**Name 1:** ..... **Date:** .....

**Name 2:** ..... **Setup No:** .....

# 50 $\alpha$-Decay and Radioactive Indoor Air

## 1 Samples, Location and Recorded Times

Sample 1: No. ..... Name / Location: .....

Sample 2: No. ..... Name / Location: .....

| Exposition | $t_0$ | $t_1$ | $t_1 - t_0$ | $t_2$ | $t_2 - t_1$ | $t_3$ | $t_3 - t_2$ |
|---|---|---|---|---|---|---|---|
| Sample 1 | | | | | | | |
| Sample 2 | | | | | | | |

($t_0$: flask opened; $t_1$: flask closed; $t_2$: Cocktail added; $t_3$: sample measured.)

## 2 Decay Counts

| Counts | $n$ (in 10 min) | $n_{\mathrm{tot}} \pm \Delta n_{\mathrm{tot}}$ | $\overline{n} \pm \Delta\overline{n}$ | $\overline{C} \pm \Delta\overline{C}$ |
|---|---|---|---|---|
| Sample 1 | | | | |
| Sample 2 | | | | |
| Blank sample | | | | |

Estimate the errors based on a Poisson distribution.

## 3 Calculation of the Radon Concentration

| | |
|---|---|
| Calibration factor $g$ | $7.03 \times 10^{-3}$ m$^3$ |
| Efficiency factor $f$ | |
| $\lambda_0$ | |
| $\lambda_1$ | |
| $\lambda_2$ | |
| $\lambda_3$ | |

| | |
|---|---|
| $a_0$ | |
| $a_2$ | |
| $a_3$ | |

$$B(t) = 3 - a_0 e^{-\lambda_0 t} - a_2 e^{-\lambda_2 t} - a_3 e^{-\lambda_3 t}$$
$$D = gfG_A(t_1 - t_0)e^{-\lambda_1(t_2 - t_1)}$$
$$R = \frac{C - C_U}{DB(t_3 - t_2)}$$

| | $B(t_3 - t_2)$ | $D$ | $C - C_U \pm \Delta(C - C_U)$ | $R \pm \Delta R$ |
|---|---|---|---|---|
| Sample 1 | | $\pm$ | $\pm$ | $\pm$ |
| Sample 2 | | $\pm$ | $\pm$ | $\pm$ |

## 4 Geiger-Counter Measurements

| | High-radiation site | Low-radiation site |
|---|---|---|
| Location | | |
| Counts in 5 min | | |
| Counts per minute | $\pm$ | $\pm$ |
| Time for 5% accuracy | $\pm$ | $\pm$ |