there is no precision of a single buret reading, but (as was pointed out in Chapter 3) one can speak of the *uncertainty* of a single reading.

Table 29–1 gives some of the National Bureau of Standards tolerances for volumetric glassware. (The less-expensive equipment found in instructional analytical laboratories may have tolerances that are double those in the table.) These tolerances are *absolute* values of the maximum allowable error. For example, the tolerance of 0.05 mL for a 50-mL buret means that the absolute error in the volume delivered may be as large as 0.05 mL. If a volume of 40 mL were used from the buret, the *relative* value of the maximum allowable error, in parts per hundred (pph) and parts per thousand (ppt), would be

$$\frac{0.05\text{ mL}}{40.00\text{ mL}}(100) = 0.125\text{ pph}$$

$$\frac{0.05\text{ mL}}{40.00\text{ mL}}(1000) = 1.25\text{ ppt}$$

Uncertainty of Buret Measurements. Since only single buret readings are to be characterized, the absolute uncertainty of a single buret reading is needed. This is somewhat arbitrary; the 50-mL buret is usually read to 0.01 mL, although a typical student absolute uncertainty might be ± 0.02 mL. Since two buret readings are subtracted to obtain the volume delivered, a student's maximum possible absolute uncertainty may be as much as ± 0.04 mL (see Section 3–7 on subtracting random variables).

For a buret, the absolute uncertainty is the same for any volume, but the relative uncertainty (pph or ppt) varies. The following calculation for typical student

Table 29–1. Tolerances for Volumetric Glassware

Capacity, mL	Maximum Error Allowable		
	Volumetric Flasks	Volumetric Pipets	Burets
5	——	0.01	0.01
10	——	0.02	0.02
25	0.03	0.03	0.03
50	0.05	0.05	0.05
100	0.08	0.08	0.10
500	0.15	——	——
1000	0.30	——	——

Note: The Kimball brand, Kimax Class A, and the Corning brand, Pyrex, of glassware conform to these specifications (National Bureau of Standards). The less expensive brands may have tolerances twice as large.

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