MARK: PHY1321 PHY1331 Fall 2019 Assignment 1. Due Sept 20, 6:00PM

/24 LAST NAME (TYPED): _____ ASSIGNED NUMBER(BRIGHSPACE)_____

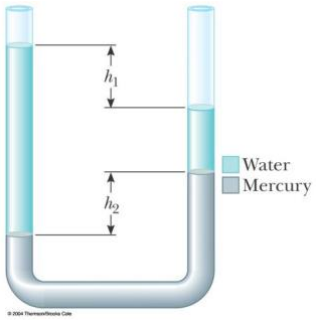
TA:

ASSIGNMENT 1: Pressure, Temperature, Ideal Gas Equation. Released: Sept 13 Due: Sept 20 6PM

Each question is marked out of 4 points, In addition to this there are 4points for presentation/aesthetics for the whole assignment.

1 HS teacher duplicated Torricelli's barometer using a mineral oil, of density 1130kg/m^3, as the working liquid. What was the height *h* of the oil column for normal atmospheric pressure?

2 A U-tube of uniform cross-sectional area, open to the atmosphere, is partially filled with mercury. Water is then poured into both arms. If the equilibrium configuration of the tube is as shown in, with h_2 = 0.80 cm, determine the value of h_1.



3 a) Show that 1 mole of any gas at atmospheric pressure and at 0^o C is taking 22.4 liters of volume
b) Show that the density of an ideal gas occupying a volume V is given by ρ=PM/RT, where M is the molar mass.
(c) Determine the density of oxygen gas at atmospheric pressure and 20.0°C.

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4 80 grams of oxygen and 40 grams hydrogen gas occupy separate, equal sections of 200 liter tank. The divide is removed and the gases are allowed to mix and react with each other. The temperature is kept constant at 110 °C, throughout the process.
a) find the pressure of each gas in the separate containers .
b) find the pressure after the reaction ends.

5 A telescope forms an image of part of a cluster of stars on a square silicon charge-coupled detector (CCD) chip 2.00 cm on each side. A star field is focused on the CCD when it is first turned on and its temperature is 20.0°C. The star field contains 5 432 stars scattered uniformly. To make the detector more sensitive, it is cooled to –200°C. How many star images then fit onto the chip? The average coefficient of linear expansion of silicon is $4.86\times10^{-6}\,(°C)^{-1}$.