X. APPENDIX II

ANALYTICAL METHOD FOR ETHYLENE DIBROMIDE

The following analytical method is adapted from Method No. 260 of the Physical and Chemical Analysis Branch of NIOSH [78, and S Tucker, written communication, March 1977].

Principle of the Method

Ethylene dibromide vapor trapped on charcoal from a known volume of air is desorbed with a 99:1 mixture of benzene-methanol (v/v). A portion of the desorbed sample is injected into a gas-liquid chromatograph equipped with an electron-capture detector. The area of the resulting peak is determined and compared with those obtained from injection of standards.

Range and Sensitivity

This method was used to analyze ethylene dibromide over the range of 1.6 μg/cu m to 16 mg/cu m (0.0002-2 ppm) at an atmospheric temperature and pressure of 25 C and 738 mmHg for a 25-liter air sample [78, and S Tucker, written communication, March 1977]. Under the conditions of sample size (25 liters), the probable range of this method is 40-800 nanograms/sample solution at a detector sensitivity that gives nearly full deflection on the strip chart recorder for a 1-mg sample. The method may be capable of measuring much smaller amounts if the desorption efficiency is adequate and if a photon-ionization detector is used on the chromatograph. Desorption efficiency must be determined over the range used.

The upper limit of the range of the method is dependent on the adsorptive capacity of the charcoal tube. This capacity varies with the concentrations of ethylene dibromide and other substances in the air. The first section of the charcoal tube held at least 21.4 mg of ethylene dibromide when a test atmosphere containing 446 mg/cu m of ethylene dibromide in dry air was sampled at 200 ml/minute for 240 minutes; at that time, the concentration of ethylene dibromide in the effluent was less than 2% of that in the influent. If a particular atmosphere is suspected of containing a large amount of contaminant, a smaller sampling volume should be taken.

Interferences

Compounds which have about the same retention time as ethylene dibromide and which are detected by the electron capture detector will interfere with the analysis. This type of interference can be overcome by changing the operating conditions of the instrument, usually by modifying the column, the column temperature, or both.

Ethylene dibromide will not be efficiently trapped when the amount of water vapor in the air is so great that condensation occurs in the trapping media. Lesser amounts of water vapor in the air may severely decrease the breakthrough volume. When interfering compounds are known or suspected to be present in the air, such information including their suspected identities could be transmitted with the sample.

Precision and Accuracy

The relative standard deviation for the combined analytical and sampling method in the prescribed range of 203-2,370 nanograms/charcoal tube was 0.070.

Advantages and Disadvantages of the Method

This method uses a sampling device that is small, portable, and involves no liquids. Interferences are minimal and can usually be eliminated by altering chromatographic conditions. Analysis of the charcoal tubes can be accomplished rapidly. Simultaneous analysis of two or more compounds suspected of being present in the same sample can usually be accomplished by simply changing chromatographic conditions.

One disadvantage of the method is that the amount of sample which can be collected by this method is limited by the weight of ethylene dibromide which the tube will hold before breakthrough. When the sample value obtained for the backup section of charcoal exceeds 25% of that found in the front section, the possibility of appreciable sample loss exists. Recoveries of ethylene dibromide from charcoal are decreased upon storage of the charcoal tube samples at room temperature, particularly with lesser amounts of analyte. The use of an internal standard is required in order to attain good precision. Other organic compounds in high concentrations may displace ethylene dibromide from the charcoal. High humidity may decrease the absorptive efficiency and capacity of the charcoal. The precision of the method is limited by the reproducibility of the pressure drop across the charcoal tube. This drop will affect the flowrate and the volume of air sampled, since the pump is usually calibrated for one tube only.

Apparatus

(a) Gas-liquid chromatograph equipped with an electron capture detector. A glass tube filled with 20/40 mesh activated charcoal should be attached to the exit port in order to trap the ethylene dibromide in the effuent gas stream.

