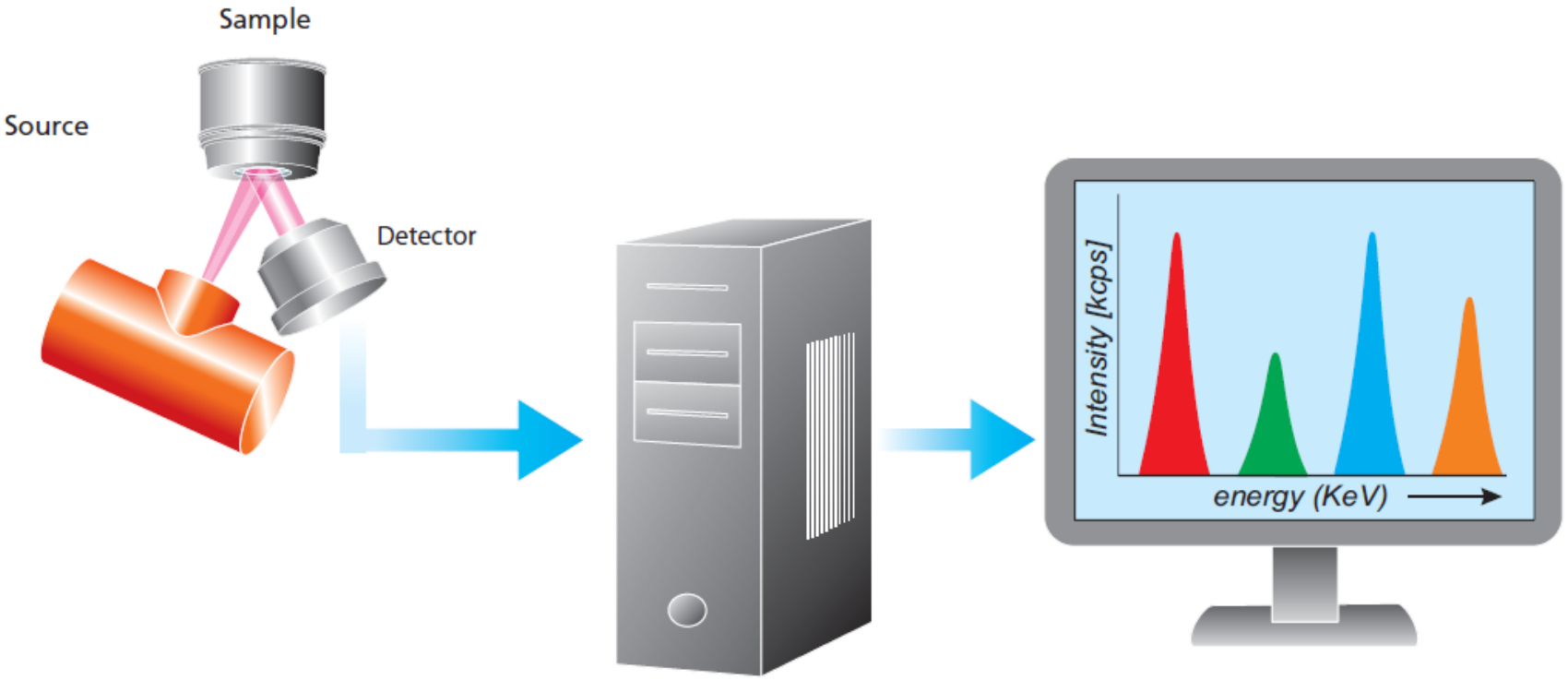



*Figure 7. Major lines and their transitions*

Fonte: Peter Brouer, Theory of XRF, PANanalytical

# EDXRF




Fonte: Peter Brouer, Theory of XRF, PANanalytical

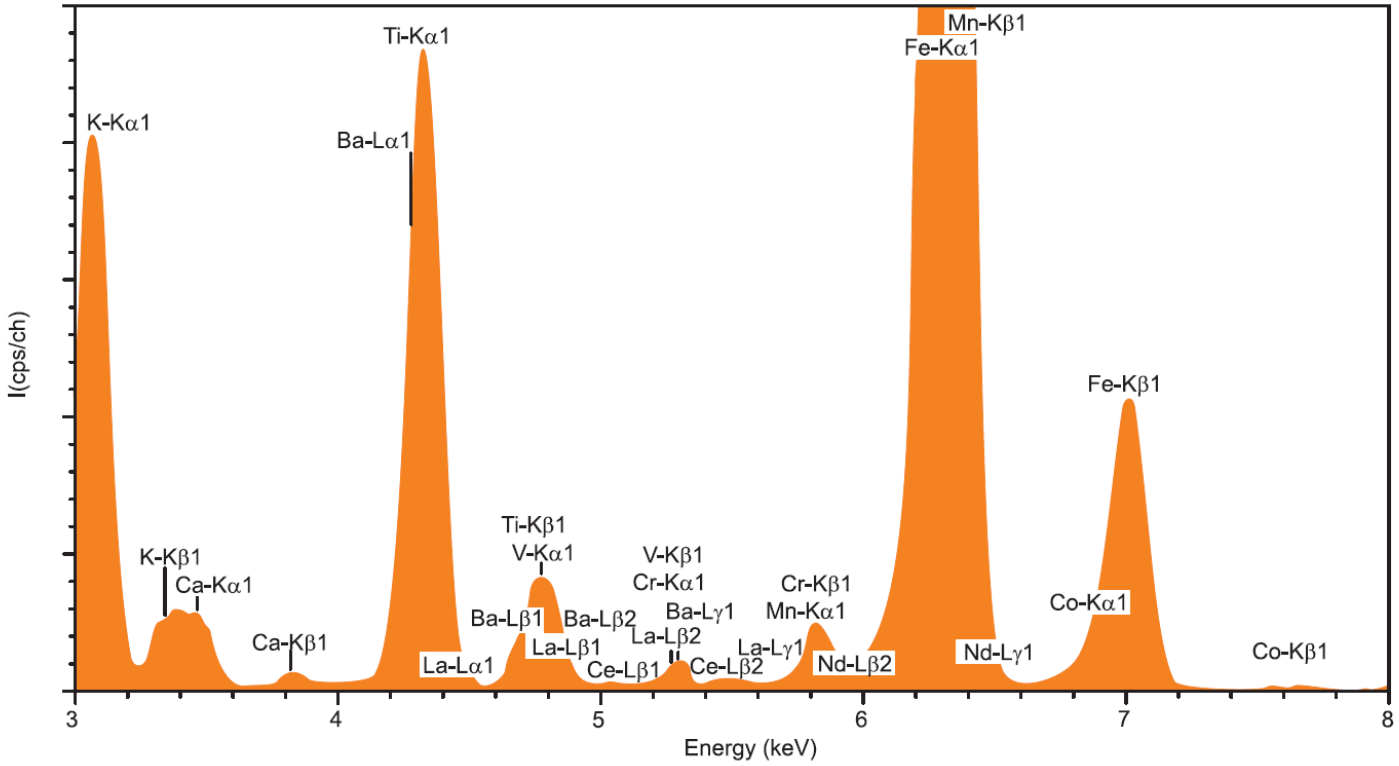



*Figure 20. Typical spectrum of a soil sample measured with an EDXRF spectrometer having 3D optics and indirect excitation*

Fonte: Peter Brouer, Theory of XRF, PANanalytical

Some of the advantages and disadvantages of EDXRF and WDXRF spectrometers are summarized in Table 2.

| | EDXRF | WDXRF |
|---|---|---|
| Elemental range | Na .. U (sodium .. uranium) | Be .. U (beryllium .. uranium) |
| Detection limit | Less optimal for light elements<br>Good for heavy elements | Good for Be and all heavier elements |
| Sensitivity | Less optimal for light elements<br>Good for heavy elements | Reasonable for light elements<br>Good for heavy elements |
| Resolution | Less optimal for light elements<br>Good for heavy elements | Good for light elements<br>Less optimal for heavy elements |
| Costs | Relatively inexpensive | Relatively expensive |
| Power consumption | 5 .. 1000 W | 200 .. 4000 W |
| Measurement | Simultaneous | Sequential/simultaneous |
| Critical moving parts | No | Crystal, goniometer |

*Table 2. Comparison of EDXRF and WDXRF spectrometers*

Fonte: Peter Brouer, Theory of XRF, PANanalytical