___ 1 A lake with 6.50×10^9 kg of water, which has a specific heat of 4180 J/(kg °C), warms from 5 °C to 16 °C. The amount of heat transferred to the lake is

A) 2.99×10^{15} J B) 2.99×10^{14} J C) 1.49×10^{14} J D) 4.48×10^{14} J E) 2.66×10^{14} J

___ 2 A 3 kg mass of metal of specific heat 0.1 kcal/ kg °C at a temperature of 600 $^{\circ C}$ is dropped into 1 kg water at 30 °C. With no heat losses to the surroundings and at atmospheric pressure determine the equilibrium temperature of the mixture, and if it is 100 °C, calculate what mass of water is turned into steam at this temperature.

The specific heat of water is 1 kcal/(kg °C) and its heat of vaporization is 540 kcal/ kg.

A) 100 °C and 74 g of steam B) 100 °C and 15 g of steam
C) 100 °C and 296 g of steam D) The equilibrium temperature is not 100 °C.
E) 100 °C and 148 g of steam

___ 3 Besides Joule's classic experiment, another way of demonstrating the equivalence of mechanical energy and heat is the following: Put some lead shot in a glass tube. Seal both ends of the tube. Invert the tube quickly several times, and measure the temperature of the shot. If you assume that all the mechanical energy is transfered as heat into the lead shot, and none of that energy is lost, what is the change in the temperature of the shot if the tube is 1.95 m long. The mass of the shot is 0.150 kg of shot, and the tube is inverted 20.0 times? [The specific heat of lead is 128. J/ kg °C.]

A) 1.49 °C B) 0.448 °C C) 2.99 °C D) 5.98 °C E) 19.9 °C

___ 4 An ideal gas initially at 100°C and pressure $P_1 = 250$ kPa occupies a volume $V_1 = 4.5$ L. It undergoes a quasistatic, isothermal expansion until its pressure is reduced to 150 kPa. How much heat enters the gas during this process? $R = 8.314$ J/(mol K) = 0.08206 L atm/(mol K).

A) 116 J B) 640 J C) 320 J D) 575 J E) 850 J

___ 5 An ideal gas with an initial volume of 4.00 L at a pressure of 4.00 atm is compressed adiabatically until it has a volume of 1.00 L and then cooled at constant volume until its temperature drops to its initial value. The final pressure is

A) 0.75 atm B) 2.40 atm C) 32.0 atm D) 1.33 atm E) 16.0 atm

___ 6 A cylinder contains 20 L of air at 1 atm. The ratio of C_P to C_V for air is 1.41. If this sample of air is compressed adiabatically to a volume of 5 L, the pressure after compression is approximately

A) 2.7 atm B) 8.4 atm C) 9.7 atm D) 7.1 atm E) 4.0 atm