(b) Gas chromatography column. 1.8 m x 4 mm (ID) constructed from borosilicate glass and packed with 3% OV-210 on 80/100 Gas Chrom Q. Other columns which achieve the desired separation may be used.

(c) A mechanical or electronic integrator or a recorder for determining peak area.

(d) Small glass-stoppered test tubes or equivalent.

(e) A 10-μl syringe and other conveniently sized syringes for preparation of the standards.

(f) Pipets, 10.0 ml and 1.0 ml.

(g) Volumetric flasks, 10-ml capacity for standard dilutions.

Reagents

(a) Benzene, pesticide quality.

(b) Methanol, pesticide quality.

(c) Ethylene dibromide of known purity.

(d) An appropriate internal standard, such as 1,1,2,2,-tetrachloroethane or 1,2 dibromopropane.

(e) A solution of internal standard in 99:1 benzene-methanol (v/v).

(f) 99:1 Benzene-methanol (v/v).

Analysis of Samples

All glassware used for the laboratory analysis should be washed in detergent and rinsed with tap and distilled water.

(a) Preparation: Score each charcoal tube, including the blank from field samples, with a file and break open in front of the first section of charcoal. Remove and discard the glass wool. Transfer the charcoal in the first (larger) section to a small stoppered test tube. Remove and discard the separating section of foam and transfer the second section of charcoal to another test tube. Analyze the two charcoal sections separately.

(b) Desorption: Prior to analysis, pipet 10.0 ml of benzene-methanol (99:1) into each test tube to desorb the ethylene dibromide from the charcoal. For the internal standard method, a 0.2% solution of n-pentadecane in benzene-methanol (99:1) is used for desorption. Sample vials should be capped after adding solvent to minimize volatilization. Desorption is complete in 30 minutes if the sample is stirred occasionally. Recoveries of the analyte from charcoal decrease with increasing storage times at room temperature. The decreases are more pronounced at lower levels of analyte. The recoveries after storage are adequate, however, when the charcoal tube samples are refrigerated. If analyses cannot be performed within 3-5 hours after sampling, the charcoal tube samples must be stored at -25 C. The refrigerated samples may be stored for up to two weeks.

BENZENE CAN CAUSE SERIOUS BLOOD ABNORMALITIES INCLUDING LEUKEMIA. EXTREME CAUTION MUST BE EXERCISED AT ALL TIMES WHEN USING BENZENE BECAUSE OF ITS HIGH TOXICITY AND FLAMMABILITY. ALL WORK WITH BENZENE MUST BE PERFORMED UNDER AN EXHAUST HOOD.

(c) Typical gas-liquid chromatographic operating conditions for analysis:

(1) Nitrogen carrier gas flow: 35ml/min
(2) Inlet temperature: 175 C
(3) Detector temperature: 315 C
(4) Column temperature: 50 C
(5) (63Ni) detector operating mode: DC at 90 to 95% standing current

(d) Injection: The first step in the analysis is the injection of the sample into the gas-liquid chromatograph. Employ the solvent flush injection technique. This eliminates difficulties arising from blowback or distillation within the syringe needle, thus increasing the accuracy and reproducibility of the injected sample volume. First, flush the 10.0-μl syringe with solvent several times to wet the barrel and plunger, then draw 3.0 μl of solvent into the syringe. Next, remove the needle from the benzene-methanol (99:1) and pull the plunger back about 0.2 μl to separate the solvent flush from the sample with an air pocket to be used as a marker. Immerse the needle in the sample and withdraw a 5.0-μl portion, taking into consideration the volume of the needle since the sample in the needle will be completely injected. After the needle is removed from the sample and prior to injection into the gas-liquid chromatograph, pull the plunger back a short distance to minimize sample evaporation from the tip. Make duplicate injections of each sample and of the standard. No more than a 3% difference between the peak areas of the similar injections should be accepted. Automatic sample injectors may be used if shown to give reproducibility at least as good as the solvent flush injection technique. In this case, injections of 2 μl are satisfactory.

