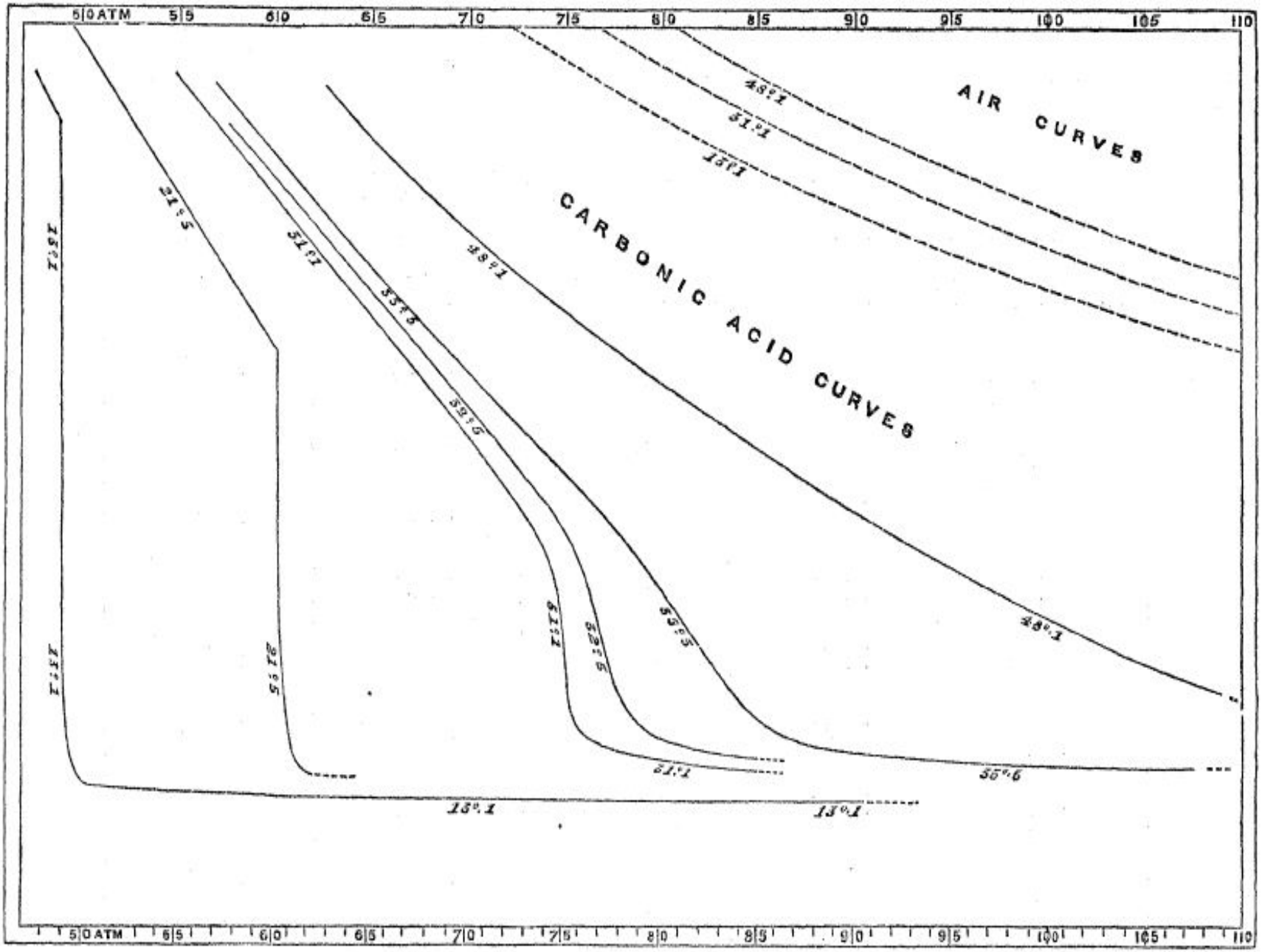

50 ATM
55
60
65
70
75
80
85
90
95
100
105
110
AIR CURVES
CARBONIC ACID CURVES
48°.1
51°.1
13°.1
21°.5
51°.1
35°.5
31°.5
48°.1
25°.2
23°.2
21°.5
61°.2
55°.5
48°.1
15°.1
13°.1
56°.6

The curve representing the results at 21.05 agrees in general form with that for 13.1, as shown in the above figure. At 13.1, under a pressure of about 49 atmospheres, the volume of carbonic acid is little more than three-fifths of that which a perfect gas would occupy under the same conditions. After liquefaction carbonic acid yields to pressure much more than ordinary liquids; and the compressibility appears to diminish as the pressure increases. The high rate of expansion by heat of liquid carbonic acid, first noticed by THILORIER, is fully confirmed by this investigation.

