Suggested problems: Chapter 18- HRW-Principles of Physics- ISV 10th Edition.

2. A certain substance has a mass per mole of 50.0 g/mol. When 325 J is added as heat to a 30.0 g sample, the sample's temperature rises from 25.0°C to 45.0°C.What are the (a) specific heat and (b) molar specific heat of this substance? (c) How many moles are in the sample?

Answer: (a) 542 J/kg.K;(b) 27.1 J/mol.K; (c) 0.600 mol.

16. Suppose 200 J of work is done on a system and 80.0 cal is extracted from the system as heat. In the sense of the first law of thermodynamics, what are the values (including algebraic signs)of (a) W, (b) Q, and (c) ΔE_{int} ?

Answer:−200 J; (b) −335 J; (c) −135 J

18. Figure 18-32 shows the cross section of a wall made of three layers. The layer thicknesses are L$_1$, L$_2$ =0.750 L$_1$, and L$_3$ = 0.350L$_1$ The thermal conductivities are k$_1$, k$_2$ = 0.900 k$_1$, and k$_3$=0.800 k$_1$. The temperatures at the left and right sides of the wall are T$_H$=30.0°C and T$_C$ =−15.0°C, respectively. Thermal conduction is steady. (a) What is the temperature difference ΔT$_2$ across layer 2 (between the left and right sides of the layer)? If k$_2$ were, instead, equal to 1.1 k$_1$, (b) would the rate at which energy is conducted through the wall be greater than, less than, or the same as previously, and (c) what would be the value of ΔT$_2$?
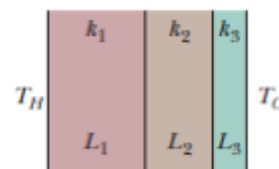
Fig. 18-32 Problem 18

Answer: (a) 16.5 C°; (b) greater; (c) 14.5 C°

29. A sphere of radius 0.350 m, temperature 27.0°C, and emissivity 0.850 is located in an environment of temperature 77.0°C. At what rate does the sphere (a) emit and (b) absorb thermal radiation? (c)What is the sphere's net change of energy in 3.50 min?

Answer:(a) 602 W; (b) 1.12 x10^3 kW; (c) 1.08 x10^{5}J

43A cylindrical copper rod of length 0.6 m and cross-sectional area 6.0 cm^2 is insulated to prevent heat loss through its surface. The ends are maintained at a temperature difference of 100 C° by having one end in a water–ice mixture and the other in a mixture of boiling water and steam.
At what rate a) is energy conducted along the rod? (b) does ice melt?

Answer:(a) 40 J/s; (b)0.12 g/s

45. At what temperature is the Fahrenheit scale reading equal to (a) three times that of the Celsius scale and (b) one-third that of the Celsius scale?

Answer: (a) 80°F; (b) −7.27°F

55.A steel rod is 3.000 cm in diameter at −10.00°C. A brass ring has an interior diameter of 2.992 cm at −10.00°C. At what common temperature will the ring just slide onto the rod?

Answer: 325.0 °C

58.How much water remains unfrozen after 50.2 kJ is transferred as heat from 240 g of liquid water initially at its freezing point?

Answer:89 g.