

Laboratorijska vaja
FIZIKA
Merjenje

Vaja 1

Merjenje s pomičnim merilom in mikrometrom

Naloga:

- 1) Izmeri vse dimenzije merjencev in izračunaj njihov volumen.
- 2) Skiciraj merjence.
- 3) Izmeri maso merjencev in izračunaj gostoto aluminija.
- 4) Merjence nariši v merilu 1:1

Vsaka meritev se opravi petkrat!

Potrebščine:

- ✚ Merjenci
- ✚ Pomično merilo
- ✚ Merilni valj
- ✚ Tehtnica

Navodilo:

Izmeri vse dimenzije merjencev. (pazi na natančnost meril) Izračunaj povprečno vrednost vsake dimenzije in njeno napako. Izračunaj volumne merjencev in njihove napake ter gostoto aluminija.

Pri računanju napak mora biti celoten postopek. Napaka meritve mora biti podana z absolutno in relativno napako.

1.



$2R = 43,70\text{mm}$
 $2r = 15,30\text{mm}$
 $d = 3,27\text{mm}$
 $m = 27,9\text{g}$
 $R = 21,85\text{mm}$
 $r = 7,65\text{mm}$

$2R = 43,62\text{mm}$
 $2r = 15,30\text{mm}$
 $d = 3,26\text{mm}$
 $m = 27,6\text{g}$
 $R = 21,71\text{mm}$
 $r = 7,65\text{mm}$

$\bar{R} = 21,78\text{mm}$
 $R = 21,78\text{mm} \pm 0,07\text{mm}$

$\bar{r} = 7,65\text{mm}$
 $r = 7,65\text{mm} \pm 0,02\text{mm}$

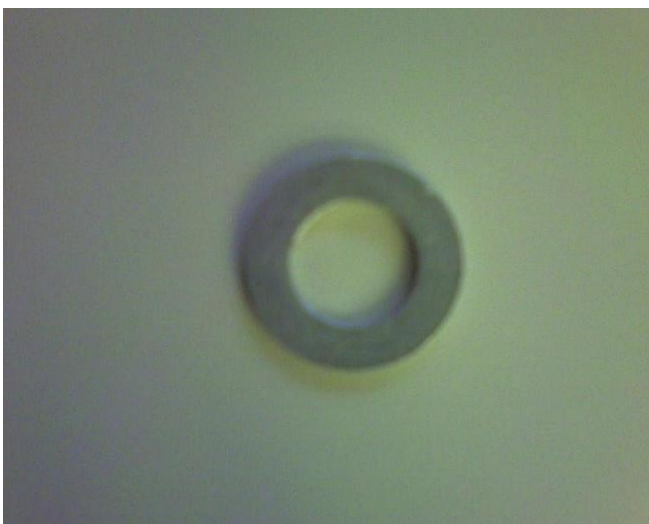
$\bar{m} = 27,75\text{g}$
 $m = 27,75\text{g} \pm 0,5\text{g}$

$\bar{d} = 3,265\text{mm}$
 $d = 3,265\text{mm} \pm 0,005\text{mm}$

$$\rho = \frac{m}{(\pi R^2 - \pi r^2) \cdot d}$$

$$= 6511 \frac{\text{kg}}{\text{m}^3} \pm 181 \frac{\text{kg}}{\text{m}^3} = 6511 \frac{\text{kg}}{\text{m}^3} \cdot (1 \pm 2,78\%)$$

2.



