metamerism is detected automatically. Metamerism is a psychophysical phenomenon commonly defined incompletely as "two samples which match when illuminated by a particular light source and then do not match when illuminated by a different light source." In actuality, there are several types of metamerism, of which the sample metamerism and illuminant metamerism are the most common. In sample metamerism, two color samples appear to match under a particular light source and then do not match under a different light source. Illuminant metamerism appears when different light sources illuminate the same sample and the differences are revealed. The observer metamerism refers to the spot where each individual perceives color slightly differently. The geometric metamerism arises when identical colors appear different when viewed at different angles, distances, light positions, and so on.

In a spectrophotometer, the light is usually split into a spectrum by a prism or a diffraction grating before each wavelength band is selected for measurement. Instruments in which narrow bands are selected by interference filters have also been developed. The spectral resolution of the instrument depends on the narrowness of the bands utilized for each successive measurement. In theory, a spectrophotometer could be set up to compare the reflected light directly with the incident light, but it is more usual to calibrate against an opal glass standard that has been calibrated by an internationally recognized laboratory. Checks must also be made on the optical zero, for example, by measurements with a black light trap, because dust or other problems can give rise to stray light in an instrument (which would give false readings). Spectrophotometers contain monochromators and photodiodes that measure the reflectance curve of color every 10 nm or less. The analysis generates typically 30 or more data points, with which a precise color composition can be calculated.

A large number of suppliers provide colorimeters, including a large array of equipment from Hunter Lab's Labscan XE with special adapter for small quantity of powders, offering an excellent choice in preformulation work. The instrument has a 3-mm port and requires 0.4-cc powder to perform the testing (9).

7.2.9 Electrostaticity

When subjected to attrition, powders can acquire an electrostatic charge, the intensity of which is often proportional to the physical force applied, as static electrification of two dissimilar materials occurs by the making and breaking of surface contacts (triboelectrification or friction electrification). Electrostatic charges are often used to induce adhesive character to bind drugs to carrier systems, for example, glass beads coated with hydroxypropylmethyl cellulose–containing drugs. The net charge on a powder may be either electropositive or electronegative, depending on the direction of electron transfer. The mass charge density can vary from 10^{-5} to 100 μC/kg, depending on the stress, ranging from gentle sieving to micronization process. This can be done using electric detectors to determine the polarity and the electrostatic field. The electrostaticity results in significant changes in the powder flow properties.

Studies on triboelectrification and potential charge buildup on equipment and particle surfaces and the subsequent adhesion caused by static charge often overlook the fact that all materials (whether they have a net surface charge or not) exhibit surface energy forces that are very short in range but come into play once the surfaces are "touching." These van der Waals forces are caused by the dispersive and polar