

Convective Contamination and Counter Measures

Liquids

$D = O(10^{-5} \text{ cm}^2/\text{s})$

Characteristic diffusion velocity

$v_{\text{diff}} \quad D/L = 10^{-5} \text{ cm/s}$

1 cm

For convective contamination to be negligible, e.g., 1%

e.g. $10^{-2} D$

$v_{\text{conv}} \quad 10^{-7} \text{ cm/s}$

Counter measures

- Diffusion capillaries
- Vertical liquid columns with stabilizing vertical T
- **Magnetic fields**

Checks

- Plots of $c(x)$
agreement with analytical solution → absence of convection

Experimental tests

In into Ga, 0.7 mm capillaries

- $D_{\text{hor}} \quad 1.2 D_{\text{vert}}$ (solute-driven)
- both perfectly Gaussian $c(x)$

Persson, Eriksson and Lindstrom, *J. Physique* 41 (1980) C8-374