$2R = 25,00\text{mm}$
 $2r = 14,28\text{mm}$
 $d = 2,07\text{mm}$
 $m = 1,3\text{g}$
 $R = 12,50\text{mm}$
 $r = 7,14\text{mm}$

$2R = 25,00\text{mm}$
 $2r = 14,22\text{mm}$
 $d = 2,33\text{mm}$
 $m = 1,4\text{g}$
 $R = 12,50\text{mm}$
 $r = 7,11\text{mm}$

$$\bar{R}=12,50\text{ mm}$$

$$R=12,50\text{ mm}\pm 0,02\text{ mm}$$

$$\bar{r}=7,13\text{ mm}$$

$$r=7,13\text{ mm}\pm 0,02\text{ mm}$$

$$\bar{m}=1,35\text{ g}$$

$$m=1,35\text{ g}\pm 0,5\text{ g}$$

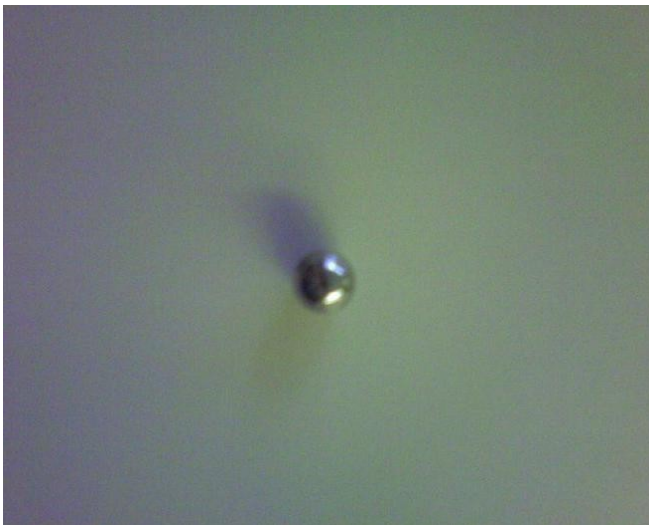
$$\bar{d}=2,20\text{ mm}$$

$$d=2,20\text{ mm}\pm 0,13\text{ mm}$$

$$\rho = \frac{m}{(\pi R^2 - \pi r^2) \cdot d}$$

$$= 1834 \frac{\text{kg}}{\text{m}^3} \pm 261,06 \frac{\text{kg}}{\text{m}^3} = 1834 \frac{\text{kg}}{\text{m}^3} \cdot (1 \pm 14,23\%)$$

3.



$$\bar{r}=5,02\text{ mm}$$

$$r=5,02\text{ mm}\pm 0,01\text{ mm}$$

$$\rho = \frac{m}{\frac{4 \cdot \pi \cdot r^3}{3}} =$$

$$= 6606 \frac{\text{kg}}{\text{m}^3} \pm 585 \frac{\text{kg}}{\text{m}^3} = 6606 \frac{\text{kg}}{\text{m}^3} \cdot (1 \pm 8,86\%)$$

4.



$l = 61,18\text{mm}$
 $d = 3,47\text{mm}$
 $m = 1,3\text{g}$
 $r = 1,74\text{mm}$

$l = 61,14\text{mm}$
 $d = 3,48\text{mm}$
 $m = 1,4\text{g}$
 $r = 1,74\text{mm}$

$$\bar{r} = 1,74\text{mm}$$

$$r = 1,74\text{mm} \pm 0,01\text{mm}$$

$$\bar{l} = 61,16\text{mm}$$

$$l = 61,16\text{mm} \pm 0,02\text{mm}$$

$$\bar{m} = 3,5\text{g}$$

$$m = 3,5\text{g} \pm 0,1\text{g}$$

$$\rho = \frac{m}{\pi \cdot r^2 \cdot l} =$$

$$= 6013 \frac{\text{kg}}{\text{m}^3} \pm 245 \frac{\text{kg}}{\text{m}^3} = 6013 \frac{\text{kg}}{\text{m}^3} \cdot (1 \pm 4,07\%)$$

5.



$v = 14,82\text{mm}$
 $\check{s} = 14,88\text{mm}$
 $l = 49,80\text{mm}$
 $d = 2,41\text{mm}$

$$\rho = \frac{m}{V} = \frac{m}{S \cdot l}$$

$$= 3375,95 \frac{\text{kg}}{\text{m}^3} \pm 25,30 \frac{\text{kg}}{\text{m}^3} = 3375,95 \frac{\text{kg}}{\text{m}^3} \cdot (1 \pm 0,74\%)$$