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Physics 240: Worksheet 29 | Name:

(1) Suppose, as the result of a thunderclap that the air surrounding the thunderhead was initially at a temperature of 27 °C and a pressure of 1 Atm. and then adiabatically increased to a pressure of 1.25 atm. What was the change in temperature of this region of air? Assume that for air, γ=1.4

(2) Suppose you have 2 moles of an ideal monatomic gas in 3 dimensions at an initial pressure of 1 atm and an initial temperature of 300K.
(a) What is the volume of the IDG?
(b) Fill in the following table.

Process	Q	W	ΔU
T->2T Isovolumetric (V=constant)			
T->2T Isobaric (P=constant)			
V->2V Isothermal (T=constant) (at 300K)			
T->2T Adiabatic (Q=0)			

(3) Suppose that 2 moles of an IDG go through the following process:
(1) T_i=300K, T_f=600K adiabatic process.
(2) V_i=0.05m³, V_f=0.10m³ isothermal process
(3) T_i=600K, T_f=300K, adiabatic process
(4) V_i=0.10m³, V_f=0.05m³ isothermal process
Calculate the following quantities:
(a) The total heat added to the process
(b) The total heat evolved by the process
(c) The net heat added to (or evolved from) the system.
(d) The Work done by the system along the entire process.
(e) ΔU for this entire closed process.
(f) Define the engine's efficiency by: $\varepsilon \equiv \frac{W_{net}}{Q_{in}}$. Find out how efficient this engine is.

(4) Show for the closed process involving 2 isotherms and 2 adiabatic processes as in problem (3) that the efficiency is given by: $\varepsilon_c = 1 - \frac{T_{cold}}{T_{hot}}$.

(5) What is the efficiency of a Carnot cycle which is operating between the temperature extremes of 0°C and -200 °C.

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