QE111: Assignment on Open Systems

Available at the URL:
http://www.rshanthini.com/tmp/QE111Thermo/AssignmentE06.pdf

a) A rigid cylinder of 20 litres internal volume contains a gas at a temperature T and at 25 bar. Oxygen is removed from the cylinder until the pressure is reduced to P_f bar while the temperature of the gas in the cylinder is maintained constant. Find the heat interaction between the cylinder and the surroundings. Does this heat enter or leave the cylinder?

b) What would be the temperature of the gas in the cylinder if the cylinder were insulated?

Choose the gas and the values of T and P_f according to the following scheme based on the digits in your registration number. For example, if your registration number ends as 268 then the gas is helium (C_p = 5.193 kJ/kg K; C_v = 3.116 kJ/kg K), T = 30°C and P_f = 8 bar.

First digit of your registration number	**0**	**1**	**2**	**3**
Gas	Nitrogen	Helium	Carbon dioxide	Hydrogen
C_p / (kJ/kg K)	1.040	5.193	0.846	14.323
C_v / (kJ/kg K)	0.743	3.116	0.657	10.199

Second digit of your registration number	**0, 3, 6 or 9**	**1, 4 or 7**	**2, 5 or 8**
T / °C	30	27	33

Third digit of your registration number	**0, 3, 6 or 9**	**1, 4 or 7**	**2, 5 or 8**
P_f / bar	10	15	8

Submission deadline: On or before 4.00 pm on May 05, 2008 (Monday)

Place of Submission: Department of Chemical & Process Engineering