

and of the distribution of the air within large rooms. A high carbon dioxide concentration in parts of an occupied room may indicate air stagnation which can result in objectionable odors or in failure to remove local surplus heat.

The Petterson-Palmquist apparatus has been generally accepted as the standard device for the determination of carbon dioxide in air investigations. The principle involved is the measurement of a given volume of air, the absorption of the contained carbon dioxide in a caustic potash solution, and the remeasurement of the volume of air at the original

TEST DATA									
BUILDING		FLOOR				DATE			
ROOM	TEMPERATURE	REL. HUM.	AIR MOTION	DUST	WATER	ODORS	CO ₂	SUPPLY REGISTERS	EXHAUST REGISTERS
	DRY GLOB	WET GLOB						AREA & VELOCITY	AREA & VELOCITY
								G.F.M.	G.F.M.
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									

PRIMARY SENSE IMPRESSION		NOTES	
NO. OCCUPANTS		WINDOWS AD.	
PHYSICAL STATE		TYPE	
AIR SPACE PER OCCUPANT		AREA	
TOTAL AIR SUPPLY BY CO ₂		LEAKAGE	
AIR SUPPLY PER OCCUPANT BY CO ₂		RATIO - GL. CONTENT	
AIR DISTRIBUTION %		FLOOR AREA PER PERSON	

FIG. 12. DATA SHEET FOR SYNTHETIC AIR CHART TEST

pressure in a finely graduated capillary tube, the difference in volume representing the absorbed carbon dioxide. (See Report of Committee on Standard Methods for Examination of Air, *American Public Health Association*, Vol. 7, No. 1; *American Journal of Public Health*, Jan., 1917).

Where field conditions are such that this apparatus may not be conveniently used, as in street cars, air samples may be collected in prepared bottles having rubber stoppers, and these may be subjected to laboratory analysis.

Dust

The Hill Dust Counter is a simple device with which to measure the number of very large particles of dust in the air, while more exact studies of dust may be made with the Konimeter, or with the Impinger. (See *Public Health Bulletin*, No. 144, 1925, U. S. Public Health Service).

Bacteria

The number of bacteria which are attached to heavy particles of dust or drops of moisture may be determined by the number of colonies that develop on a culture plate which has been exposed for two minutes. A standard 4-in. Petrie dish, with agar-agar for a media, is used for this purpose. The plates are incubated from 24 to 48 hours at a temperature of 98 deg. Fahr. At the end of this time the separate colonies have developed to a size which are easily counted. If an incubator is not available cultures may be grown at room temperatures (70 deg.) for a period of five days.

Volumetric air measurements must be made with skill and precision and great care must be exercised in securing the right conditions under which such measurements are made. There are two general methods in use for measuring air volumes, the first, by means of an anemometer, and the second, by means of a Pitot tube.

Anemometers and Pitot Tubes

When it is necessary to employ an anemometer for measuring air volume, the instrument must have been recently calibrated, and the greatest care must be exercised in methods of manipulation. The influence of obstructions at the register face, the distance from the register at which the anemometer is held and the great variation in velocities which exists over the area of most air discharge openings all combine to make an exact quantitative measurement of air by an anemometer a difficult matter.

For a further discussion of the measurement of air flow by means of the anemometer and Pitot tube, see p. 503, Chapter 31.

Air Movement Determinations

Air movement is a vital factor in the prevention of stagnant areas and bodily discomfort. Where a determination of air movement is desirable the Kata-thermometer, as developed by Dr. Leonard Hill, of England, may be used. (See Report of Committee on Standard Methods for Examination of Air, *American Public Health Association*, *American Journal of Public Health*, Vol. 7, No. 1, January, 1917. The wet Kata-thermometer gives the rate of cooling by radiation, convection and evaporation. The dry Kata-thermometer gives the rate of cooling by radiation and convection. The difference between the two is the rate of heat loss due solely to evaporation. Air movement is a consideration in the determination of the effective temperature.

Air movement may be determined approximately by observation of the movement of a smoke cloud and the use of a stop watch; the smoke cloud being formed by means of an ammonium chloride cloud device, or by a smoke bomb. Carefully balanced gas balloons may also be used.

REFERENCES

- Modus Operandi of the Synthetic Air Chart*, by John R. Allen (A.S.H.V.E. TRANSACTIONS, Vol. 26, 1920, p. 545).
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- Instruments for the Measurement of Air Velocity*, by J. H. Parkin (A.S.H.V.E. JOURNAL, June, 1929, p. 149).