Heat problem

1. Calculate the heat required (in J and calories) to raise the temperature of a 5 kg block of copper 60°C.
2. Calculate the energy needed to heat the equivalent mass of water the same amount

Substances	**Specific heat (*c*)**	
Solids	J/(kg·°C)	kcal/(kg°C)[1]
Aluminum	900	0.215
Asbestos	800	0.19
Concrete, granite (average)	840	0.20
Copper	387	0.0924
Glass	840	0.20
Gold	129	0.0308
Human body (average at 37 °C)	3500	0.83
Ice (average, -50°C to 0°C)	2090	0.50
Iron, steel	452	0.108
Lead	128	0.0305
Silver	235	0.0562
Wood	1700	0.4
Liquids		
Benzene	1740	0.415
Ethanol	2450	0.586
Glycerin	2410	0.576
Mercury	139	0.0333
Water (15.0 °C)	4186	1.000

Thermal expansion problem 1

1. Calculate the increase in temperature necessary to increase the volume of a brass sphere by 5%.

Material	Coefficient of linear expansion $\alpha(1/^{\circ}\mathrm{C})$	Coefficient of volume expansion $\beta(1/^{\circ}\mathrm{C})$
Solids		
Aluminum	25×10^{-6}	75×10^{-6}
Brass	19×10^{-6}	56×10^{-6}
Copper	17×10^{-6}	51×10^{-6}
Gold	14×10^{-6}	42×10^{-6}

Thermal expansion problem 2

1. 500 mL of an unknown liquid expands to 533 mL when heated by 60 °C. Identify the unknown liquid.

Liquids		
Ether		1650×10^{-6}
Ethyl alcohol		1100×10^{-6}
Petrol		950×10^{-6}
Glycerin		500×10^{-6}
Mercury		180×10^{-6}
Water		210×10^{-6}

Thermal radiation

1. The surface of the Sun has a temperature of 5780 K. Find the peak wavelength of the thermal emission.
2. The human body temperature is 37 °C. Find the peak of the thermal emission.