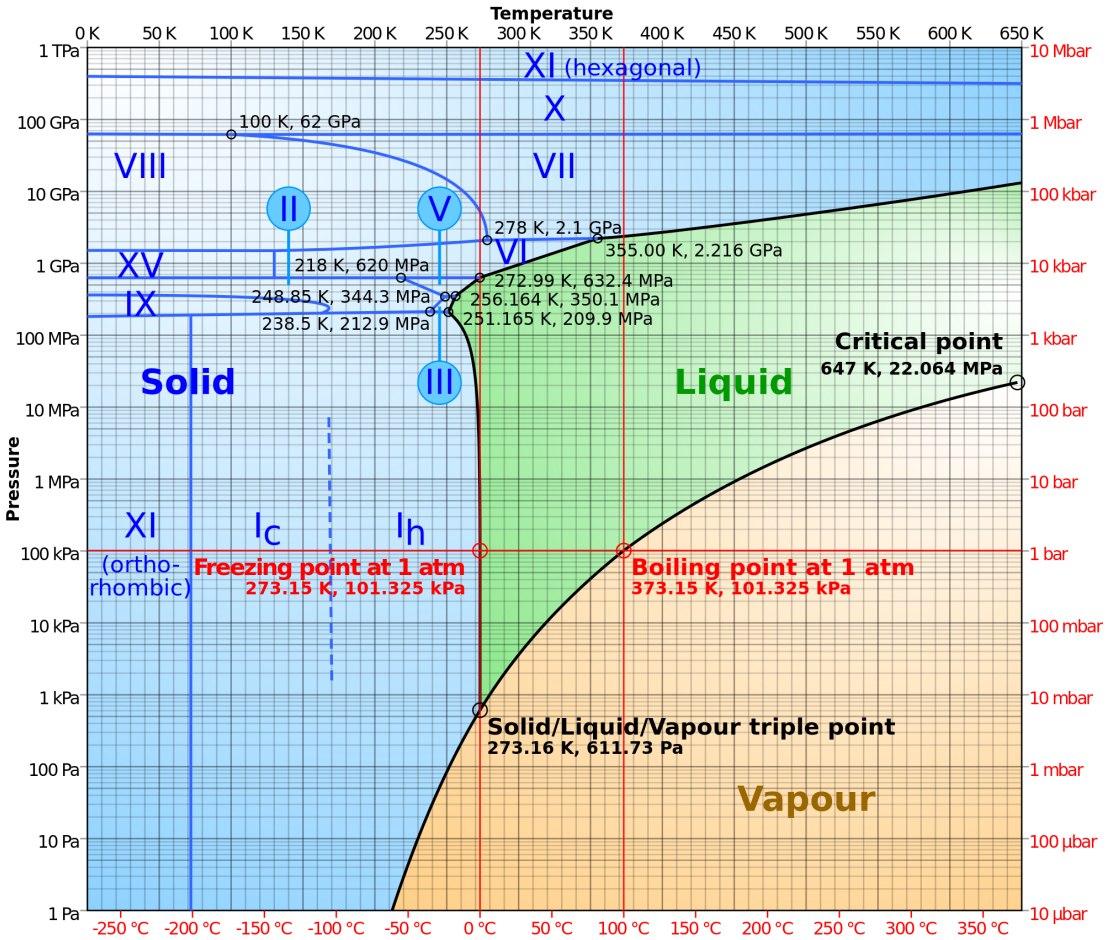
The next series of experiments was made at the temperature of 31.1, or 0.2 above the point at which, by compression alone, carbonic acid is capable of assuming visibly the liquid form. Since I first announced this fact in 1863, I have made careful experiments to fix precisely the temperature of this critical point in the case of carbonic acid. It was found in three trials to be 30.92 C., or 87.7 FAH.

Although for a few degrees above this temperature a rapid fall takes place from increase of pressure, when the gas is reduced to the volume at which it might be expected to liquefy, no separation of the carbonic acid into two distinct conditions of matter occurs, so far as any indication of such a separation is afforded by the action of light.

By varying the pressure or temperature, but always keeping the latter above 30 .92, the great changes of density which occur about this point produce the flickering movements I formerly described, resembling in an exaggerated form the appearances exhibited during the mixture of liquids of different densities, or when columns of heated air ascend through colder strata.

It is easy so to adjust the pressure that one-half of the tube shall be filled with uncondensed gas and one-half with the condensed liquid. Below the critical temperature this distinction is easily seen to have taken place, from the visible surface of demarcation between the liquid and gas…..

Phase diagram of water in P-T plane



[Source: Google images]

- Critical values for water: $T_c = 647K$, $P_c = 217.75$ atm, $\rho_c = 356Kg/m^3$.
- Blue shaded region shows eleven phases of ice.
- 17 phases have been found till date.