

therefore makes them firmer rather than otherwise, as is clearly demonstrated when a portion of the water is removed as in fading.

In addition to snow, ice, and ordinary water, an invisible form exists in nature as vapour suspended in the atmosphere, or as steam enclosed in the boilers of our engines.

These three forms of aggregation—solid, liquid and gaseous—have of course the same composition ; but, as we know, vary in appearance and properties. They are easily transformed one into the other, and frequently exist in nature in contact with each other. Although easily accomplished this transformation is not so simple as, without reflection, we might suppose. If a thermometer be placed in contact with melting ice, it will always indicate the same temperature no matter what the heat applied to the ice may be, and furthermore, so long as any of it remains in contact with the resultant water, this also does not vary, but remains constantly at the freezing point. Since neither the ice nor the water have increased in temperature the heat applied to them is not indicated by the thermometer, and is hence called *latent heat*. Heat, as we know, can be transformed into force, and in this case it has been used to overcome the force which holds the minute particles (called molecules) of which the ice is composed, in their place, preventing them from moving past each other as they do in liquids. The heat necessary to do this work can be measured by applying a definite amount (in the shape of hot water) to a pound of ice. If we were to mix a volume of water at 80°C . (176°F .) with the same weight of ice at its melting point, and could prevent the loss of any heat, we should find that after a time the ice would have disappeared, and two volumes of water at the freezing point would be the result ; clearly showing that considerable heat had been rendered latent.

Very frequent use is made of this property of water, as for example in “freezing mixtures.” In these the heat required to melt the ice is supplied by the materials to be cooled or frozen. A convenient form is that in which this material (i.e., a can of cream) is imbedded in a mixture of salt and ice. Since salt is very soluble it can cause the ice to melt at a much lower point than it generally does, thereby materially reducing it in temperature. In the construction of the scale for his thermometer Fahrenheit used the lowest point obtainable by this mix-