(e) Measurement of area: The areas of the sample peaks are measured by electronic integration or some other suitable method of area measurement. Preliminary sample results are read from a standard curve prepared as outlined below.

(f) The approximate retention times of ethylene dibromide and two potential internal standards under the GC conditions described in this method are:

Compound	Retention Time	B.P.
Ethylene dibromide	2.2 min	131 C
1,2-Dibromopropane	2.9 min	140 C
1,1,2,2-Tetrachloroethane	4.1 min	146 C

Determination of Desorption Efficiency

The desorption efficiency of a particular compound can vary from one laboratory to another and also from one batch of charcoal to another. Thus, it is necessary to determine at least once the percentage of ethylene dibromide that is removed in the desorption process. Repeat this procedure for each new batch of charcoal used.

Place the same amount of activated charcoal as in the first section of the sampling tube (100 mg) into a 5-cm, 4-mm ID glass tube; flame seal at one end. This charcoal must be from the same batch as that used in sampling and can be obtained from unused charcoal tubes. Cap the open end with Parafilm or equivalent. Inject a known amount of n-heptane solution containing 55 mg/ml of ethylene dibromide directly into the activated charcoal with a microliter syringe and recap the tube with more Parafilm or equivalent. The amount injected is equivalent to that present in a 1-liter sample at the selected level.

Prepare at least six tubes in this manner for each concentration and allow to stand overnight or longer to ensure complete adsorption of the ethylene dibromide on the charcoal. These six tubes are referred to as the "desorption samples." Treat a parallel blank tube in the same manner, except add no ethylene dibromide to it. Desorb and analyze the desorption samples and blank tubes in exactly the same manner as the sampling tube described for unknown air samples.

Prepare two or three standards by injecting the same volume of ethylene dibromide into 10.0 ml of the 99:1 benzene-methanol mixture (containing 0.2% n-pentadecane if the internal standard method is used) with the same syringe used in the preparation of the desorption samples.

These are analyzed with the desorption samples.

The desorption efficiency equals the difference between the average peak area of the desorption samples and that of the blank divided by the average peak area of the standards, or:

$$\text{desorption efficiency} = \frac{\text{area of sample} - \text{area of blank}}{\text{area of standard}}$$

The desorption efficiency is dependent on the amount of ethylene dibromide collected on the charcoal. Plot the desorption efficiency versus the weight of ethylene dibromide found. This curve is used to correct for adsorption losses when sample concentrations are calculated.

Calibration and Standards

It is convenient to express the concentration of standards in terms of mg ethylene dibromide/ml of benzene-methanol because samples are desorbed in 10 ml of benzene-methanol. Use the density of ethylene dibromide to convert milligrams into microliters for easy measurement with a microliter syringe. Prepare a series of standards varying in concentration over the range of interest and then analyze them under the same gas-liquid chromatographic conditions and during the same time period as the unknown samples. To minimize error, inject 10 times the desired weight of ethylene dibromide into 10 times the desired volume of benzene-methanol. Prepare standard curves by plotting concentration in mg/ml versus peak area.

In the case of the internal standard method, prepare standard curves by plotting concentration in mg/ml versus the ratio of the peak areas of ethylene dibromide to n-pentadecane.

Calculations

Read the weight in milligrams of ethylene dibromide corresponding to the total peak area from the standard curve. No volume corrections are needed because the standard curve is based on mg ethylene dibromide/ml of benzene-methanol and the volume of sample injected is identical to the volume of the standards injected.

