University of Souk Ahras
Faculty of Science and Technology
Department of Fundamental education in Science and Technology
Thermodynamic 2
L2 GM

Unit 1

Basic Concepts of Thermodynamics 1 week

Exercise 1:

2 g of air was isobarically heated from T_1 = 0° C to T_2 = 1° C at a pressure p = 1 atm. The density of air at T = 0° C is 0,00129 g/cm^3;

What is the work of expansion?

Exercise 2:

Consider 0,5 moles of an ideal gas in its initial state : $T_A = 285\ K, V_A = 5\ L\ and\ P_A$, This gas undergoes a cyclic process consisting of the following reversible transformations:
Isochoric heating from $T_A = 285\ K\ until\ T_B = 350\ K$
Isothermal expansion from $V_B\ to\ V_C = 7\ L$
Adiabatic cooling until temperature □□ = □□
Isothermal compression to initial state A
Determine at each state P,T and V
Calculate the heat Q and the work W exchanged with the surrounding
Calculate the internal energy change ΔU , the enthalpy change ΔH and the entropy change ΔS of the gas for every transformation.
Cv = 5/2 R, Cp = 7/2 R and R = 8,32 J/K/mol

Exercise 3:

0.2 moles of oxygen are confined in a cylinder fitted with a piston under pressure P_0= 2 atm and at temperature T0= 300 K. Compression brings the pressure to P_1 = 10 atm.

A/ Assuming the transformation is reversible and isothermal, calculate :

1. The work supplied to the gas during compression.
2. The change in internal energy.
3. The quantity of heat released.

B/ Assuming that the transformation is reversible and adiabatic (γ = 7/5), calculate:

1. The Final volume V1 and final temperature.
2. The work done by the gas as a function of T_0 and T_1.
3. The change in internal energy of the gas.

C/ Assuming that the irreversible transformation is adiabatic.

express :

1. The variation in the internal energy of the gas as a function of T0 and T1.
2. T1 as a function of T0, numerical application
   R = 8,314J/K.mol, 1 atm = 10^5 Pa