

Lab report: **D5 Spectral analysis**

Date: .....

Participants: group nr. .... Names .....

.....

Supervisor..... Sign.: .....Date: .....

1. Spectrometer calibration with Helium lamp

Hartmann equation:

| Pos.<br>s<br>(Skt.) | color &<br>strength | wave<br>length<br>$\lambda$ (nm) | $\frac{10^3}{(\lambda-\lambda_0)}$<br>( $\text{nm}^{-1}$ ) |
|---------------------|---------------------|----------------------------------|--|
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|                     |                     |                                  |  |

$$s = s_0 + \frac{A}{\lambda - \lambda_0}$$

$$s_0 = \frac{\sum s_i \lambda_i (s_j - s_k)}{\sum \lambda_i (s_j - s_k)} = \frac{\sum s_i a_i}{\sum a_i}$$



$$\lambda_0 = \frac{\sum \lambda_i s_i (\lambda_j - \lambda_k)}{\sum s_i (\lambda_j - \lambda_k)} = \frac{\sum \lambda_i b_i}{\sum b_i}$$

$i, j, k = 1, 2, 3$ , cyclic

$$a_1 = \lambda_1 (s_2 - s_3), \quad b_1 = s_1 (\lambda_2 - \lambda_3)$$

$$a_2 = \lambda_2 (s_3 - s_1), \quad b_2 = s_2 (\lambda_3 - \lambda_1)$$

$$a_3 = \lambda_3 (s_1 - s_2), \quad b_3 = s_3 (\lambda_1 - \lambda_2)$$

| i        | $s_i$   | $\lambda_i$   | $a_i$ | $b_i$ | $s_i a_i$ | $\lambda_i b_i$ |
|----------|---|---|-------|-------|-----------|-----------------|
| 1        |   |   |       |       |           |                 |
| 2        |   |   |       |       |           |                 |
| 3        |   |   |       |       |           |                 |
| $\Sigma$ |  |  |       |       |           |                 |

Result:  $s_0 =$  Skt.  $\lambda_0 =$  nm

3. Spectral analysis of unknown lamp due to He calibration:

Lamp A:

| Pos. s<br>(Skt.) | Color &<br>strength | $\frac{10^3}{(\lambda-\lambda_0)}$<br>(nm <sup>-1</sup> ) | wave<br>length $\lambda$<br>(nm) |
|------------------|---------------------|---|----------------------------------|
|                  |                     |   |                                  |
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|                  |                     |   |                                  |
|                  |                     |   |                                  |

Element found:

Comments:

Lamp B:

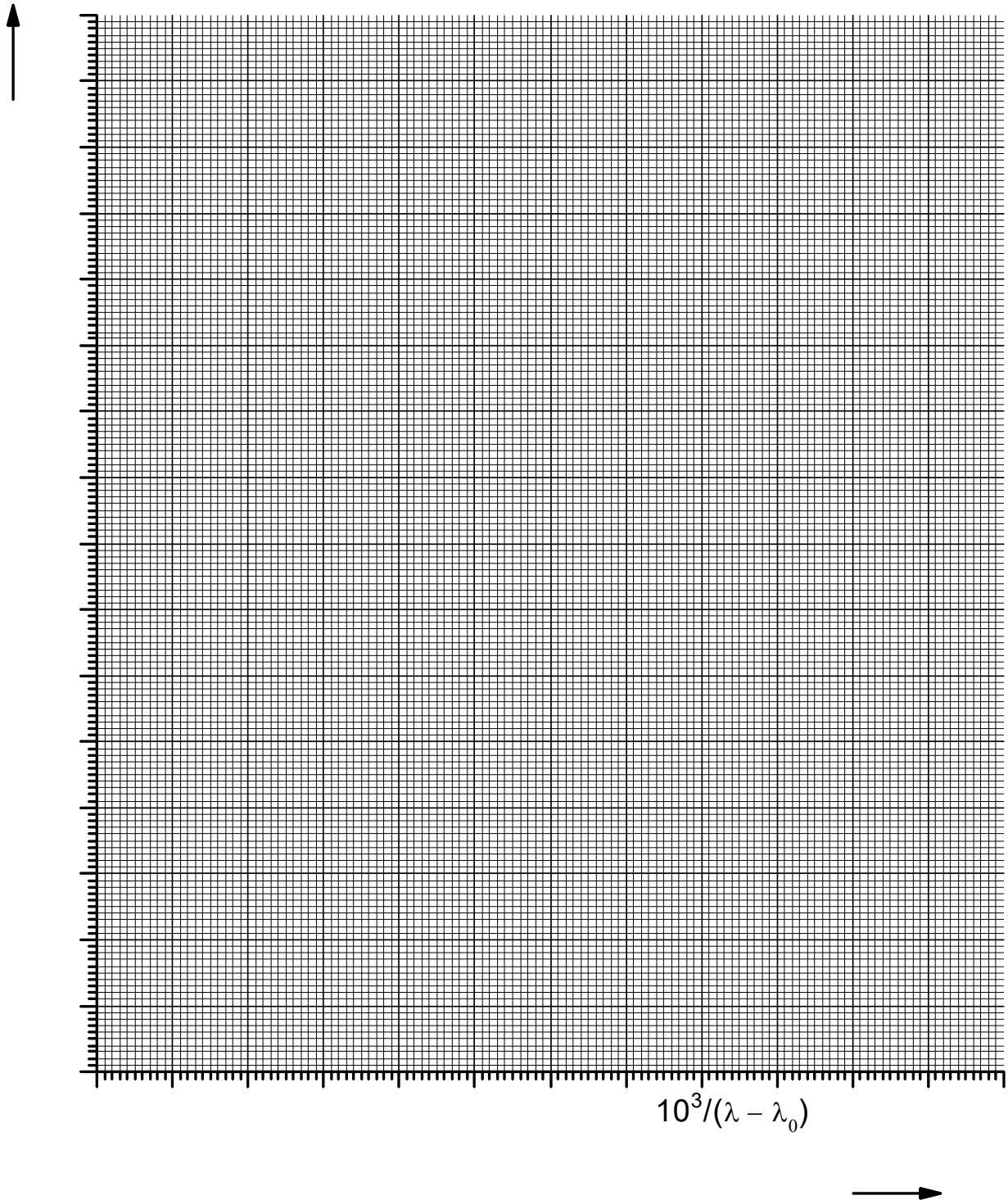
| Pos. s<br>(Skt.) | Color &<br>strength | $\frac{10^3}{(\lambda-\lambda_0)}$<br>(nm <sup>-1</sup> ) | wave<br>length $\lambda$<br>(nm) |
|------------------|---------------------|---|----------------------------------|
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|                  |                     |   |                                  |
|                  |                     |   |                                  |

Element found:

Comments:

## 2. Spectrometer - calibration: He

Position  $s$   
(Skt.)



Discuss your results and estimate possible error sources: