2. Counting Konimeter Samples

Konimeter samples may be examined and counted by use of the special microscope attached to some konimeters. More satisfactory counts are obtained by using a regular miscroscope with light-field illumination and fitted with a special holder so that the konimeter dust spots can be rotated and any one can be brought into view readily. A satisfactory magnification has been found to be 200*x* obtained by using a 10*x* objective with a compensated 20*x* ocular. The ocular is fitted with a squared micrometer scale, similar to that shown in Figure 7, with two crossed

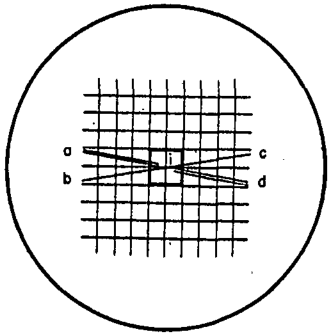

Figure 7. Micrometer scale for counting konimeter samples.

lines that outline sectors of 18 degrees. The parallel lines *ai* and *id* are for use in estimating the size of particles. In counting, the scale is centered over the dust spot and all the particles in the two 18-degree sectors are counted, giving a total count of all the dust in 36 degrees or 10 per cent of the entire spot. From this count must be subtracted a control count of an equal area of the unused plate and adhesive film. The net count of 10 per cent of the total area of the dust spot is multiplied by 10 and divided by the volume of air sampled (in milliliters) to obtain the number of particles per milliliter. If the results are desired in million particles per cubic foot, the number of particles per milliliter may be multiplied by 0.02832; for a 2.5-ml. sample the actual count for a 36-degree sector may be multiplied by 0.113; and for a 5-ml. sample, the 36-degree sector count should be multiplied by 0.057.

3. Counting Owen's Jet Samples

The cover slip with dust deposit is mounted dry with dust side down on a microscope slide and examined under a microscope with an oil immersion objective, dark-field illumination, and about 1000*x* magnification. An ocular with a crossbar ruled micrometer with 1-mm. squares is used; a representative band of

one square width across the ribbon of dust is selected, and all the particles in this band are counted. Two or more bands may be counted and averaged if desired, but the effort is hardly justifiable because the ribbon is rarely uniform in distribution or width throughout its length, especially at each end. The number of bands in the length of sample ribbon must then be determined if this factor has not previously been established. Lower magnification must be used to measure the ribbon in terms of the ruled ocular disk and the relation between objectives, if not known, can be established by the use of a stage micrometer. Since the volume of air sampled was 50 ml., the number of particles per milliliter is computed by multiplying the number found in one band by the number of bands and dividing by 50. This result may easily be computed to million particles per cubic foot by multiplying it by 0.028, but no correlation with standard impinger results should be assumed from such computation.

B. DETERMINING PARTICLE SIZE DISTRIBUTION

Use of the microprojector[54,56] is perhaps the most satisfactory method of determining the particle-size distribution of dust samples collected either by the impinger (one or more drops evaporated to dryness on a slide), the konimeter, the Owen's jet, or the electric precipitator. While a magnification of 1000 diameters (employing 10*x* objective) is ordinarily used for counting, a magnification of 10,000 diameters (90*x* oil-immersion objective) is recommended for determining the particle size, a change in tube length being necessary to adjust the magnification. Particle-size distribution is determined by estimating the size of each of the particles in representative fields of the sample using the 0.5-μ squares on the screen for comparison. The particles are classified according to diameter in intervals of each 0.5 μ, counts for each class being registered on a Marbel blood counter or by other suitable means. The number of particles of a particular size that occur in a given count determines that size frequency. These frequencies are usually expressed in percentages of the total count.

The data from a particle-size determination may be presented graphically, as in Figure 8 by plotting the counts as ordinates against the sizes as abscissas at regularly spaced-size intervals. This graph clearly illustrates the size variation and counts and shows two typical frequency distributions.

When particle-size data are tabulated, as in Table 4, which has size groups at 0.5-μ intervals and frequencies in percentage, it is again possible to compare the characteristics of different dust dispersions. The median is the cumulative 50 per cent size, usually a representative measure of average dust size. It should be noted, however, that in the case of some dusts with wide variations in size the mode may prove not to coincide with the median, and would be a better measure of central tendency. Aluminum dust, soapstone dust, and slate milling, in all of which the mode, value of most frequent occurrence, is 1.25 μ, although the medians range

[54] C. E. Brown and W. P. Yant, *U. S. Bur. Mines Rept. Invest.* No. **3289**, 1935.