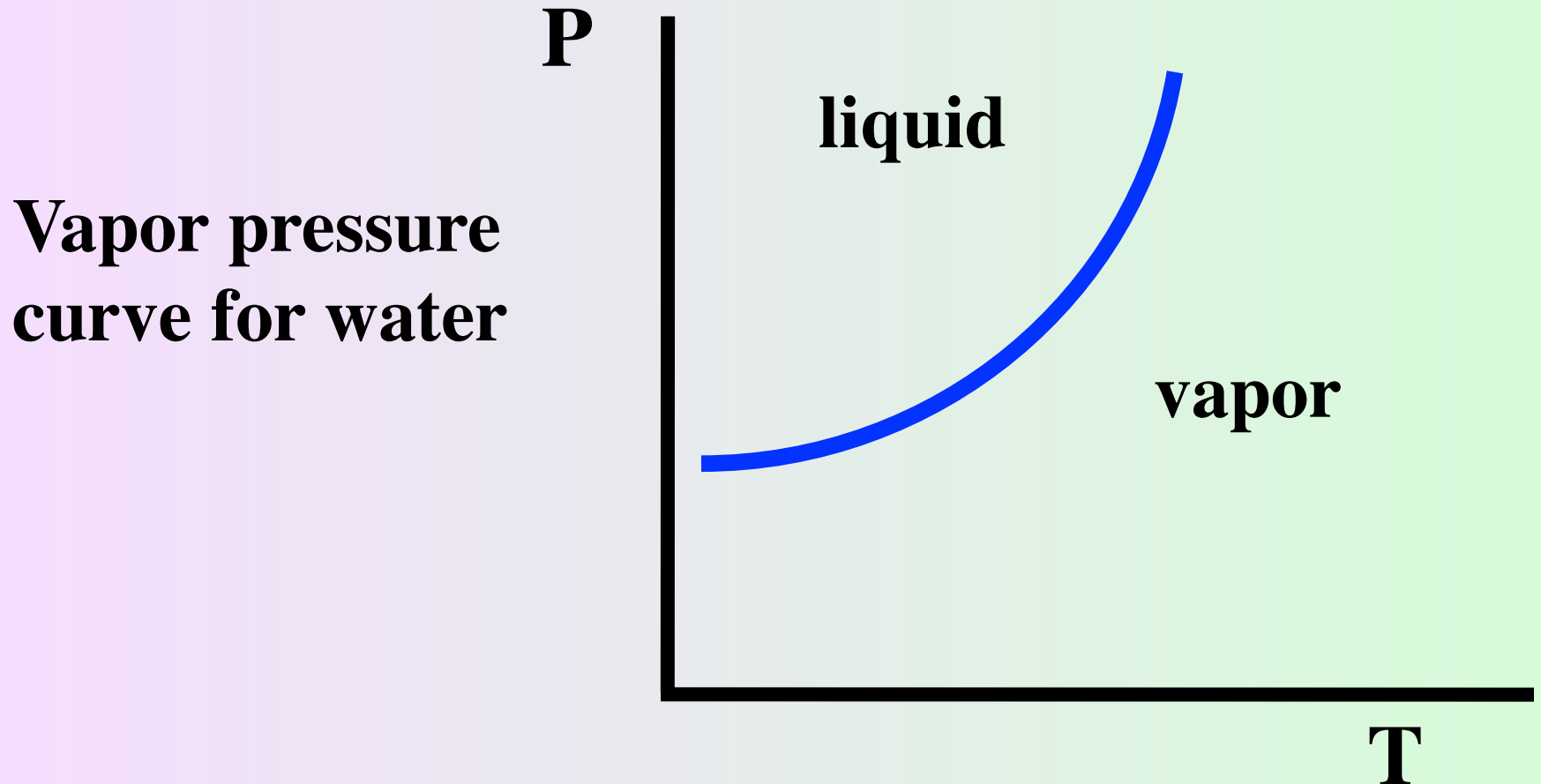


# Phase Diagrams

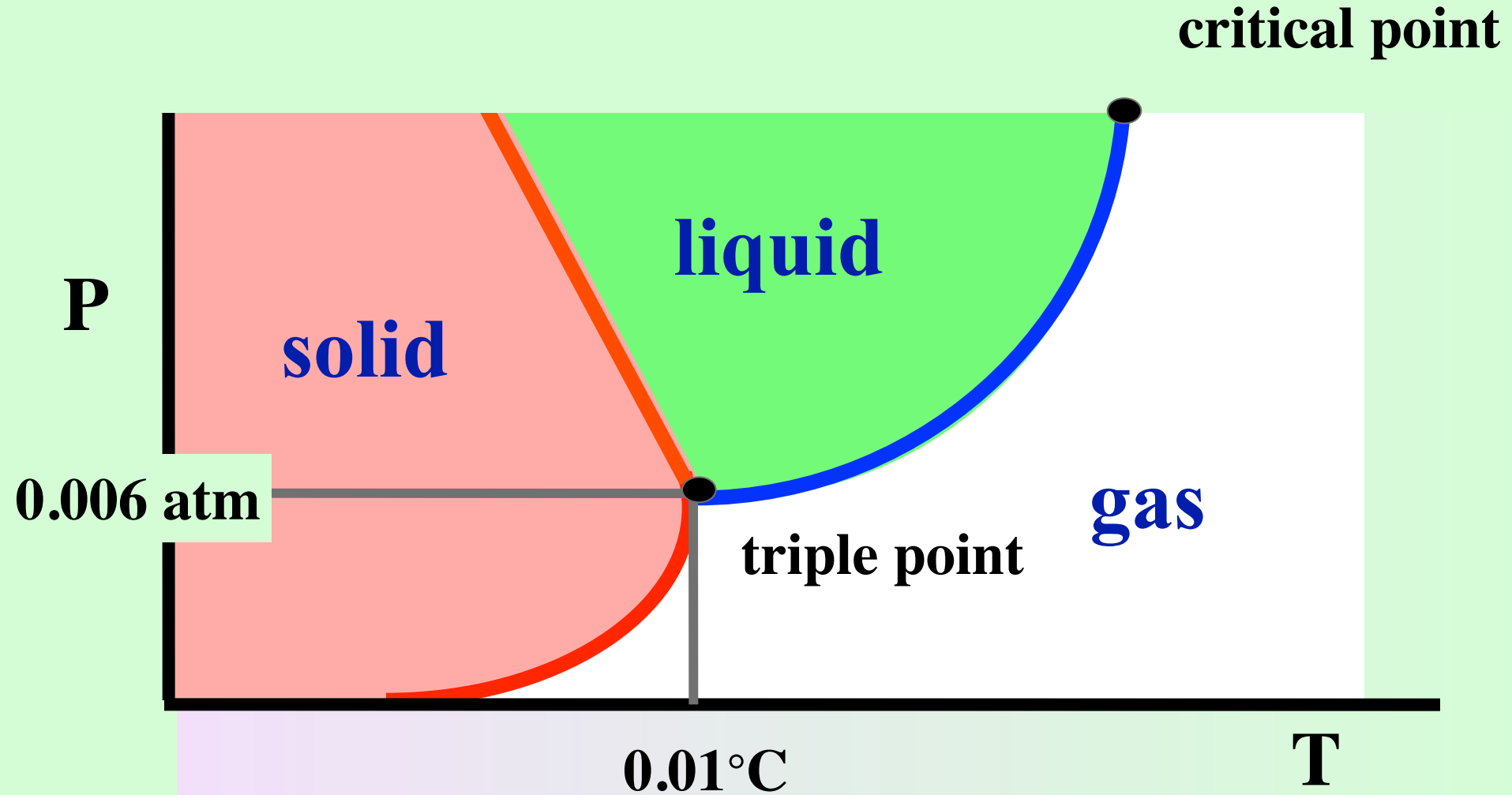
**Phase diagrams are graphs that summarize conditions ( temperature, pressure ) under which a substance exists as a solid, liquid, or gas.**

