

TABLE 39-E. PHYSICAL METHODS USED IN AIR ANALYSIS

Method	Principle of Operation	Type of Sampling	Range		Application and Remarks
			Lower (ppm)	Upper (ppm)	
Absorption (volumetric, gasometric or manometric)	Measured volume of gas-air mixture is absorbed by reagent and volume shrinkage determined. Pressure reduction may also be measured (manometric)	Grab	200	1,000,000	Selective. Oxygen deficiency determinator. Special forms will detect lower concentrations. U.S. Bureau of Mines describes a portable form for field use, and several compact models are available.
Adsorption (Gravimetric)	Gas-air or vapor-air mixture is trapped on adsorbent such as activated charcoal or silica gel. Change in weight represents weight of contaminant in known air volume.	Continuous	<1	Depends on amount sampled	Nonselective. Used primarily for total solvents when a mixture of solvents is encountered. Adsorbed material when eluted can be measured by gas chromatography.
Electrical Conductivity	Gas-air mixture is absorbed in a solution whose electrical conductivity is measured before and after absorption.	Grab or Continuous	0.01	10,000	Selective. Can be applied to all acid or alkaline gases and also to vapors which can be burned to CO ₂ , SO ₂ , or HCl. Field instrument available.
Heat of Combustion 1 Benzol Indicator or Vaporizer	Gas-air or vapor mixture is passed over a heated platinum wire which is part of a balanced Wheatstone bridge. Combustion of the gas on the wire unbalances the bridge.	Grab	20	1,000	Selective. Field instrument was designed primarily for benzol but can be applied to other combustible gases not removed by water vapor absorbent which is provided for proper operation of the instrument.
2 Explosimeter (Flammable)	Explosimeter is a less sensitive form of the above instrument for explosive concentrations of flammable gases.	Grab	10,000 and up	50,000	Water vapor absorbent not necessary because of lower sensitivity. Single meter calibrations for all gases the product of whose molecular heat of combination and the lower explosive limit is a constant.
3 CO Indicator (Hopcalite)	Gas is passed over a catalyst (Hopcalite) which converts CO to CO ₂ . Heat of combustion is measured by thermopiles connected to a galvanometer.	Continuous	10	10,000	Portable apparatus for field use. Water vapor and oil fumes are removed so they cannot poison catalyst.