

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Explain the latent heat and specific heat of water, ammonia, and methanol with degrees of freedom LIANXI MA, Blinn College — There are 15 known crystalline solid phases of water and all of them are called ice. But here the ice in our context is the one when water is cooled down to 0 °C at 1 atmosphere. It is well known that at 0 °C and 1 atmosphere, the density of water is 0.9998 g/cm³ and the density of ice is 0.9162 g/cm³. Question: For 0 °C water and ice, which has a higher internal energy? Because they have same temperature, their molecules should have same kinetic energies. Therefore their potential energies among molecules need to be compared. Because ice's density is lower so it should have larger potential energy, which indicates an incredible conclusion that ice has higher internal energy. How do we explain this paradox? The internal energies of 0 °C water and ice are considered from the perspective of degree of freedom and latent heat of fusion of water is calculated, which is in good agreement with the published value. With the same consideration, the latent heats of fusion of ammonia and methanol are calculated and the results are in reasonable agreement with the published values. This simple strategy can give specific heats of water, liquid ammonia, and methanol, which are in good agreement with known data.

Lianxi Ma
Blinn College

Date submitted: 30 Nov 2008

Electronic form version 1.4