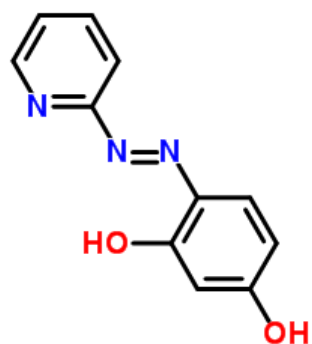


Uranyl determination by colorimetry

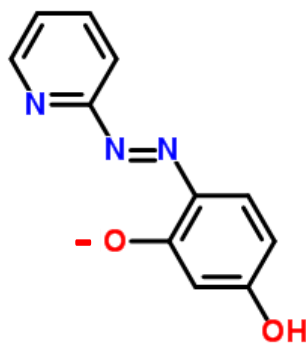
Goal : Measure the concentration of UO_2^{2+} in an unknown solution by UV-Visible technic

PAR : 4-(2-pyridylazo) resorcinol



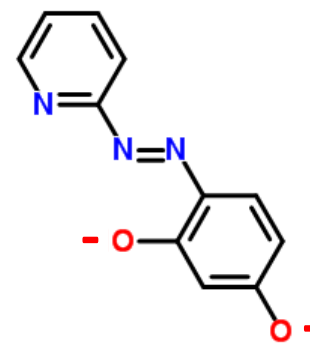
PAR

pKa1 : 5,6



PAR mono-anionique

pKa2 : 12,3

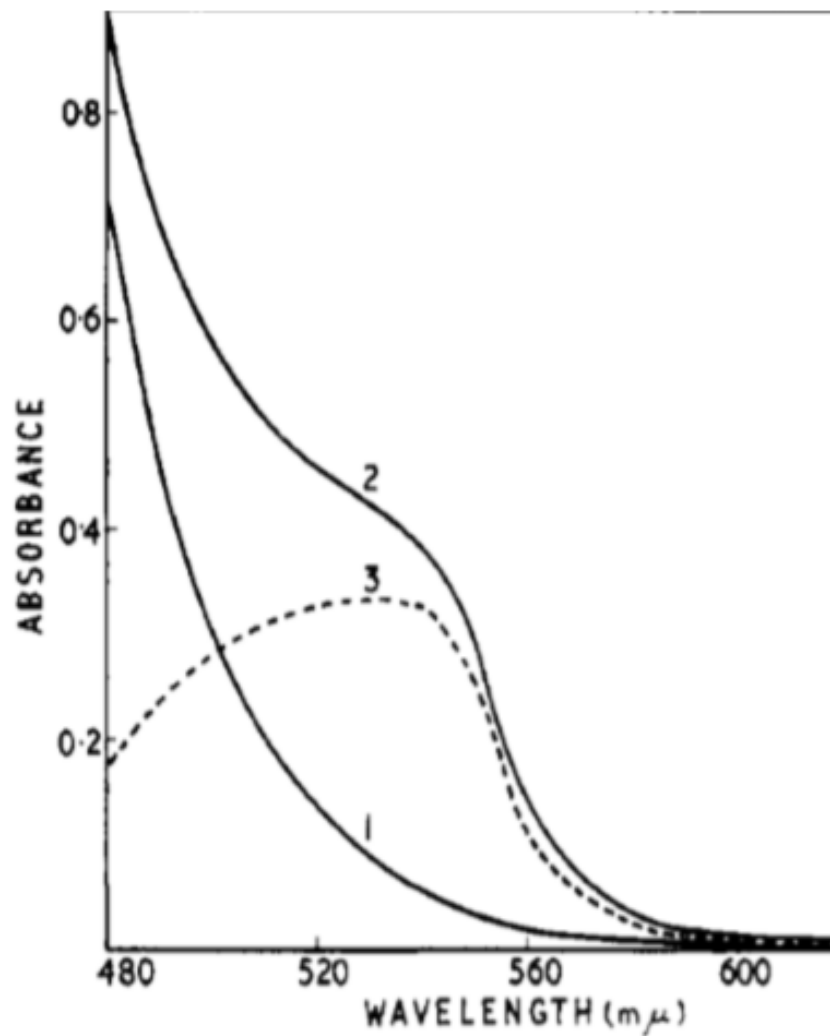


PAR di-anionique

pH 8 : complexe 1:1 with UO_2^{2+}

UV spectra

1. Reagent blank vs. water
2. Uranium (103 μg .) plus PAR vs. water
3. Uranium (103 μg .) plus PAR vs. reagent blank



Beer-Lambert law

$$A = \epsilon l C = \log \frac{I_0}{I}$$

A : absorbance

ϵ : molar extinction coefficient (L/mol/cm)

l : optical path (cm)

