

**IDENTIFICATION AND MEASUREMENT OF
GASES AND VAPORS(842-315-200)**

EHS 252E SPRING QUARTER 2017

TUESDAYS 3-6p, CHS 51-279 4 UNITS

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)) INDUSTRIAL HYGIENE MEASUREMENTS

LABORATORY COMPONENT (842-316-200)

EHS 252F SPRING QUARTER 2016

**WEDNESDAYS 2:00-5:00p, CHS 41-235 (1ST
lecture), CHS 56-059(Z),**

CHS 66-079(SQH) 3 UNITS

Aims: This course covers the theoretical and practical bases of detecting, sampling and analyzing gases and vapors through lectures and assignments [EHS 252E] and laboratories [EHS 252F], focusing on the work environment.

Learning Outcomes: Students will be able to distinguish a gas from a vapor relative to sampling and analysis, understand the basic concepts of gases and vapors in theory, the literature, and in the field, and explain the theory and field sampling of gases and vapors. They will be able to provide a critical review of the strengths and weaknesses of an air sampling and analysis method, know why EPA, OSHA, and ACGIH guidelines differ, and will be able to locate and critically evaluate the published literature. They will be able to know the situations to apply direct reading technology relative to time-weighted average sampling. The need for quality assurance and quality control and calibration of instruments will be understood and articulated.

The above learning objectives reflect the following environmental health competencies for Master of Science students: A1 Retrieve and organize literature; synthesize and critically evaluate scientific literature in environmental health, public health and other relevant fields; A2 Use existing databases to provide background information or data to address research questions and draw appropriate inferences/estimates from environmental health data; A3 Evaluate seminars and presentations in environmental health and distill the critical and salient issues from them; B4 Identify potential sources of systematic error (bias) as well as random error; B6 Identify potential sources of systematic error (bias) as well as random error; C1 Use computer systems and analytic software packages; D1 Make reasonable inferences from results of analysis of observational and analytic studies.

The EHS Master of Public Health competencies involved are: C1 Describe major direct and indirect human health and safety effects of major environmental or occupational agents; C3 Describe federal and state regulatory programs, guidelines, and authorities that control environmental health issues; C5 Specify approaches for assessing, preventing and controlling environmental hazards that pose risks to human health and safety; C6 Identify key sources of data and use existing databases to provide background or supportive data to address environmental health questions.

The following cross-cutting public health competencies (CC) are also reflected in the design and content of the course: communication and informatics; leadership; public health biology; professionalism; program planning; systems thinking.

Format: One 3-hour lecture a week for EHS252E complimented by the appropriate 3-hour laboratory experiments in EHS252F

Evaluation: Evaluation will be by progressive assessment with a final assignment (50% of mark) for EHS 252E being distributed 2 weeks before its due date. THIS WILL ALSO INCLUDE TOPICS FOR THE ORAL EXAMINATION. Students will present designated papers as part of their oral examination at the time designated for the Final Examination.

Assignments will be at intervals of two weeks with two weeks provided to complete each assignment. Late penalties will be administered. Assignments 1-3 comprise 50% of the total marks. Assignment 4 comprises 50% of the total marks with the Oral Qualifying 25% of the total grade.

DATE	LECTURE/LABORATORY		
Tues Apr	4	Lect	Introduction; definitions W pp 5-19; M pp 1-32; SQH pp 153-159
Wed	5	Lab	Introduction, use of TLVs [<i>CHS 41-235</i>] <i>SQH</i>
Tues	11	Lect	Properties of gases & vapors W pp 21-85; SQH 149-152;160-162;165-167;191-198
Wed	12	Lab	Air flow, pressure, volume measurements [<i>Z</i>]
Tues	18	Lect	Generating known concentrations/calibrations W, pp 163-184; Lodge pp 3-27; SQH, 343-346
Wed	19	Lab	Pump calibration, mass concentration [<i>Z</i>]
Tues	25	Lect	Sampling methods; adsorption W, pp 87-110, 135-162; Lodge pp 37-42; SQH, 198-200, 377-390, 396-423
Wed	26	Lab	Carbon monoxide [<i>SQH</i>]
Tues May	2	Lect	Direct reading devices: Organic Vapor Analyzers; M pp 101-156; SQH, 329-338, 343-361
Wed	3	Lab	Impaction, cascade impactor, respirable mass sampling { <i>Z</i> }
Tues	9	Lect	Direct reading devices: Detector Tubes/Explosion Meters M pp 33-100; SQH, 346-351
Wed	10	Lab	Toluene [<i>SQH</i>]

