1. A constant volume gas thermometer is calibrated in dry ice at -80.0°C and in boiling ethyl alcohol at +78.0°C. The two pressures are 0.900atm and 1.635atm.

a) What Celsius value of absolute zero does this calibration yield? What is the pressure at b) the freezing point of water, c) the boiling point of water.
a) -274°C; b) 1.27atm; c) 1.74atm

2. (3) Liquid nitrogen has a boiling point of -195.81°C at atmospheric pressure. Express this temperature a) in Fahrenheit, b) in Kelvin.

a) -320°F; b) 77.3K

3. (4) The melting point of gold is 1064°C, and the boiling point is 2660°C. Express these temperatures in Kelvin. Express the temperature difference in both Celsius and Kelvin. a) 1337K b) 2933K

4. (11) A pair of eyeglass frames is made of epoxy plastic. At room temperature (20.0°C), the frames have circular lens holes 2.20cm in radius. To what temperature must the frames be heated if lenses 2.21cm in radius are to be inserted in them? The average coefficient of linear expansion for epoxy is 1.30E-4C^{-1}. (55.0°C)

5. (9) A brass ring of diameter 10.00cm at 20.0°C is heated and slipped over an aluminum rod of diameter 10.01cm. Assuming the average coefficients of linear expansion are constant, a) to what temperature must this combination be cooled to separate them? Is this attainable? b) What if the aluminum rod were 10.02cm in diameter? (α_{Al}=24E-6/C°; α_{br}=19E-6/C°)
   a) -179°C; b)-400K not possible.
6. The average coefficient for volume expansion for CCl_4 is 5.81E-4/C°. If a 50gallon steel drum is filled completely with this liquid at 10.0°C, how much will spill over when the temperature rises to 30.0°C? α_{Fe}= 11E-6/C°. (0.548gallon.)

Macroscopic description of an ideal gas PV=nRT; P= $\frac{\rho}{M_{mol}}RT$

7. (21) The mass of a hot air balloon and its cargo (not including the air inside the balloon) is 200kg. The air outside is at 10.0°C and 101kPa. The volume of the balloon is 400m^3. To what temperature must the air inside the balloon be heated before the balloon will lift off? (Air density at 10.0°C is 1.25kg/m^3)
   (199°C)
8. (23) a) Find the number of moles in one cubic meter of an ideal gas at 20.0°C and atmospheric pressure. b) for air, Avogadro's number of molecules has mass 28.9g. Calculate the mass of one cubic meter of air. a) 41.6 moles b) 1.20kg

9. (24) At 25.0m below the surface of the sea (ρ=1,025kg/m^3) where the temperature is 5.00°C, a diver exhales an air bubble having a volume of 1.00cm^3. If the surface temperature of the sea is 20.0°C, what is the volume of the air bubble just before it breaks the surface? (3.7ml)