Make corrections for the blank from the field sampling for each sample by subtracting the amounts of ethylene dibromide found on the front and back sections of the blank from the amounts found in the respective sections of the sample:

$$\text{corrected amount} = \text{amount on sample} - \text{amount on blank}$$

Add the corrected amounts present in the front and in the backup sections of the same sample tube to determine the total amount of ethylene dibromide in the sample. Divide this total amount by the desorption efficiency to obtain the adjusted total amount of ethylene dibromide in the sample:

$$\text{adjusted total amount} = \frac{\text{total amount}}{\text{desorption efficiency}}$$

The concentration of ethylene dibromide in the air sampled, expressed in mg/cu m, is given by the quotient of the adjusted amount in mg divided by the volume of air sampled in cu m:

$$\text{concentration (mg/cu m)} = \frac{\text{adjusted amount (mg)}}{\text{volume (cu m)}}$$

Another method of expressing concentration is ppm:

$$\text{concentration (ppm)} = \text{concentration (mg/cu m)} \times \frac{24.45}{MW} \times \frac{760}{P} \times \frac{(T + 273)}{298}$$

where:

24.45 = molar volume (liter/mole) at 25 C and 760 mmHg

760 = standard atmospheric pressure (mmHg)

P = pressure (mmHg) of air sampled

T = temperature (degrees C) of air sampled

MW = molecular weight of ethylene dibromide (g/mole)

298 = standard atmospheric temperature (degrees K)

X. APPENDIX III

MATERIAL SAFETY DATA SHEET

The following items of information which are applicable to a specific product or material shall be provided in the appropriate block of the Material Safety Data Sheet (MSDS).

The product designation is inserted in the block in the upper left corner of the first page to facilitate filing and retrieval. Print in upper case letters as large as possible. It should be printed to read upright with the sheet turned sideways. The product designation is that name or code designation which appears on the label, or by which the product is sold or known by employees. The relative numerical hazard ratings and key statements are those determined by the rules in Chapter V, Part B, of the NIOSH publication, An Identification System for Occupationally Hazardous Materials. The company identification may be printed in the upper right corner if desired.

(a) Section I. Product Identification

The manufacturer's name, address, and regular and emergency telephone numbers (including area code) are inserted in the appropriate blocks of Section I. The company listed should be a source of detailed backup information on the hazards of the material(s) covered by the MSDS. The listing of suppliers or wholesale distributors is discouraged. The trade name should be the product designation or common name associated with the material. The synonyms are those commonly used for the product, especially formal chemical nomenclature. Every known chemical designation or competitor's trade name need not be listed.

(b) Section II. Hazardous Ingredients

The "materials" listed in Section II shall be those substances which are part of the hazardous product covered by the MSDS and individually meet any of the criteria defining a hazardous material. Thus, one component of a multicomponent product might be listed because of its toxicity, another component because of its flammability, while a third component could be included both for its toxicity and its reactivity. Note that a MSDS for a single component product must have the name of the material repeated in this section to avoid giving the impression that there are no hazardous ingredients.

Chemical substances should be listed according to their complete name derived from a recognized system of nomenclature. Where possible, avoid using common names and general class names such as "aromatic amine," "safety solvent," or "aliphatic hydrocarbon" when the specific name is known.

The "%" may be the approximate percentage by weight or volume (indicate basis) which each hazardous ingredient of the mixture bears to the whole mixture. This may be indicated as a range or maximum amount, ie, "10-40% vol" or "10% max wt" to avoid disclosure of trade secrets.

Toxic hazard data shall be stated in terms of concentration, mode of exposure or test, and animal used, eg, "100 ppm LC50-rat," "25 mg/kg LD50-skin-rabbit," "75 ppm LC man," or "permissible exposure from 29 CFR 1910.1000," or, if not available, from other sources of publications such as the American Conference of Governmental Industrial Hygienists or the American National Standards Institute Inc. Flashpoint, shock sensitivity or similar descriptive data may be used to indicate flammability, reactivity, or similar hazardous properties of the material.

