particles. Although particle size distribution is an essential consideration [illegible] intelligent interpretation of performance data, there are numerous cases [illegible] size information should be accompanied by color. Air-borne solid matter does [illegible] have the same blackening power at all points on its size-distribution [illegible] Generally, where color distinction is important, the relatively great surface [illegible] of the smaller particles will make them a greater nuisance.

D. REMOVAL OF AIR-BORNE ORGANISMS

A good correlation exists between the number of microorganisms in [illegible] the concentration of dust particles. It is concluded, therefore, that many organisms or bacteria are attached to air-borne dust particles, and consequently will be removed from the air by dust-separating devices. Organisms carried by droplets such as are produced by coughing or sneezing, likewise can be removed by cleaners capable of separating fog or mist particles.[2]

An important precaution should be observed in the case of air washers [illegible] means are not taken to inhibit or prevent the growth of organisms in recirculating water tanks, bacteria or virus may be returned to the occupied spaces by entrainment of mist in the air stream. If mist or fog evaporates while in transit to the space under treatment, microorganisms may be left air-borne and so contribute to a gradually rising concentration in the course of air recirculation.

Air filters treated with adhesives may accumulate a luxuriant growth [illegible] viscous material does not contain germicidal or inhibiting agents. A serious nuisance can result from bacterial decomposition of organic matter accumulated on filters.

III. Properties of Aerodispersions

The classification and description of various forms of matter that may be carried by an air stream into a cleaning device appear in Chapter VI and need not be repeated here.

Many properties of a gas and its impurities should be considered in planning an effective cleaning installation. Some are evident; others are easily overlooked. A comprehensive review of these properties is not possible here, but a check list of characteristics is offered to aid in selecting the ones that are apt to be significant in a particular application. Brief comments will be made about a few properties that are important in the design and application of most air-cleaning systems.

A. PROPERTIES OF THE CARRIER GAS

These physical properties or conditions of the air or gas should be reviewed before designing or selecting a system for removing impurities:

1. Quantity or rate of flow, preferably by weight.

[2] H. M. Decker, F. A. Geile, H. E. Moorman, and C. A. Glick, *Heating, Piping, Air Conditioning*, **23**, 125–129 (October, 1951); H. M. Decker, J. B. Harstad, F. J. Piper, and [illegible] Wilson, *Heating, Piping, Air Conditioning*, **26**, 155–158 (May, 1954).

2. Temperature: actual at inlet, and desired at outlet.
3. Pressure: at inlet, and allowable change.
4. Density.
5. Viscosity.

Temperature and Pressure. Of all the properties of the carrier gas that [illegible] the designer of cleaning equipment, temperature requires the greatest [illegible] It affects the phase distribution of suspended matter, chemical activity, [illegible] diffusivity, gas viscosity and density, durability of construction materials, and size of equipment. Both pressure and temperature may determine the [illegible] of air-borne matter, along with chemical nature. For most applications [illegible] pressure changes are negligible compared with temperature changes, and [illegible] temperature is the controlling condition.

Pressure is considered in designing the structure to provide the necessary [illegible] and prevent leakage into the surrounding atmosphere, but it usually has [illegible] effect upon the cleaning processes. However, research workers are careful to assess the importance of pressure in diffusion processes, and where viscosity [illegible] density may influence the migration of particles through the fluid.

B. PROPERTIES OF AIR CONTAMINANTS

Many properties of matter carried by the air or gas should be considered before designing or selecting equipment for its removal. It is true, of course, that for [illegible] one application, the list of significant properties may contain only a few [illegible] the following items:

1. Water distribution: solid, liquid, and vapor phase; presence of water in suspended solids (water is treated as a foreign constituent whenever the carrier [illegible] not water vapor or steam).
2. Composition of solids, liquids, and gases.
3. Concentration of each constituent.
4. Particle size distribution, or screen analysis.
5. Unusual shape characteristics of solid particles.
6. Density of solid or liquid particles.
7. Porosity of solid particles.
8. Condensation temperature, or dew point, of vapors.
9. Sublimation temperature, or freezing point, of solids or semisolids.
10. Diffusivity of gaseous or submicron constituents.
11. Solubility in water or other collecting liquids.
12. Volatility or vapor pressure.
13. Hygroscopic or hydrophobic tendency.
14. Adhesive or cohesive nature of particles.
15. Presence of magnetic particles.
16. Electrical characteristics.
17. Hardness, abrasiveness, erosiveness.
18. Corroding or etching potential.