

Prince of Songkla University Faculty of Engineering

Final Test 4 October 2009 215-657 Aerosol Science and Engineering

Semester	1/2552
9:0	0-12:00

Room: The Robot Head Room

Name		ID	
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Direction:

- Open book exam. Everything is allowed.
 There are total of 5 problems.

Problem	Full score	Your score
1	30	
2	15	
3	15	·
4	20	
5	10	
Total	90	

Perapong Tekasakul Instructor

215-657 Aerosol Science and Engineering

Final Test (Total 90 Points)

Na	me	ID
1.	Ansv 1.1	ver all questions as clear as possible. (30 Points) What is the difference between aerosol concentration and particle density? (2 Points)
	1.2	Explain, in detail, how an Andersen Impactor works. (4 Points)

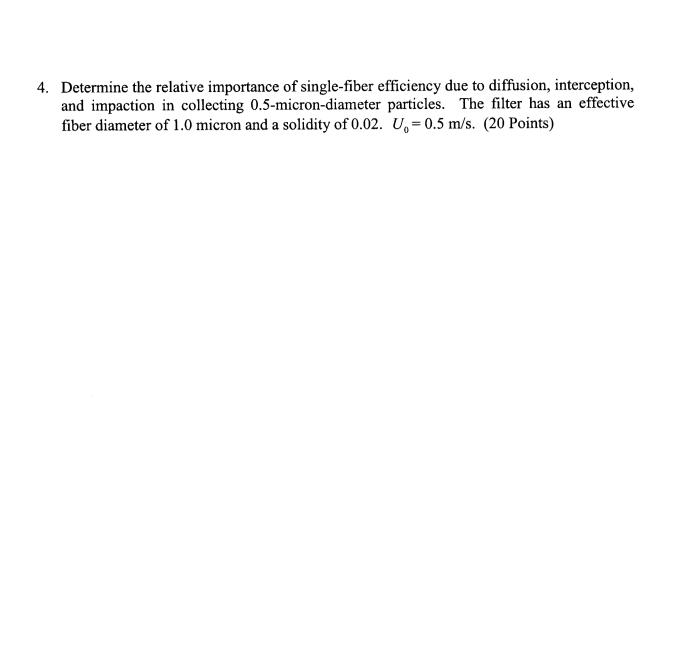
1.3 Describe Davies' criteria in sampling aerosol from still air. (4 Points)

1.4	What is the major difference between fibrous filter and membrane filter? (2 Points)
1.5	How does single-fiber efficiency affect the overall efficiency of a filter? (3 Points)
1.6	What are main parameters in considering filter performance? Also describe the filter figure of merit. (4 Points)
1.7	How many modes of particles constituted in atmospheric aerosol? Describe. (3 Points)

1.8	Give 5 examples of each desirable and undesirable aerosol. (5 Points)
	Desirable:
	1.
	2.
	3.
	4.
	5.
	Undesirable:
	1.
	2.
	3.
	4.
	5.
1.9	How light scattering is used to measure size of aerosol particles? Explain. (3 Points)

2. Design a single-stage impactor with a cutoff diameter of 0.25 micron that operates at a flow rate of 5 lpm. Assume the particles are water droplets (density 1000 kg/m³) and viscosity of air is 1.81x10⁻⁵ Pa.sec. (15 Points)

3. Suppose you want to sample an aerosol from a still air. If the particle (density 900 kg/m³) size does not exceed 20 micron and the sampling flow rate in 3 lpm. What should the size of the probe be if we align the probe vertically upward? Is it possible? If not, how would you solve the problem? (15 Points)



5. For a 0.15-micron-diameter spherical particle ($\rho_p = 2500 \text{ kg/m}^3$), determine the Cunningham correction factor and terminal settling velocity at standard conditions. (10 Points)