(c) Section III. Physical Data

The data in Section III should be for the total mixture and should include the boiling point and melting point in degrees Fahrenheit (Celsius in parentheses); vapor pressure, in conventional millimeters of mercury (mmHg); vapor density of gas or vapor (air = 1); solubility in water, in parts/hundred parts of water by weight; specific gravity (water = 1); percent volatiles (indicated if by weight or volume) at 70 degrees Fahrenheit (21.1 degrees Celsius); evaporation rate for liquids or sublimable solids, relative to butyl acetate; and appearance and odor. These data are useful for the control of toxic substances. Boiling point, vapor density, percent volatiles, vapor pressure, and evaporation are useful for designing proper ventilation equipment. This information is also useful for design and deployment of adequate fire and spill containment equipment. The appearance and odor may facilitate identification of substances stored in improperly marked containers, or when spilled.

(d) Section IV. Fire and Explosion Data

Section IV should contain complete fire and explosion data for the product, including flashpoint and autoignition temperature in degrees Fahrenheit (Celsius in parentheses); flammable limits, in percent by volume in air; suitable extinguishing media or materials; special firefighting procedures; and unusual fire and explosion hazard information. If the product presents no fire hazard, insert "NO FIRE HAZARD" on the line labeled "Extinguishing Media."

(e) Section V. Health Hazard Information

The "Health Hazard Data" should be a combined estimate of the hazard of the total product. This can be expressed as a TWA concentration, as a permissible exposure, or by some other indication of an acceptable standard. Other data are acceptable, such as lowest LD50 if multiple components are involved.

Under "Routes of Exposure," comments in each category should reflect the potential hazard from absorption by the route in question. Comments should indicate the severity of the effect and the basis for the statement if possible. The basis might be animal studies, analogy with similar products, or human experiences. Comments such as "yes" or "possible" are not helpful. Typical comments might be:

> Skin Contact--single short contact, no adverse effects likely; prolonged or repeated contact, possibly mild irritation.
>
> Eye Contact--some pain and mild transient irritation; no corneal scarring.

"Emergency and First Aid Procedures" should be written in lay language and should primarily represent first-aid treatment that could be provided by paramedical personnel or individuals trained in first aid.

Information in the "Notes to Physician" section should include any special medical information which would be of assistance to an attending physician including required or recommended preplacement and periodic medical examinations, diagnostic procedures, and medical management of overexposed employees.

(f) Section VI. Reactivity Data

The comments in Section VI relate to safe storage and handling of hazardous, unstable substances. It is particularly important to highlight instability or incompatibility to common substances or circumstances, such as water, direct sunlight, steel or copper piping, acids, alkalies, etc. "Hazardous Decomposition Products" shall include those products released under fire conditions. It must also include dangerous products produced by aging, such as peroxides in the case of some ethers. Where applicable, shelf life should also be indicated.

(g) Section VII. Spill or Leak Procedures

Detailed procedures for cleanup and disposal should be listed with emphasis on precautions to be taken to protect employees assigned to cleanup detail. Specific neutralizing chemicals or procedures should be described in detail. Disposal methods should be explicit including proper labeling of containers holding residues and ultimate disposal methods such as "sanitary landfill," or "incineration." Warnings such as "comply with local, state, and federal antipollution ordinances" are proper but not sufficient. Specific procedures shall be identified.

(h) Section VIII. Special Protection Information

Section VIII requires specific information. Statements such as "Yes," "No," or "If necessary" are not informative. Ventilation requirements should be specific as to type and preferred methods. Respirators shall be specified as to type and NIOSH or US Bureau of Mines approval class, ie, "Supplied air," "Organic vapor canister," etc. Protective equipment must be specified as to type and materials of construction.

(i) Section IX. Special Precautions

"Precautionary Statements" shall consist of the label statements selected for use on the container or placard. Additional information on any aspect of safety or health not covered in other sections should be inserted in Section IX. The lower block can contain references to published guides or in-house procedures for handling and storage. Department of Transportation markings and classifications and other freight, handling, or storage requirements and environmental controls can be noted.

(j) Signature and Filing

Finally, the name and address of the responsible person who completed the MSDS and the date of completion are entered. This will facilitate correction of errors and identify a source of additional information.

