**班级\_\_\_\_\_\_\_\_\_\_\_ 学号\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 姓名\_\_\_\_\_\_\_\_\_\_\_\_ 教师签字\_\_\_\_\_\_\_\_\_\_\_\_**

**实验日期\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_预习成绩\_\_\_\_\_\_\_\_\_ 总成绩\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Measuring the viscosity of a liquid**

**1. Pre-lab**

If an initially stationary sphere is dropped from some height *h* above the liquid surface, would the sphere accelerate or decelerate upon entering the liquid column?

**2. Data sheet** Systematic error of the micrometer = \_\_\_\_\_\_\_\_\_\_\_\_mm

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Liquid temperature  *T* (°C) | Particle | Measured diameter *d*’(mm) | Actual diameter *d* (mm) | Time interval *t* (s) | Viscosity *η*  (kg m-1 s-1) | Average viscosity <*η>* (kg m-1 s-1) |
| 35 | 1 |  |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 40 | 6 |  |  |  |  |  |
| 7 |  |  |  |  |
| 8 |  |  |  |  |
| 9 |  |  |  |  |
| 10 |  |  |  |  |
| 45 | 11 |  |  |  |  |  |
| 12 |  |  |  |  |
| 13 |  |  |  |  |
| 14 |  |  |  |  |
| 15 |  |  |  |  |
| 50 | 16 |  |  |  |  |  |
| 17 |  |  |  |  |
| 18 |  |  |  |  |
| 19 |  |  |  |  |
| 20 |  |  |  |  |
| 55 | 21 |  |  |  |  |  |
| 22 |  |  |  |  |
| 23 |  |  |  |  |
| 24 |  |  |  |  |
| 25 |  |  |  |  |

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| **Lecturer** |  |
| **Signature** |  |

**3. Data analysis**

（Use the measured data to calculate the average viscosity of castor oil at different temperatures. Plot the viscosity as a function of temperature. Derive an expression for the relative uncertainty of the viscosity *η*, and then compute this uncertainty for a particular temperature.)

**4. Discussion and Conclusions**

**5. Questions**

1. What are the possible origins of errors?
2. Why is there a negative correlation between viscosity and temperature?
3. How will the viscosity measurements be affected if a sphere is dropped from somewhere close to the cylindrical boundary of the container?
4. How will the viscosity measurements be affected if a sphere is dropped into a tilted container?