

EOLI

Efficient Operation of Urban Wastewater Treatment Plants

Contract Number ICA4-CT-2002-10012

UNAM (Partner No. 6)

WP3

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Participants in this report:

Gloria Moreno Rodríguez

Leonardo Jiménez Bautista

Leticia García Montes de Oca

Alejandro Vargas Casillas

Jaime Moreno Pérez

Germán Buitrón Méndez



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Concentration measurement

- Estimation from UV-Vis spectrophotometric data
- Basic idea: a measured spectrum $s(\lambda)$ can be decomposed as sum of n base spectra $\alpha_i(\lambda)$

$$s(\lambda) = \sum_{i=1}^n \beta_i \cdot \alpha_i(\lambda) \quad i = 1, \dots, n$$

- The coefficients β_i are a function of the concentrations
(main difference with other methods)

$$\beta_i = \varphi_i(x_1, \dots, x_n), \quad i = 1, \dots, n$$

- In matrix and vector notation...

$$\mathbf{s} = \mathbf{A} \cdot \boldsymbol{\beta}, \quad \boldsymbol{\beta} = \varphi(\mathbf{x})$$

Concentration determination

Calibration and measurement

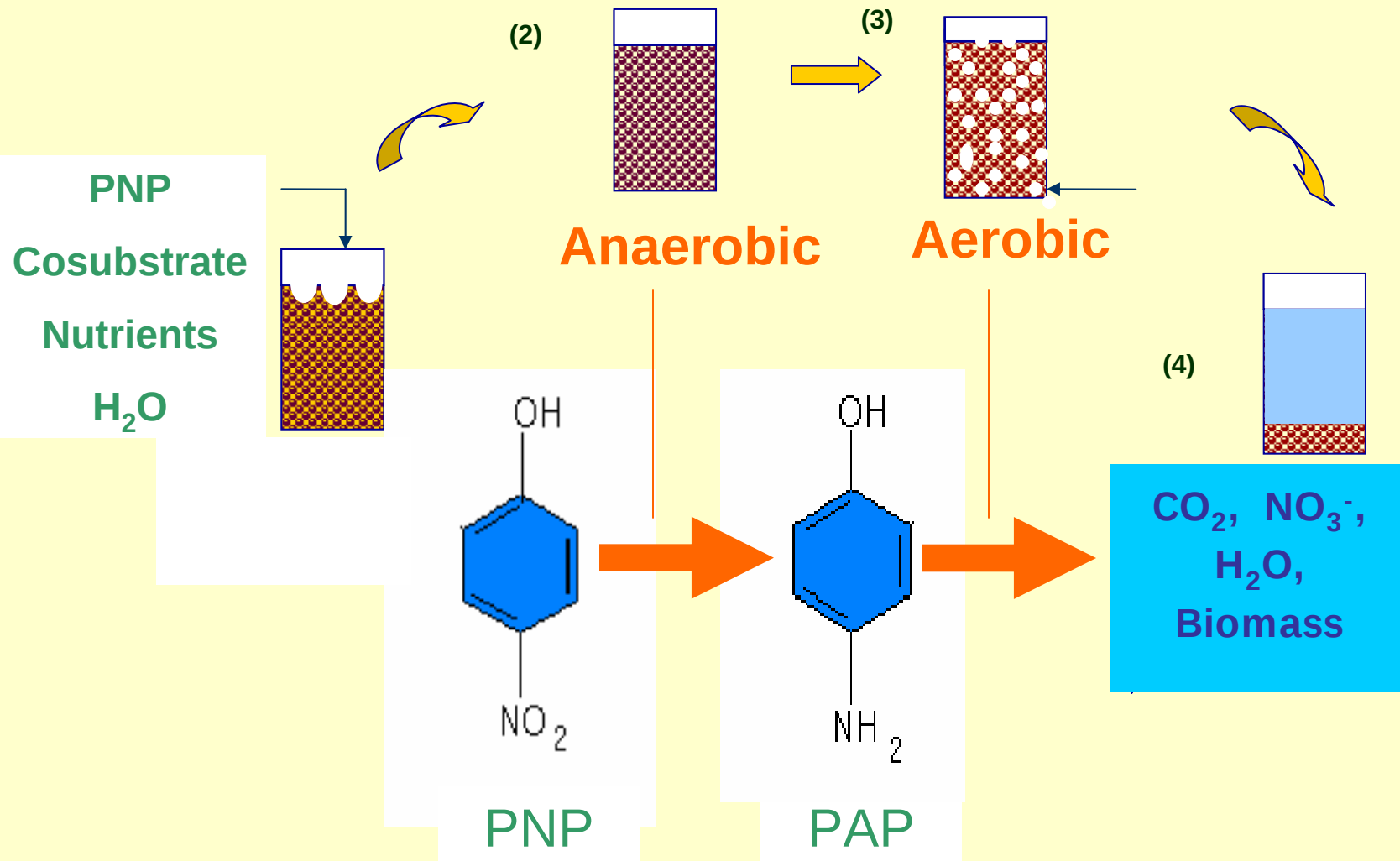
Calibration procedure:

1. Take samples and measure concentrations by other methods (e.g. HPLC)
2. Determine matrix A and the parameters of a proposed φ by a combination of linear least squares and other nonlinear optimization methods

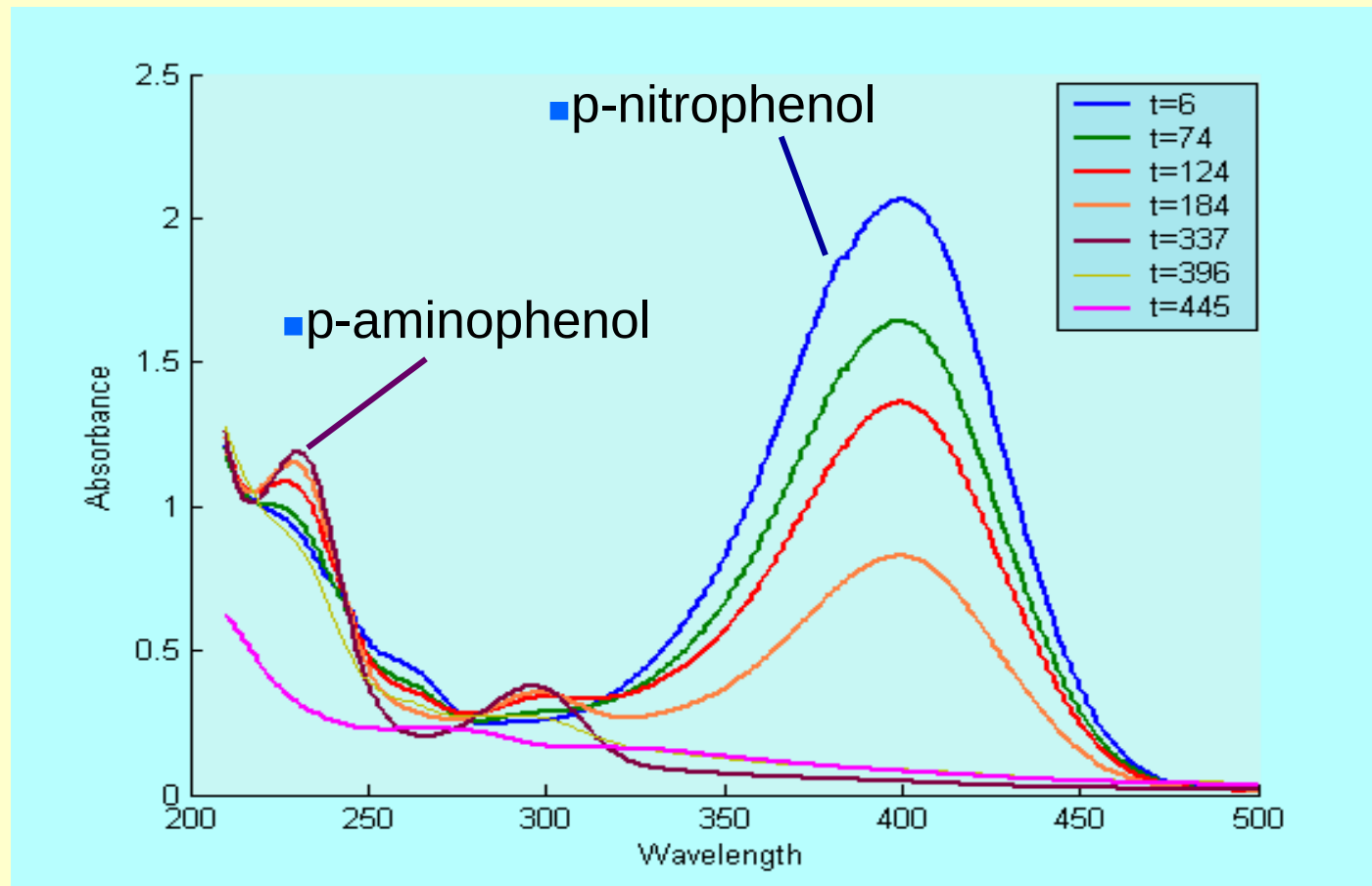
Measurement:

1. Take sample and filter suspended solids
2. Measure absorbance spectrum
3. Determine β by linear least squares using matrix A
4. Determine concentration vector x by solving $\beta = \varphi(x)$

PNP Degradation



Example: kinetics



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End of the presentation



Work Package 3

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Second Year Report

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