

Appendix I: Pipet Techniques

Suction is used to draw solution into a pipet and delivery is controlled by proper admission of air into the neck end of the pipet. In a chemistry laboratory one should **NEVER SUCTION BY MOUTH**. Several types of pipetting bulbs are commercially available. They fit on top of the pipet and do not require suction by mouth. You must use one of these devices in a chemistry laboratory.

A. Standardized techniques of filling and emptying pipets are necessary in order to minimize the error which would result from irreproducible drainage effects.

1. The pipet should always be rinsed with 2 or 3 small portions of the sample solution so that the entire inner wall of the pipet is wetted with the solution before the actual sample is pipetted.

2. Filling the pipet - hold the pipet vertically and draw up the liquid about 2 cm above the upper mark.

3. Holding the pipet vertically over the beaker or container with the sample, wipe the outside of the pipet with a tissue - keep the tip of the pipet touching the lip of the beaker and let the liquid drain slowly to the upper mark or calibration mark of the pipet.

B. In delivery of a liquid from a **transfer pipet** one should allow rapid, free delivery until the liquid level is in the lower stem of the pipet. Then the tip of the pipet should be held against the inner wall of the receiving container until flow stops and then for an additional count of ten. The pipet should be removed horizontally from the wall of the receiving container and then withdrawn entirely. The small "slug" of solution remaining in the tip of a fully drained pipet should always remain, since allowance has been made for this amount in the calibration of the pipet.

C. However, some pipets are calibrated "for a blow-out" in which case the final part of the delivery should be changed to allow for "blow-out" of the last of the liquid portion. This type of pipet is marked by the manufacturer with a 1/8 inch wide band of frosted glass near the top of the pipet. Unless a pipet is marked in this way, the blow-out process should **never** be used.

These procedures described above are those adopted by the National Bureau of Standards (Circular #602).

A long delivery (free flow) time followed by a very brief drainage period (a count of ten) has been found more reproducible than a rapid delivery time and a long drainage time.

D. Remember the pipet of precision is the transfer pipet. This can be calibrated either for drainage or for blow-out. Most transfer pipets are drainage pipets. For pipets of less than 0.5 mL, blow-out delivery or delivery between 2 marks (such as in a Mohr pipet) is to be preferred. Pipets calibrated "to contain" are used in the measurement of a sample when it can be diluted with a solution that can be used to rinse out the pipet. This is the most accurate way to measure small amounts (especially of blood because of high viscosity).

Never try to deliver aliquots by tapping the finger against the pipet or tapping the pipet against the receiving container.

TYPES of PIPETS

Name	Calibration	Function/Use	Available sizes (in mL)	Type of Drainage
Volumetric	TD	Delivery of a fixed volume	1 - 200	Free drainage
Mohr	TD	Delivery of a variable volume	1 - 25	Drain to lower calibration
Serological (etched)	TD	Delivery of a variable volume	0.1 - 10	Blow-out last drop
Serological	TD	Delivery of a variable volume	0.1 - 10	Drain to lower calibration
Ostwald-Folin (etched)	TD	Delivery of a fixed volume	0.5 - 10	Blow-out last drop
Lambda	TC	To contain a fixed volume	0.001 - 2	Wash out with suitable solvent
Lambda	TD	Delivery of a fixed volume	0.001 - 2	Blow-out last drop