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The Millikan Oil Drop

**Objective-** To show that an electric charge of an oil drop is quantized.

**Procedure-**  A computer simulated software was being used for the lab. For every trial, different size drop was simulated. The distance between the positive plate and the negative plate was 3.10mm for every trial. The voltage across the plates varied with the drops. The readings were recorded when the oil drop stopped by varying the voltage.

**Constant Values-** Distance between the two plates is 3.10mm. Elementary Charge i.e

*e*=1.6\*10-19coloumbs (C). Density of oil=851 kg/m3

**Data-**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trials | Radius of the drop (r, in micrometer) | Voltage across plates (∆V) | Mass of the oil drop in Kg | |q| charge of the oil drop in coulombs (C) | |q|/*e* |
| 1 | 1.41 | 273 | 9.99\*10-15 | 1.11989\*10-18 | 6.999 |
| 2 | 1.38 | 890 | 9.36\*10-15 | 3.1978\*10-19 | 1.99 |
| 3 | 1.41 | 380 | 9.99\*10.15 | 7.98876\*10-19 | 4.99 |
| 4 | 1.55 | 503 | 1.327\*10-14 | 8.01736\*10-19 | 5.01 |
| 5 | 1.39 | 600 | 9.57\*10-15 | 4.847\*10-19 | 3.02 |
| 6 | 1.45 | 510 | 1.086\*10-14 | 6.4735\*10-19 | 4.04 |
| 7 | 1.30 | 498 | 7.83\*10-15 | 4.777\*10-19 | 2.98 |
| 8 | 1.48 | 550 | 1.15\*10-14 | 8.6106\*10-19 | 5.15 |
| 9 | 1.46 | 525 | 1.109\*10-14 | 6.431\*10-19 | 4.01 |
| 10 | 1.37 | 348 | 9.16\*10-14 | 5.314\*10-19 | 3.32 |

**Conclusion-**  The charge of the oil drops in every trial seems to be an integer multiple of the elementary charge(*e*). As we take more decimals into account in calculation the charge approaches an integer except the last trial. So we can conclude that an electric charge of an oil drop is Quantized. In other words it is an integer multiple of a fundamental charge *e*.