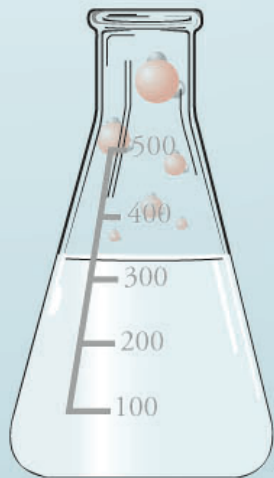
A series of water molecules, each consisting of one red oxygen atom and two black hydrogen atoms, are shown falling from the top left towards the bottom left. They are arranged in a vertical line, with some appearing to be in motion as they fall into a flask.

Reporting Values from Measurements

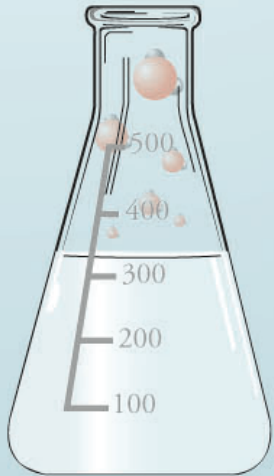
An Introduction to Chemistry

By Mark Bishop



Precision and Accuracy

- **Precision** describes how closely a series of measurements of the same object resemble each other. The closer the measurements are to each other, the more precise the measurement. The precision of a measurement is not necessarily equal to its accuracy.
- **Accuracy** is a measurement's relationship to the property's true value.



Precision and Accuracy (cont.)



This archer is precise
but not accurate.



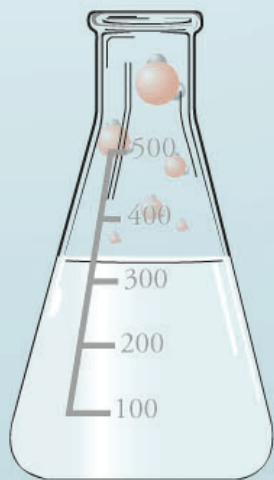
This archer is precise
and accurate.



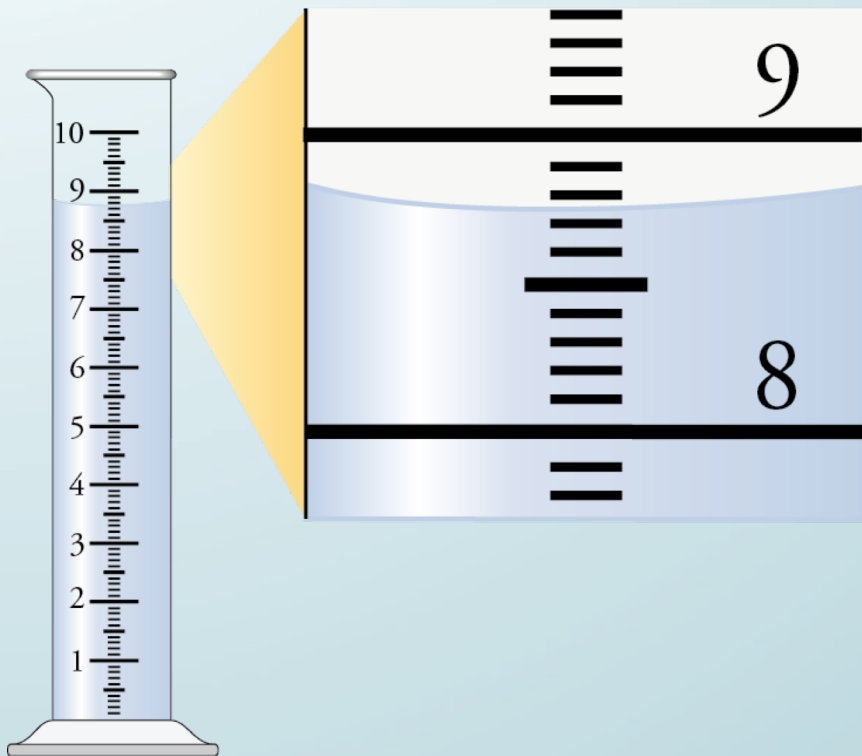
This archer is imprecise
and inaccurate.

