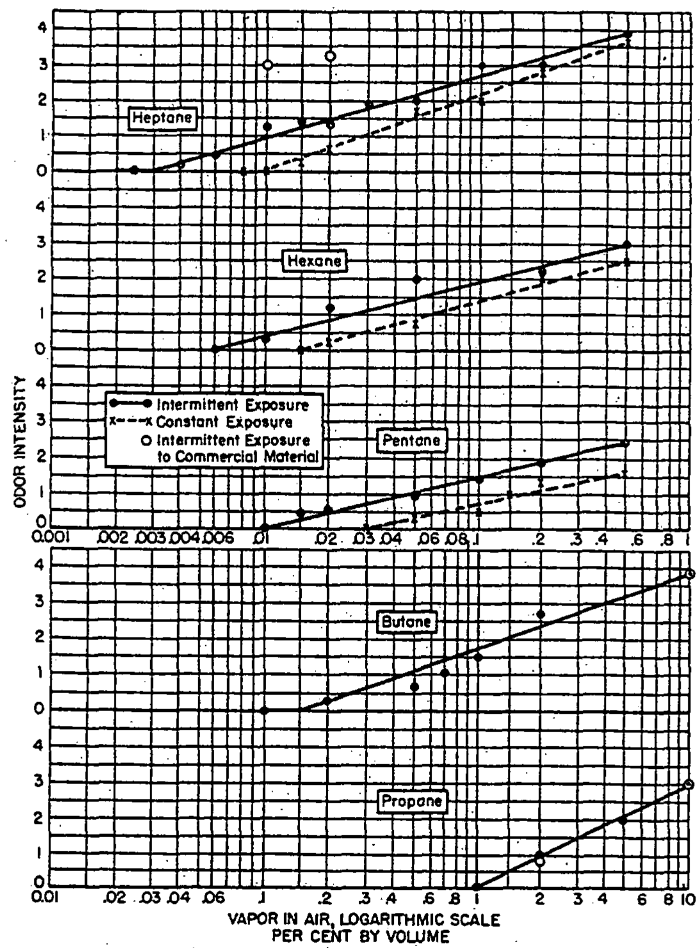

FIG. 3. Relation between concentration of vapor of purified paraffin hydrocarbons and odor intensity.

1. Interferometer

Perhaps the most dependable and most widely applicable physical instrument yet developed for field use is the 50-cm. portable gas interferometer. This instrument accurately measures minute changes in refractivity, so that it may successfully be used to determine low concentrations of contaminating gases or vapors in the atmosphere, providing the refractivity of the contaminant is sufficiently different from

that of air, which is 291.7×10^{-6} at 0° C. and 760 mm. Hg pressure. Since refractivity is a function of density, as well as of molecular structure, slight changes in pressure and temperature have an important bearing on results and must be carefully controlled. The light source must be of constant wave length and is usually an incandescent filament. The interferometer is a sensitive form of refractometer which, instead of measuring refraction directly, compares the refractivity of one gas to that of another. In air analysis, the usual standard of comparison is dry air, from which all carbon dioxide has been removed. This standard atmosphere must be at the same temperature and pressure as the atmosphere to be examined. An interferometer may be calibrated against known mixtures of vapor in air, of the same order of concentration as atmospheric mixtures in which it is to be employed. Also, it may be calibrated for absolute refractivity changes, that is, refractivity factor, by increasing the pressure of dry air in one cell, referred to similar dry air at constant atmospheric pressure in the other.[10, 11] Once this refractivity calibration has been accomplished, instrument scale readings may be translated to vapor percentages by employing any reliable data on the refractivity of vapors and gases. These data are perhaps most readily utilized when presented as unit refractivity change ($U\Delta R$), i.e., the change

TABLE 3

Unit Refractivity Change, $U\Delta R$

Solvent	$U\Delta R \times 10^6$	Solvent	$U\Delta R \times 10^6$
Methyl alcohol	2.5	Heptane	19.2
Ethyl alcohol	5.4	Octane	22.7
n-Propyl alcohol	8.6	Cymene	25.9
n-Butyl alcohol	11.6	Cyclohexane	15.1
Amyl alcohol	14.3	Cyclohexene	14.4
Methyl amyl alcohol	16.7	Cyclohexanol	15.4
Ethyl formate	8.7	Cyclohexanone	13.7
Ethyl acetate	11.6	Methyl cyclohexane	17.5
n-Butyl acetate	18.0	Methyl cyclohexanone	16.3
Amyl acetate	20.4	Benzene	14.4
Ethyl propionate	14.7	Toluene	17.5
Furfural	13.1	Xylene	20.4
Acetone	7.6	Ethylbenzene	20.1
Butanone	10.2	Pyridine	12.7
Pentanone	13.1	Chloroform	11.3
Hexanone	16.1	Carbon tetrachloride	14.6
Hexone	16.6	s-Dichloroethylene	10.8
Heptanone	19.0	Trichloroethylene	13.7
Octanone	21.9	Tetrachloroethylene	16.9
Mesityl oxide	16.3	Ethylene dichloride	11.1
Isophorone	19.2	Propylene dichloride	13.6
Ethyl ether	11.9	Dichloroethyl ether	16.9
Isopropyl ether	17.8	Chlorobenzene	17.5
n-Butyl ether	23.0	Ethyl bromide	9.5
Cellosolve	11.6	Ethylene bromide	14.3
Dioxane	11.3	Ethyl iodide	12.8
Pentane	13.4	Carbon disulfide	11.3
Hexane	16.6	Water	−0.28

[10] J. D. Edwards, *U. S. Bur. Mines Tech. Paper* No. *131* (1919).
[11] F. A. Patty, *J. Ind. Hyg. Toxicol.*, *21*, 469 (1939).