C : molar concentration (mol/L)

I : transmitted intensity

I_0 : initial intensity

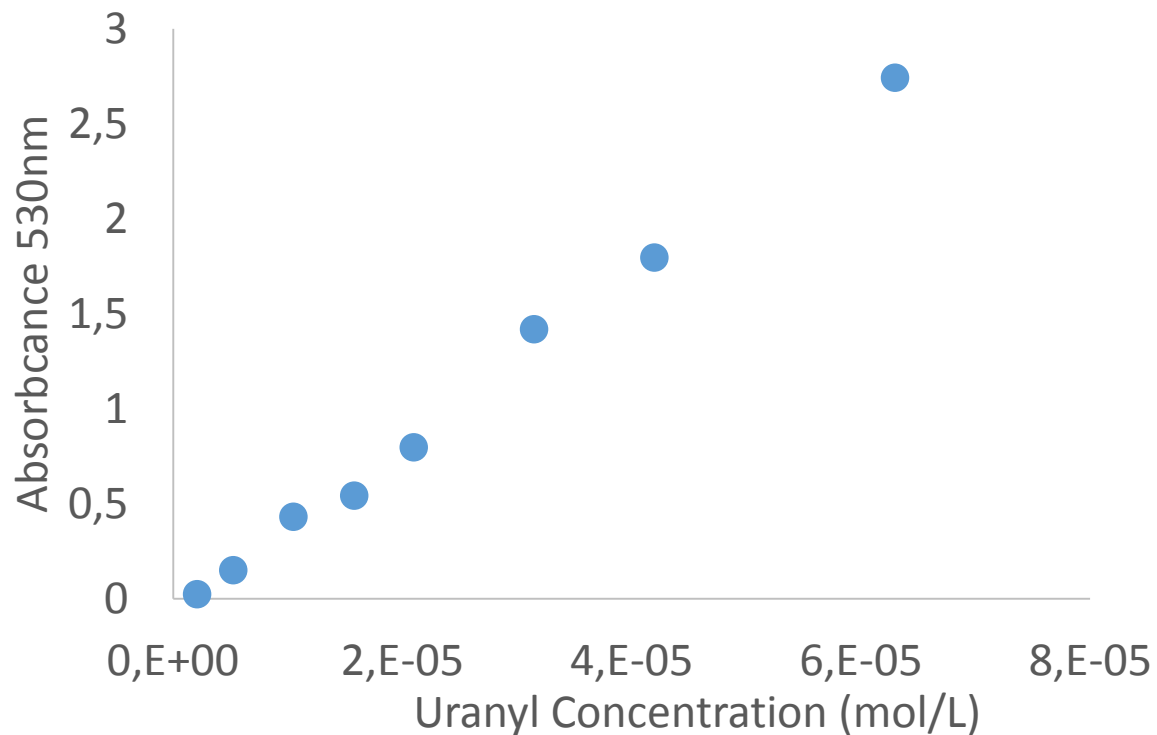
Protocol

- Preparation of the buffer solution of Ethanolamine (1,5g/10mL) dilute in water. pH is fixed to 8 in adding 3M HNO₃
- PAR solution (0,2%) in water
- Preparation of calibration samples : 1mL of buffer solution, 0,4mL of PAR solution, add UO₂ to a concentration between 2,1μM to 63 μM from a Stock solution of 2,1 mM. Complet to 10 mL in water

