D 1

17.60 •• A copper calorimeter can with mass 0.100 kg contains 0.160 kg of water and 0.0180 kg of ice in thermal equilibrium at atmospheric pressure. If 0.750 kg of lead at a temperature of 255°C is dropped into the calorimeter can, what is the final temperature? Assume that no heat is lost to the surroundings.

D 2

18.33 • We have two equal-size boxes, *A* and *B*. Each box contains gas that behaves as an ideal gas. We insert a thermometer into each box and find that the gas in box *A* is at a temperature of 50°C while the gas in box *B* is at 10°C. This is all we know about the gas in the boxes. Which of the following statements *must* be true? Which *could* be true? (a) The pressure in *A* is higher than in *B*. (b) There are more molecules in *A* than in *B*. (c) *A* and *B* do not contain the same type of gas. (d) The molecules in *A* have more average kinetic energy per molecule than those in *B*. (e) The molecules in *A* are moving faster than those in *B*. Explain the reasoning behind your answers.

D 3

The gas inside a balloon will always have a pressure nearly equal to atmospheric pressure, since that is the pressure applied to the outside of the balloon. You fill a balloon with helium (a nearly ideal gas) to a volume of 0.590 L at a temperature of 21.0 ^{o}C .

What is the volume of the balloon if you cool it to the boiling point of liquid nitrogen, 77.3 K?

D 4

A flask contains a mixture of neon (Ne), krypton (Kr), and radon (Rn) gases. (*Hint:* The molar mass of the Ne is 20.180 g/mol, of the Kr is 83.80g/mol, and of the Rn 222 g/mol)

Part A

What is the ratio of the average kinetic energy of the Ne to that of the Kr?

Part B

What is the ratio of the average kinetic energy of the Kr to that of the Rn?

Part C

What is the ratio of the average kinetic energy of the Rn to that of the Ne?

Part D

What is the ratio of the root-mean-square speed of the Ne to that of the Kr?

Part E

What is the ratio of the root-mean-square speed of the Kr to that of the Rn?

Part F

What is the ratio of the root-mean-square speed of the Rn to that of the Ne?