TABLE 20.2 Latent Heats of Fusion and Vaporization

Substance	Melting Point (°C)	Latent Heat of Fusion (J/kg)	Boiling Point (°C)	Latent Heat of Vaporization (J/kg)
Helium	−269.65	5.23×10^3	−268.93	2.09×10^4
Nitrogen	−209.97	2.55×10^4	−195.81	2.01×10^5
Oxygen	−218.79	1.38×10^4	−182.97	2.13×10^5
Ethyl alcohol	−114	1.04×10^5	78	8.54×10^5
Water	0.00	3.33×10^5	100.00	2.26×10^6
Sulfur	119	3.81×10^4	444.60	3.26×10^5
Lead	327.3	2.45×10^4	1 750	8.70×10^5
Aluminum	660	3.97×10^5	2 450	1.14×10^7
Silver	960.80	8.82×10^4	2 193	2.33×10^6
Gold	1 063.00	6.44×10^4	2 660	1.58×10^6
Copper	1 083	1.34×10^5	1 187	5.06×10^6

Source: http://www.kshitij-iitjee.com/latent-heat

Sublimation is the process of transition from solid phase to gas. The heat required for this process is called the **heat of sublimation** (L_s)

Chemical reactions are analogous to phase change in which they involve definite quantities of heat. **The heat of combustion** (L_c) of gasoline is L_c = 46000J/g or 4.6x10^7J/kg since complete combustion of 1 g of gasoline is equivalent to 46000J or 11000 cal.

Heat Calculations:

A camper pours 0.300 kg of coffee, initially in a pot at 70.0 degree C, into a 0.120 kg aluminum cup initially at 20.0 degrees C. What is the equilibrium temperature? Assume that coffee has the same specific heat as water and that no heat is exchanged with the surrounding. water = 4190 J/Kg K aluminum = 910 J/Kg K

T_0 c: 70.0 C (initial temp. of coffee) $m_{c=}$ mass of coffee

$T_{0Al:}$ 20.0 C (initial temp. of Aluminum cup) m_{Al} = mass of water

$C_{w:}$ 4190 J/kg · K (specific heat of water)

$C_{Al:}$ 910J/kg · K (specific heat of Aluminum cup)

The (negative) heat gained by the coffee is Qc=$m_c\, c_w\, \Delta T_c$. The (positive) heat gained by the cup is Q_{Al} = $m_{Al}\; c_{Al}\, \Delta T_{Al}$ .We set Qc+Q_{Al} =0 and substitute ΔTc=T-T_{0C} and ΔT_{Al} =T- T_{0Al} :

Qc+Q_{Al} :

= $m_c\, c_w\, \Delta T_c + m_{Al}\, c_{Al}\, \Delta T_{Al}$ =0 (the temperature should be in "equilibrium" (0))

= $m_c\, c_w$ (T- T_0 c) + $m_{Al}\, c_{Al}$ (T-$T_{0Al)}$ =0 (substitute the ΔT into (T, which is the final temperature – T_0, which is the initial temperature)