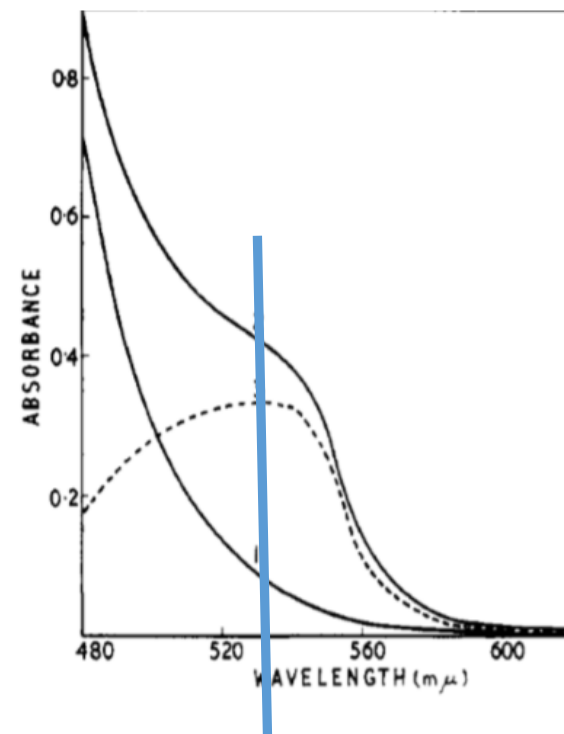


- UV-Visible measurement of the calibration sample
- UV-Visible measurement of the unknown solution