Reporting Values from Measurements

- One of the conventions that scientists use for reporting numbers from measurements is to report all of the certain digits and one estimated (and thus uncertain) digit.

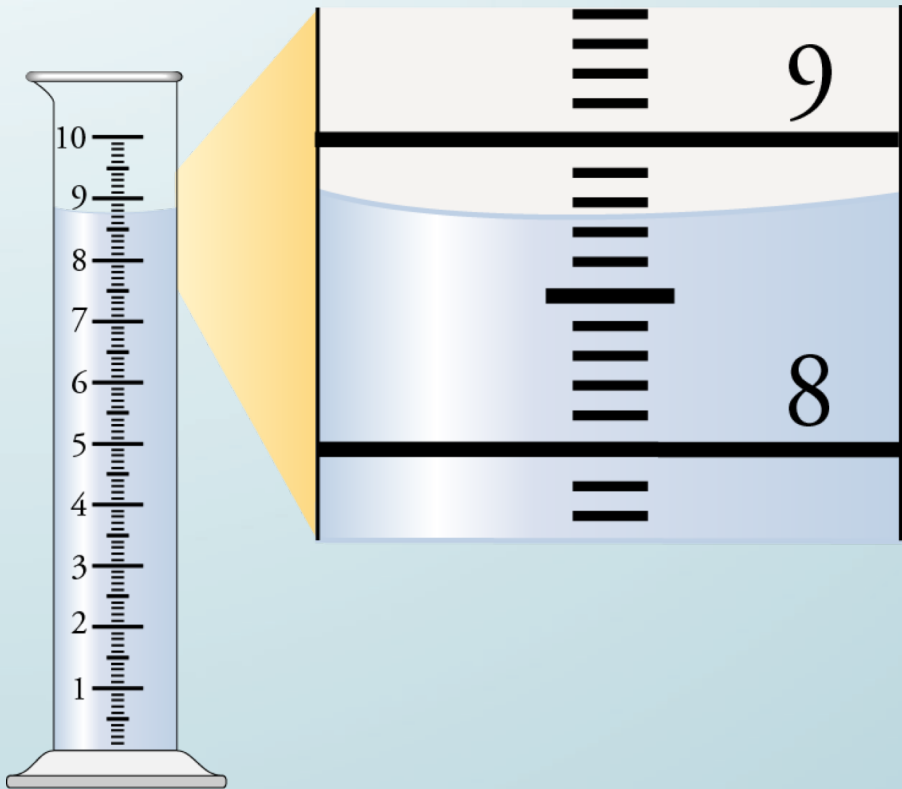


Graduated Cylinder



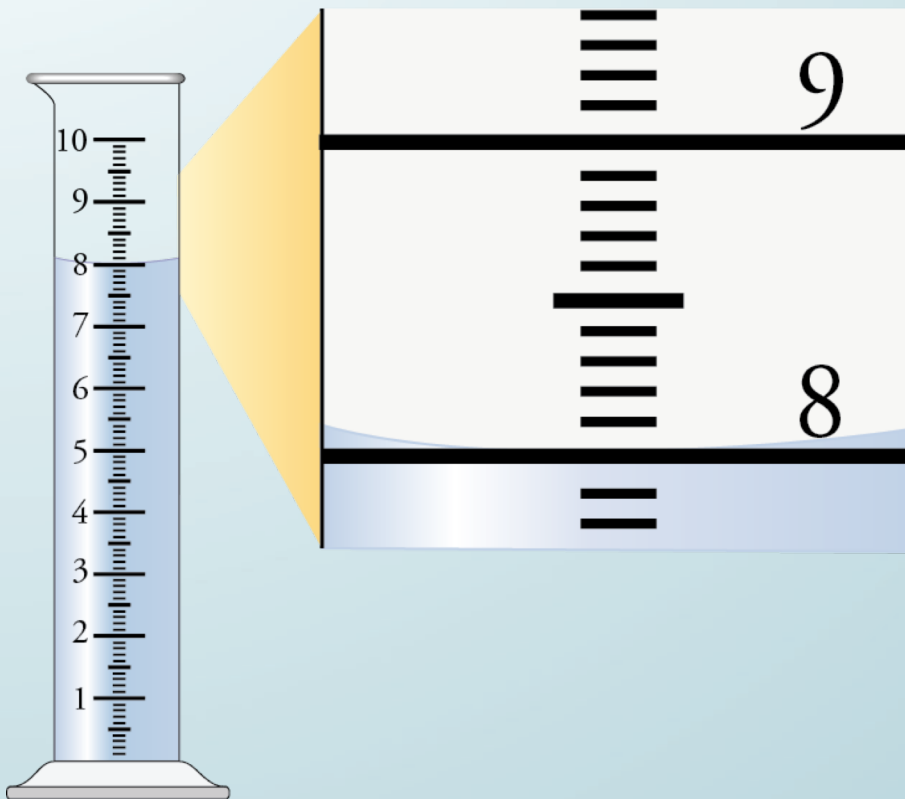
— Comparing the position of the bottom of the meniscus and the milliliter scale yields a measurement of 8.74 mL.

