- Prática II : <u>Incertezas</u>

- Propagadas para a capacidade térmica do Calorímetro

$$m_1 c\,(T_f - T_1) + m_2 c\,(T_f - T_2) + \mathbb{C}\,(T_f - T_1) = 0$$

Considerando $c = c_{água} = 1$ e desprezando sua incerteza, a propagação fica:

$$\mathbb{C} = \frac{m_1 c\,(T_1 - T_f) + m_2 c\,(T_2 - T_f)}{(T_f - T_1)} = \frac{m_1 c T_1 - m_1 c T_f + m_2 c T_2 - m_2 c T_f}{(T_f - T_1)}$$

$$\sigma_{\mathbb{C}}^2 = \left(\frac{\partial \mathbb{C}}{\partial m_1}\right)^2 \sigma_{m_1}^2 + \left(\frac{\partial \mathbb{C}}{\partial m_2}\right)^2 \sigma_{m_2}^2 + \left(\frac{\partial \mathbb{C}}{\partial T_1}\right)^2 \sigma_{T_1}^2 + \left(\frac{\partial \mathbb{C}}{\partial T_2}\right)^2 \sigma_{T_2}^2 + \left(\frac{\partial \mathbb{C}}{\partial T_f}\right)^2 \sigma_{T_f}^2$$

- $$\frac{\partial \mathbb{C}}{\partial m_1} = \frac{c\,(T_1 - T_f)}{(T_f - T_1)} = -c$$

- $$\frac{\partial \mathbb{C}}{\partial T_2} = \frac{m_2 c}{(T_f - T_1)} = \frac{m_2 c}{\Delta T_1}$$

- $$\frac{\partial \mathbb{C}}{\partial m_2} = \frac{c\,(T_2 - T_f)}{(T_f - T_1)} = \frac{c\,\Delta T_2}{\Delta T_1}$$

- $$\frac{\partial \mathbb{C}}{\partial T_1} = \frac{\left[m_1 c\,(T_1 - T_f) + m_2 c\,(T_2 - T_f)\right] + (T_f - T_1)(m_1 c)}{(T_f - T_1)^2} = \frac{m_2 c\,(T_2 - T_f)}{(T_f - T_1)^2} = -\frac{m_2 c\,\Delta T_2}{\Delta T_1^2}$$

$$\frac{\partial \mathbb{C}}{\partial T_f} = \frac{(T_f - T_1)\left[-m_1 c - m_2 c\right] - \left[m_1 c\,(T_1 - T_f) + m_2 c\,(T_2 - T_f)\right]\cdot 1}{(T_f - T_1)^2} = \frac{m_2 c\,(T_1 - T_2)}{(T_f - T_1)^2} = \frac{m_2 c\,(T_1 - T_2)}{\Delta T_1^2}$$

$$\sigma_{\mathbb{C}}^2 = c^2 \sigma_{m_1}^2 + c^2\left[\frac{(T_2 - T_f)}{(T_f - T_1)}\right]^2 \sigma_{m_2}^2 + \left[\frac{m_2 c\,(T_2 - T_f)}{(T_f - T_1)^2}\right]^2 \sigma_{T_1}^2 + \left[\frac{m_2 c}{(T_f - T_1)}\right]^2 \sigma_{T_2}^2 + \left[\frac{m_2 c\,(T_1 - T_2)}{(T_f - T_1)^2}\right]^2 \sigma_{T_f}^2$$