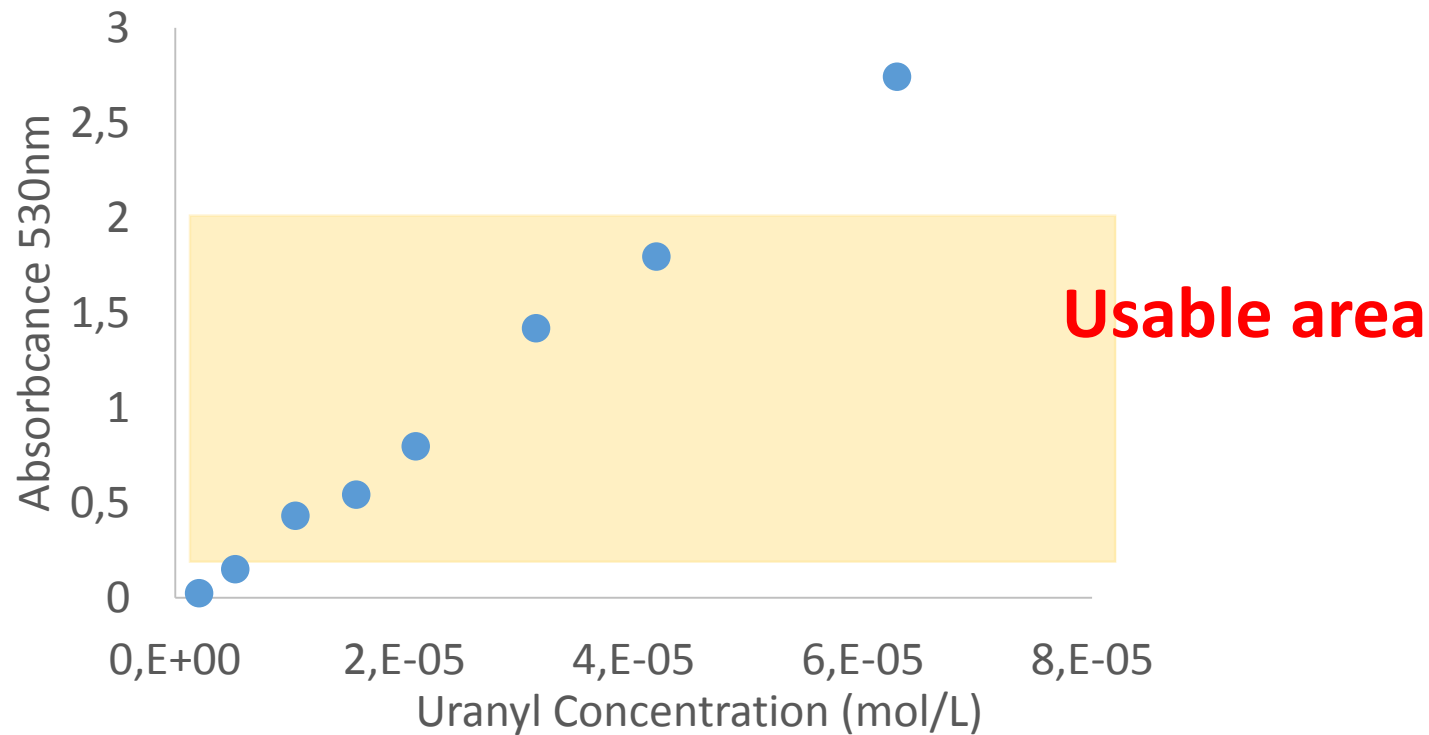
Calibration curve



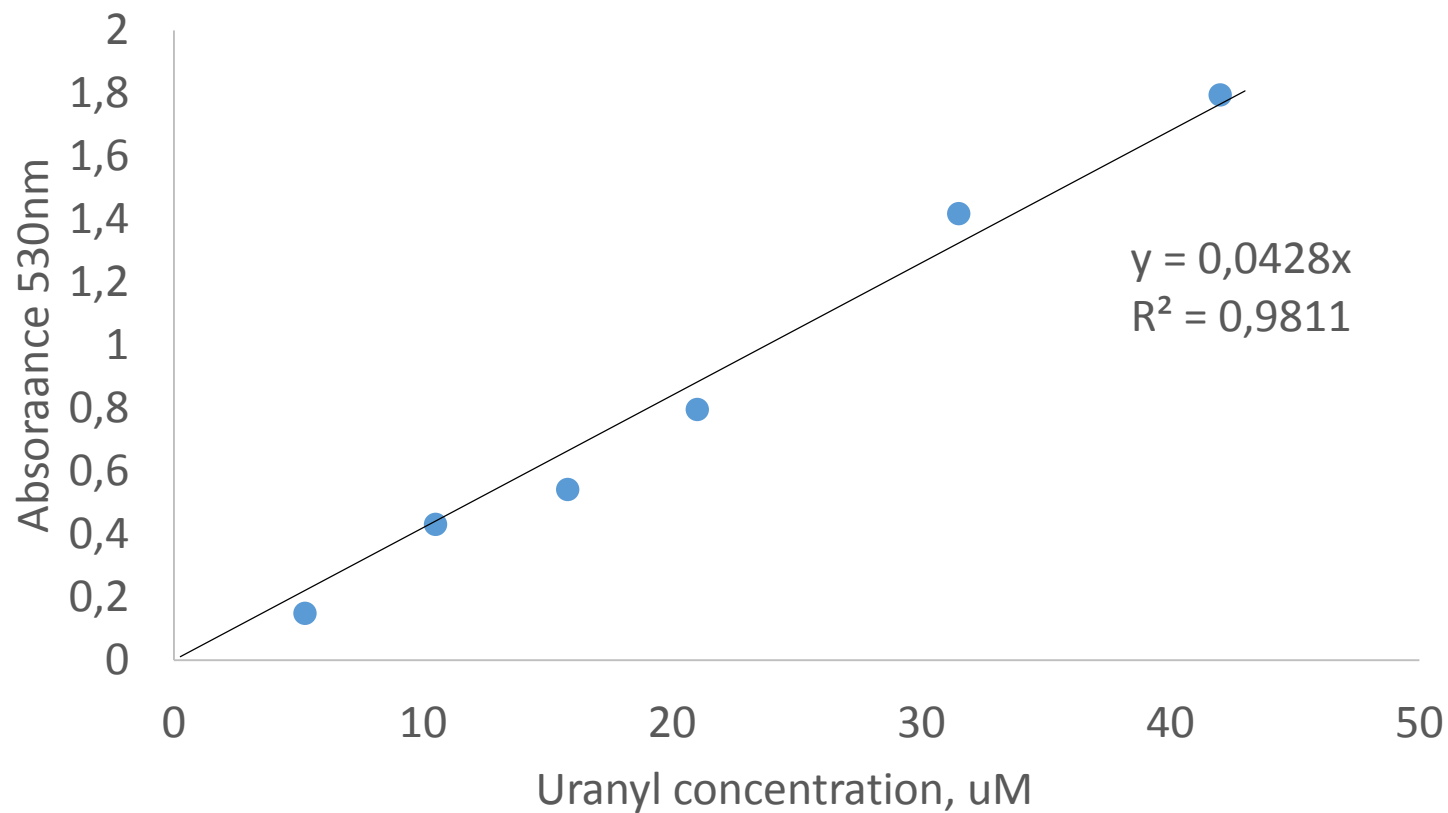
1. Reagent blank vs. water
2. Uranium (103 μg .) plus PAR vs. water
3. Uranium (103 μg .) plus PAR vs. reagent blank



Calibration curve



Calibration curve



Unknown solution

Absorbance measured : 0,2625

Dilution factor for the sample preparation : 135 (74 μ L in 10mL)

Concentration : $(0,2625/0,0428) \times 135 = 845 \mu\text{M} = 0,85 \text{ mM}$



slope

Molar extinction coefficient of the Complex

$$A = \varepsilon l C = \log \frac{I_0}{I}$$

$$\varepsilon = 0,0428 \times 10^6 = 42800 \text{ mol}\cdot\text{L}^{-1}\cdot\text{cm}^{-1}$$

