19. Flammability, explosibility.

20. Physiologic effects: toxicity, irritation, odor.

Concentration of Contaminants. The magnitude of dust concentrations or "loadings" encountered in air or gas cleaning may be exhibited on a simplified scale:

100 g./m.³	pneumatic conveying
10 g./m.³	heavy loadings from processes
1 g./m.³	moderate loadings
0.1 g./m.³	light loadings; essentially clear effluents in daylight
10 mg./m.³	dusty workroom air
1 mg./m.³	acceptable concentration of "nuisance" dusts
0.1 mg./m.³	country atmosphere

There is evidence that the concentration of solids in the range applying to pneumatic conveying has an influence on the effectiveness of cyclone separation. There appears to be an improvement of separation at the high concentration, somewhat in the nature of a large-particle "stampede," or a "carry along" of small particles.

In the case of electric precipitation, a high concentration of particles interferes with the charging process and with the retention of charges by particles until they reach the collecting surfaces. Accordingly, high concentrations affect this separation process adversely.

Increase in the concentration or partial pressure of a gaseous constituent tends to increase the removal percentage in scrubbing towers. Assuming a fairly low equilibrium concentration at the gas-liquid interface, an increased concentration of gas in the air stream gives an increased "driving force," causing the gas to pass into the scrubbing liquid. However, if the liquid approaches saturation with the gas, or the driving force is reduced, the percentage of gas transmitted across the interface into the liquid declines.

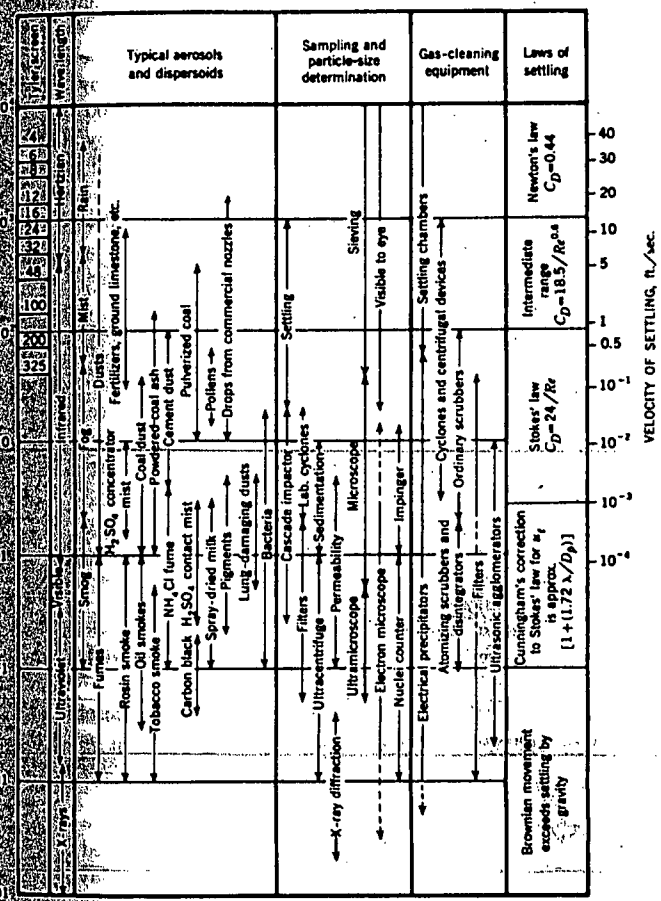
Concentration of a gas or vapor in the air affects the retentivity of adsorbents and thus the percentage of the contaminant they will separate. For fresh or regenerated adsorbent, the separation ratio may be essentially independent of vapor concentration in the air stream. As the adsorbent approaches saturation with the gas being separated, its retentivity for that substance gradually drops to zero.

Particle Size. A statement of the separating ability of an air cleaner without reference to the size of solid or liquid particles removed is as indefinite as specifying the air-flow capacity of a blower without stating the resistance it will overcome. In other words, a percentage figure for the effectiveness of a dust separator is practically meaningless when standing alone. Performance specifications should contain a qualifying phrase of the following form when solid or liquid particles are involved: ". . . based on the fraction below —— microns"; ". . . based on the fraction above —— microns"; or ". . . based on the fraction between —— and —— microns."

In some cases, where exceptional performance is expected, it is important to specify not only the particle-size distribution of air-borne matter but also the

method of size analysis. There is no universal method of measuring particle size that can be used for the rating of air- or gas-cleaning equipment.

The figure, from Johnstone's[8] adaptation of data on characteristics of air-borne matter and capabilities of various separating devices on the scale of particle size. Screen-size particles, generally considered those over 44 μ, are easy to separate in the simplest types of equipment, including gravitational separators.



Characteristics of air-borne matter and capabilities of air-cleaning devices related to particle size. Settling velocities are for spheres of density 1 in air at 70° F. (From Johnstone.[8])

[8] H. F. Johnstone, Gas cleaning and purification, *Encyclopedia of Chemical Technology*, Interscience Encyclopedia, New York, 1951, pp. 83–106.