The MSDS shall be filed in a location readily accessible to employees exposed to the hazardous substance. The MSDS can be used as a training aid and basis for discussion during safety meetings and training of new employees. It should assist management by directing attention to the need for specific control engineering, work practices, and protective measures to ensure safe handling and use of the material. It will aid the safety and health staff in planning a safe and healthful work environment and in suggesting appropriate emergency procedures and sources of help in the event of harmful exposure of employees.

MATERIAL SAFETY DATA SHEET

I PRODUCT IDENTIFICATION

MANUFACTURER'S NAME	REGULAR TELEPHONE NO. EMERGENCY TELEPHONE NO.

ADDRESS

TRADE NAME

SYNONYMS

II HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	HAZARD DATA

III PHYSICAL DATA

BOILING POINT, 760 MM HG		MELTING POINT
SPECIFIC GRAVITY (H_2O=1)		VAPOR PRESSURE
VAPOR DENSITY (AIR=1)		SOLUBILITY IN H_2O, % BY WT
% VOLATILES BY VOL		EVAPORATION RATE (BUTYL ACETATE=1)
APPEARANCE AND ODOR		

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)			AUTOIGNITION TEMPERATURE		
FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER		UPPER		
EXTINGUISHING MEDIA					
SPECIAL FIRE FIGHTING PROCEDURES					
UNUSUAL FIRE AND EXPLOSION HAZARD					

V HEALTH HAZARD INFORMATION

HEALTH HAZARD DATA

ROUTES OF EXPOSURE

INHALATION

SKIN CONTACT

SKIN ABSORPTION

EYE CONTACT

INGESTION

EFFECTS OF OVEREXPOSURE

ACUTE OVEREXPOSURE

CHRONIC OVEREXPOSURE

EMERGENCY AND FIRST AID PROCEDURES

EYES

SKIN

INHALATION

INGESTION

NOTES TO PHYSICIAN

VI REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

INCOMPATIBILITY

HAZARDOUS DECOMPOSITION PRODUCTS

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

NEUTRALIZING CHEMICALS

WASTE DISPOSAL METHOD

VIII SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY (SPECIFY IN DETAIL)

EYE

GLOVES

OTHER CLOTHING AND EQUIPMENT

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

OTHER HANDLING AND STORAGE REQUIREMENTS

PREPARED BY

ADDRESS

DATE

XII. TABLES AND FIGURE

TABLE XII-1

CHEMICAL AND PHYSICAL PROPERTIES OF ETHYLENE DIBROMIDE

Formula	CH2BrCH2Br
Formula weight	187.88
Melting point (C)	9.6
Boiling point (C)	131.4
Vapor density (air=1)	6.5
Vapor pressure (mmHg at 25 C)	12.0
Firepoint	None
Heat of vaporization (cal/g at 25 C)	+53
Flashpoint	None
Flammability	Nonflammable
Viscosity (centipoise at 20 C)	1.65
Density (g/ml at 20 C)	2.18
Density of saturated air (air=1)	1.08
Concentration of saturated air (by volume at 25 C)	1.3%
Solubility:	
in ethanol	Soluble
in ethyl ether	Soluble
in water	0.43 g/100 g water at 30 C
Conversion factors (760 mmHg at 25 C)	1 mg/liter=1 g/cu m=130 ppm 1 ppm=7.68 mg/cu m=7.68 μg/liter

Adapted from references 1,3,4,118

TABLE XII-2

OCCUPATIONS WITH POTENTIAL EXPOSURES TO ETHYLENE DIBROMIDE

Antiknock compound makers
Cabbage growers
Celluloid makers
Corngrowers
Drug makers
Ethylene dibromide workers
Fat processors
Fire extinguisher makers
Fruit fumigators
Fumigant workers
Gasoline blenders
Grain elevator workers
Grain fumigators
Gum processors
Lead scavenger makers
Motor fuel workers
Nematode controllers
Oil processors
Organic chemical synthesizers
Resin makers
Seed corn maggot controllers
Soil fumigators
Termite controllers
Tetraethyl lead makers
Waterproofing makers
Waxmakers
Wood insect controllers
Wool reclaimers

