1. A spray lacquer operation uses 3 gallons of methyl acetate per hour. Calculate the dilution air requirements for health and fire. Assume K is 5

2. In an enclosed garage, gasoline is transferred from a storage tank to waiting vehicles. In the process, gasoline vapor is released into the air inside the garage. How much ventilation air is required if 1 gallon per hour of liquid is evaporated. Assume poor dilution with a K of 7.

3. A round tapered hood has 3000 fpm duct velocity. What is the hood static pressure and the coefficient of entry.

4. A freely suspended slot hood, 2" by 84", exhausts 1000 cfm. What is the velocity at a point 10" in front of the opening? What would be the velocity if a flange is added?

5. The static pressure of the hood is 1.75" of water gauge. The throat diameter is 6" and the hood is a 24" wheel grinder with a straight take off. What air flow would you expect?

6. A six point traverse of a 5" diameter duct gave the following velocity pressures. What is the volume rate in cfm?
0.39, 0.4, 0.41, 0.42, 0.40, 0.38" water.

7. A local exhaust system has the following design data:
Fan inlet SP is -8.4", Fan outlet SP is +1.6, Fan velocity inlet and outlet is 5665 fpm. What is the fan static Pressure?

8. A centrifugal fan running at 500 rpm is exhausting 3600 cfm, the SP is 2", and Brake horse power is 1.9. It is desired to increase the airflow to 4000 cfm by speeding up the fan. What are the new rpm, SP, and BHP?

9. A local exhaust system is designed to handle 10,000 cfm at a TP of 5.5" water. If it is estimated that a fan with a mechanical efficiency of 60% is to be used, calculate the brake horse power.

10. A room 50' by 20' by 10' contains 100 ppm CCl4 (MW is 153.81). Assuming a K value of 3. How much time will be required to reduce the concentration to 25 ppm if an exhaust blower of 300 cfm is used.

11. The average velocity pressure of an airstrteam in a duct is 0.50"W.G. What is the velocity? Assume non STP, d is 0.90

12. The diameter of a round duct is 24". The average velocity of air flowing in the duct is 2500 fpm at standard conditions. What is the flow rate?

13. Fill in the blanks

TP	SP	VP
?	-8.1	+2.0
-7.4	-9.4	?
+6.9	?	+2.0
+5.2	+3.2	?

$$Q = A\,V$$

$$TP = VP + SP$$

$$V = 4005\sqrt{\frac{VP}{d}} = 1096\sqrt{\frac{VP}{\rho}} = 1096\sqrt{\frac{VP}{.075}}$$

$$Ce = \sqrt{\frac{VP}{SPH}}$$

$$SPH = VP(1+F)$$

$$Ce = \sqrt{\frac{VP}{VP(1+F)}} = \sqrt{\frac{1}{1+F}}$$

$$Ce = \frac{1}{\sqrt{1+F}}$$

$$Q = 4005\,Ce\,A\,\sqrt{SP}$$

$$Q = \frac{(403)(10^6)\,SG\;ER\;K}{MW\;\;C}$$

$$Q = \frac{(403)(100)\,SG\;ER\;S_F}{MW\;\;LEL}$$

$$\Delta t = -\frac{V}{Q'}\left[\ln\frac{G - Q'C_2}{G - Q'C_1}\right] \quad \text{BUILD UP}$$

$$C_2 = \frac{G\left[1 - e^{-\frac{Q'\Delta t}{V}}\right]}{Q'} \qquad C_1 = \phi$$

$$\Delta t = -\frac{V}{Q'}\ln\frac{C_2}{C_1} \quad \text{RATE of PURGING}$$

$$C_2 = C_1\,e^{-\frac{Q'\Delta t}{V}}$$

$Q = 3.7\ LVX$ FREE SUSPENDED SLOT

$Q = 2.6\ LVX$ FLANGED

$Q = V(10X^2 + A)$ PLAIN

$Q = .75\ V(10X^2 + A)$ FLANGED

$Q = 1.4\ PVD$ CANOPY

$FSP = SP_{OUT} - SP_{IN} - VP$

$$\frac{Q_1}{Q_2} = \frac{RPM_1}{RPM_2} \qquad \frac{Q_1^2}{Q_2^2} = \frac{SP_1}{SP_2} \qquad \frac{Q_1^3}{Q_2^3} = \frac{BHP_1}{BHP_2}$$

$$AHP = \frac{5.2\ Q\ TP}{33000} = \frac{Q\ TP}{6350}$$

$$BHP = \frac{AHP}{E}$$