Tues	16	Lect	NIOSH, OSHA, and EPA methods SQH, pp 326-589; W, p209
Wed	17	Lab	Ozone/Toluene continued [SQH]
Tues	23	Lect	Indoor Air Pollution, Ambient Environ Air Monitoring
	24	Lab	Condensation particle counter & nanoparticle sampling[Z]
Tues	30	Lect	Other topics; Wrap-up
Wed	31	Lab	2 p.m. Asbestos counting [Z]; 3:30 p.m. Organic Mixtures[SQH]
Tues	June 6	No Lect	-Seattle AIHCE
Wed	7	No Lab	-Seattle AIHCE

**Final Oral Presentations (Final Assignment due) Monday June 12, 8:00a-11:00a
ROOM TBA**

TEXTS (Optional)

1. GD Wight, *Fundamentals of Air Sampling*, Lewis, Boca Raton, FL, 1994. [W]
2. CJ Maslansky, SP Maslansky, *Air Monitoring Instrumentation*, Van Nostrand Reinhold, New York, NY, 1993. (Biomedical Library Reserve) Out of Print. [M]
3. ACGIH, *2016 or 2017 TLVs and BEIs: Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, ACGIH, Cincinnati, OH.
4. SS Que Hee. *Hazardous Waste Analysis*, Government Institutes, Rockville, MD, 1999. [SQH]

READING AND REFERENCE LIST:

1. ACGIH. *Industrial Ventilation*, 28th Ed, ACGIH, 2013.
The 26th edition is in the COEH Library.
2. SV Hering, Ed. *Air Sampling Instruments*, 7th Ed., Am. Conf. Govern. Indust. Hygienists, Cincinnati, Ohio, 1989. COEH Library.
3. JP Lodge. *Methods of Air Sampling and Analysis*, 3rd Ed., Lewis Publishers, 1991. COEH Library; Biomedical Library Reserve
4. NIOSH. *NIOSH Manual of Analytical Methods*, latest edition, Cincinnati, OH, <http://www.cdc.gov/niosh/docs/2003-154/>
5. D Anna, Ed. *The Occupational Environment-its Evaluation and Control*, AIHA, Fairfax, VA, 2011. Chapters 11-13, 15-18.
6. OSHA. *OSHA Analytical Methods*, latest edition, <https://www.osha.gov/dts/sltc/methods/>
7. BA Plog, J Niland, PJ Quinlan, *Fundamentals of Industrial Hygiene*, 4th Ed., National Safety Council, 1996. Earlier editions are in COEH and Biomedical Library reserve and CHS 56-071.
8. NIOSH. *Pocket Guide to Chemical Hazards*, US DHHS No. 97-140, latest edition, <http://www.cdc.gov/niosh/npq/>
9. Draeger. *Draeger Tube Handbook*, 11th Ed., Lubeck, Germany, 1997. CHS 56-071.
10. EPA. *Sampling and Analysis Guidance*, <http://www2.epa.gov/region8/sampling-and-analysis-guidance>
11. CAL OSHA. <http://www.dir.ca.gov/DOSH/Pol/P&PC-91.HTM> . ALSO <https://www.dir.ca.gov/samples/search/query.htm>
12. A textbook in physical chemistry such as:
SH Maron, CF Prutton. *Principles of Physical Chemistry*, 4th ed., Macmillan, New York, 1967.

VIDEOS(On Biomedical Library Class Reserve; PLEASE REWIND WHEN FINISHED)and U Tube

1. States of Matter,39608-A-NT, Films for the Humanities and Sciences,2009
2. Carbon Monoxide Poisoning, B373. Long Island Productions, 1996.
3. Fire Extinguisher Training, B105. Long Island Productions, 1996.
4. American Experience: Triangle Fire, PBS,
<http://video.pbs.org/video/1817898383/>
5. Confined Space Entry, X-CSE. Long Island Productions, 1992.
6. Sorbent Tube Sampling, Galston:
https://www.youtube.com/watch?v=C_f6mdHq9OY
7. 3M 3500 3520 Organic Monitor, Galston Laboratories:
<https://www.youtube.com/watch?v=MrmPiCVZPBQ>
8. Introduction to Draeger Tube Sampling,Draeger:
https://www.youtube.com/watch?v=gqTs_csxBPE
9. Indoor Air Quality, 39419-A-NT. Films for the Humanities and the Sciences, 2007.
10. Indoor Air Quality,Sutterhealth,2010
<http://www.youtube.com/watch?v=bSCOnFLTzGQ>
11. Indoor Air Quality Investigation, Building Science Corporation, 2008,
<http://www.youtube.com/watch?v=TAavBk2HISc>
12. Air Quality 101: The Basics, UPLan (UtahPlanning), 2009
http://www.youtube.com/watch?v=Hx_yWFQvJT4
13. Air Quality: Photochemical Smog, Channel Monster, 2011
<http://www.youtube.com/watch?v=2WF2aMbAcNc>
14. One Night in Bhopal. Films for the Humanities and the Sciences,2005. 60 min. Also available at <http://topdocumentaryfilms.com/one-night-in-bhopal/>