Adapted from reference 21

TABLE XII-3

CONCENTRATIONS* OF RADIOACTIVITY IN MOUSE TISSUES AFTER INJECTION OF 40 MG/KG IP OF 14C-ETHYLENE DIBROMIDE

Tissue	1 hr	3 hr	24 hr
Bone (whole femur)	1.4	2.1	0.5
Brain	0.2	0.6	0.1
Tail of epididymis	3.1	4.4	0.7
Fat	4.9	2.4	0.3
Heart	1.1	1.1	0.2
Large intestine + contents	5.3	15.0	0.3
Small intestine + contents	34.0	5.8	0.4
Kidney	13.0	12.0	1.0
Liver	12.0	6.6	0.4
Lung	2.5	3.3	0.4
Muscle (gastrocnemius)	0.9	1.0	0.1
Skin	1.2	2.1	0.3
Spleen	4.1	4.7	0.6
Stomach + contents	1.7	4.6	1.0
Testis	1.1	1.5	0.2
Whole blood	7.2	7.4	6.2
Plasma	12.0	12.0	2.6
Residue of animal	1.3	2.4	0.2

*Results expressed as % administered dose/g wet tissue.

Adapted from reference 9

TABLE XII-4

CONCENTRATIONS* OF RADIOACTIVITY IN MALE GUINEA PIG TISSUES AFTER ADMINISTRATION OF 30 MG/KG IP OF 14C-ETHYLENE DIBROMIDE

Tissue	Hours after Administration					
	4	8	12	24	48	72
Kidney	286.64	236.52	147.79	73.45	14.66	10.47
Liver	129.03	104.91	78.39	38.07	16.20	15.58
Adrenal	60.73	60.82	26.56	28.63	13.24	10.43
Pancreas	35.04	36.81	28.85	18.68	7.52	6.01
Spleen	15.79	13.96	15.83	14.89	8.92	6.95
Heart	14.01	15.63	11.59	9.51	4.13	3.23
Lung	20.93	19.00	17.76	15.43	8.08	5.83
Testis	10.68	10.72	9.08	8.34	5.05	3.98
Brain	6.19	7.62	6.75	6.47	3.70	2.51
Fat**	21.39	7.86	8.72	3.19	3.05	2.07
Muscle	5.53	4.97	4.58	4.15	2.91	2.16
Blood	9.97	3.40	5.78	4.59	3.36	2.77

*Values represent mean levels in µg/g of tissue or µg/ml of fluid of duplicate determinations on three animals at each interval.
**Suprarenal fat

Adapted from reference 10

TABLE XII-5

RETENTION* OF RADIOACTIVITY IN MALE GUINEA PIG TISSUES AFTER INJECTION OF 30 MG/KG IP OF 14C-ETHYLENE DIBROMIDE

Tissue	Hours after Administration					
	4	8	12	24	48	72
Liver	16.29	13.65	10.50	4.72	2.12	2.16
Kidney	6.00	5.69	3.31	1.64	0.31	0.24
Stomach + contents	1.14	0.52	0.62	0.38	0.18	0.18
Lung	0.35	0.38	0.37	0.24	0.12	0.10
Pancreas	0.31	0.36	0.33	0.20	0.07	0.06
Testis	0.16	0.17	0.12	0.12	0.07	0.06
Heart	0.13	0.16	0.12	0.10	0.04	0.03
Brain	0.12	0.16	0.14	0.13	0.07	0.05
Adrenal	0.09	0.10	0.04	0.03	0.01	0.02
Spleen	0.07	0.06	0.07	0.08	0.03	0.02

*Values represent the mean % of the administered dose of duplicate determinations on three animals at each interval.

