EXPERIMENT

1 The Laboratory Balance: Mass Determinations

Objective

Familiarity with the various instruments used for making physical measurements in the laboratory is essential to the study of experimental chemistry. In this experiment, you will investigate the uses and limits of the various types of laboratory balances.

Introduction

The accurate determination of *mass* is one of the most fundamental techniques for students of experimental chemistry. **Mass** is a direct measure of the *amount of matter* in a sample of some substance. That is, the mass of a sample is a direct indication of the number of atoms or molecules the sample contains. Because chemical reactions occur in proportion to the number of atoms or molecules of reactant present, it is essential that the mass of reactant used in a process be accurately and precisely known.

Various types of balances are available in the typical general chemistry laboratory. Such balances differ in their construction, appearance and operation and in the level of precision (number of significant figures) they permit in mass determinations. Three of the most common types of laboratory balances are indicated in Figures 1-1, 1-2, and 1-3. Determine which sort of balance your laboratory is equipped with, and ask your instructor for a demonstration of the use of the balance if you are not familiar with its operation.

The method of operation differs for the three types of balances, and you should ask your instructor for a demonstration of the proper procedure to use. There are, however, some general points to keep in mind when using any balance:

1. Always make sure that the balance gives a reading of 0.000 grams when nothing is present on the balance pan. Adjust the tare or zero knob if necessary. If the balance cannot be set to zero, ask the instructor for help.
2. All balances, but especially electrical/electronic balances, are damaged by moisture. Do not pour liquids in the immediate vicinity of the balance. Clean up any spills immediately from the balance area.
3. No reagent chemical substance should ever be weighed directly on the pan of the balance. Ideally, reagents should be weighed directly into the beaker or flask in which they are to be used. Plastic weighing boats may also be used if several reagents are required for an experiment. Pieces of filter paper or weighing paper should ordinarily *not* be used for weighing of reagents.
4. Procedures in this manual are generally written in such terms as "weigh 0.5 gram of substance (to the nearest milligram)." This does not mean that exactly 0.500 gram of substance is needed. Rather, the statement means to obtain an amount of substance between 0.450 and 0.550 gram but to record the actual amount of substance taken (e.g., 0.496 gram). Unless a procedure states explicitly to weigh out an