Graduated Cylinder Accurate to ± 0.1



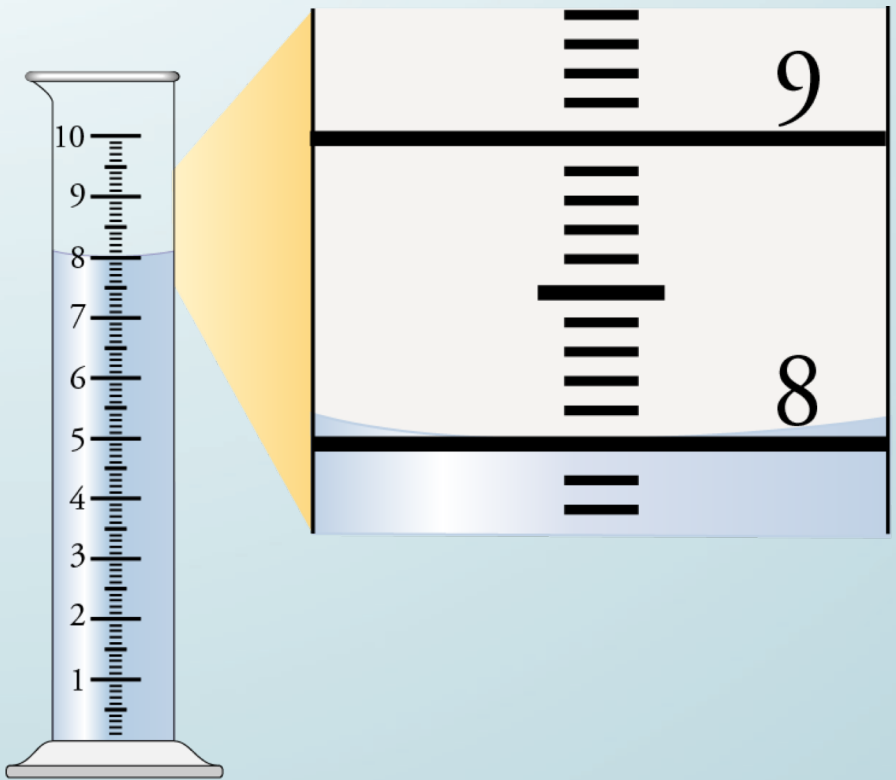
— If the graduated cylinder is only accurate to ± 0.1 mL, we report 8.7 mL.

Trailing Zeros



— We report 8.00 mL to show an uncertainty of ± 0.01 mL.

Trailing Zeros (2)

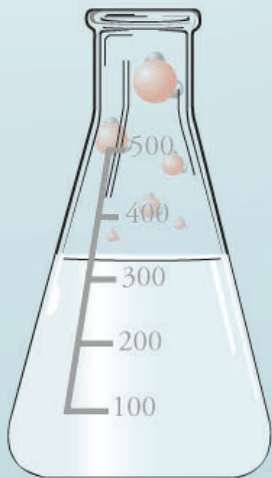


— If the graduated cylinder is only accurate to ± 0.1 mL, we report 8.0 mL.

Digital Readout



Report all digits unless otherwise instructed.



Digital Readout (2)



In many cases, it is best to round the number in the value to fewer decimal positions than displayed. For the mass displayed above, 100.432 g would indicate ± 0.001 g.