Adapted from reference 10

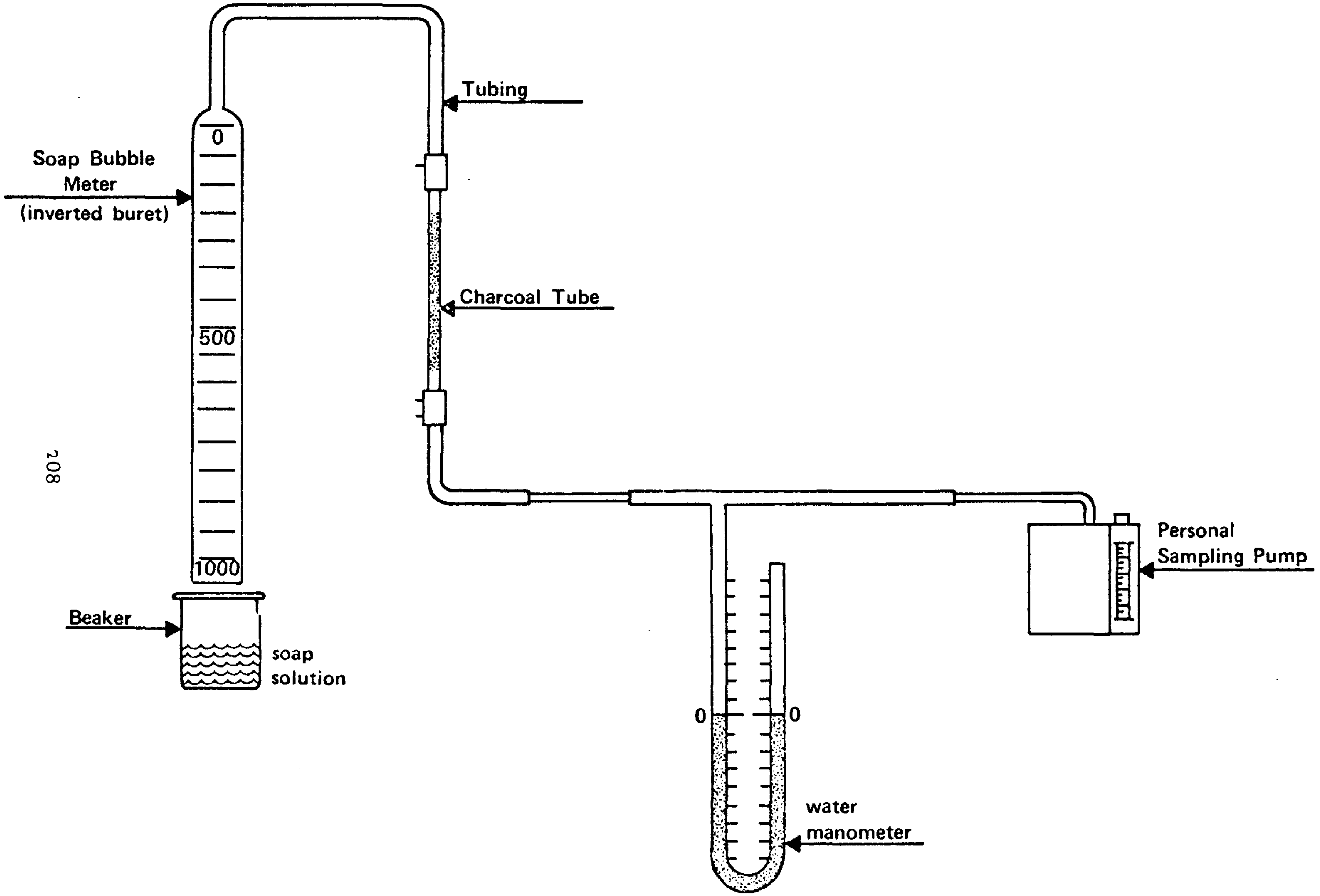

FIGURE XII-1. CALIBRATION SETUP FOR PERSONAL SAMPLING PUMP WITH CHARCOAL TUBE

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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
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