# A Familiar Phase Diagram

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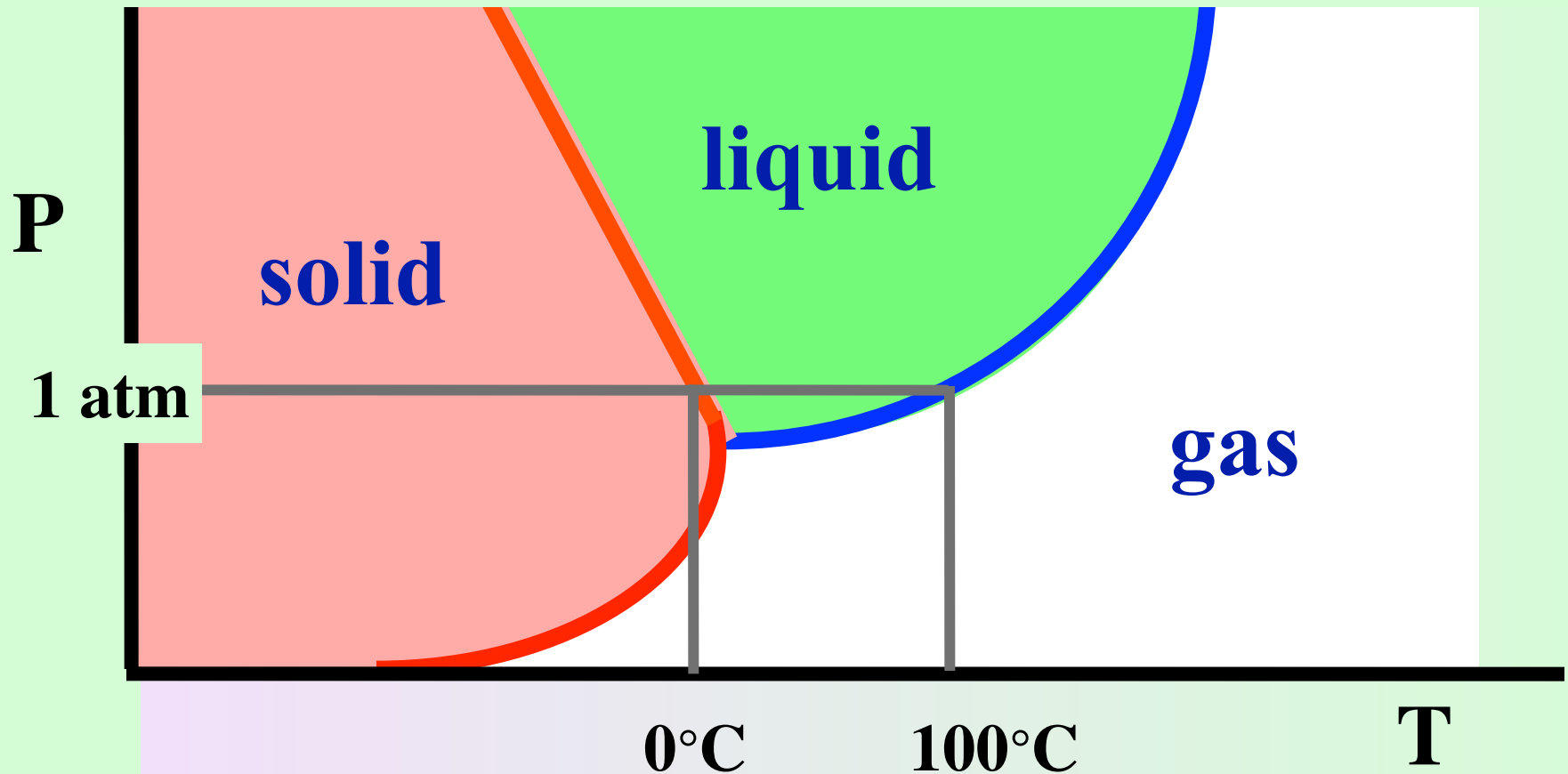


# Including the Solid Phase

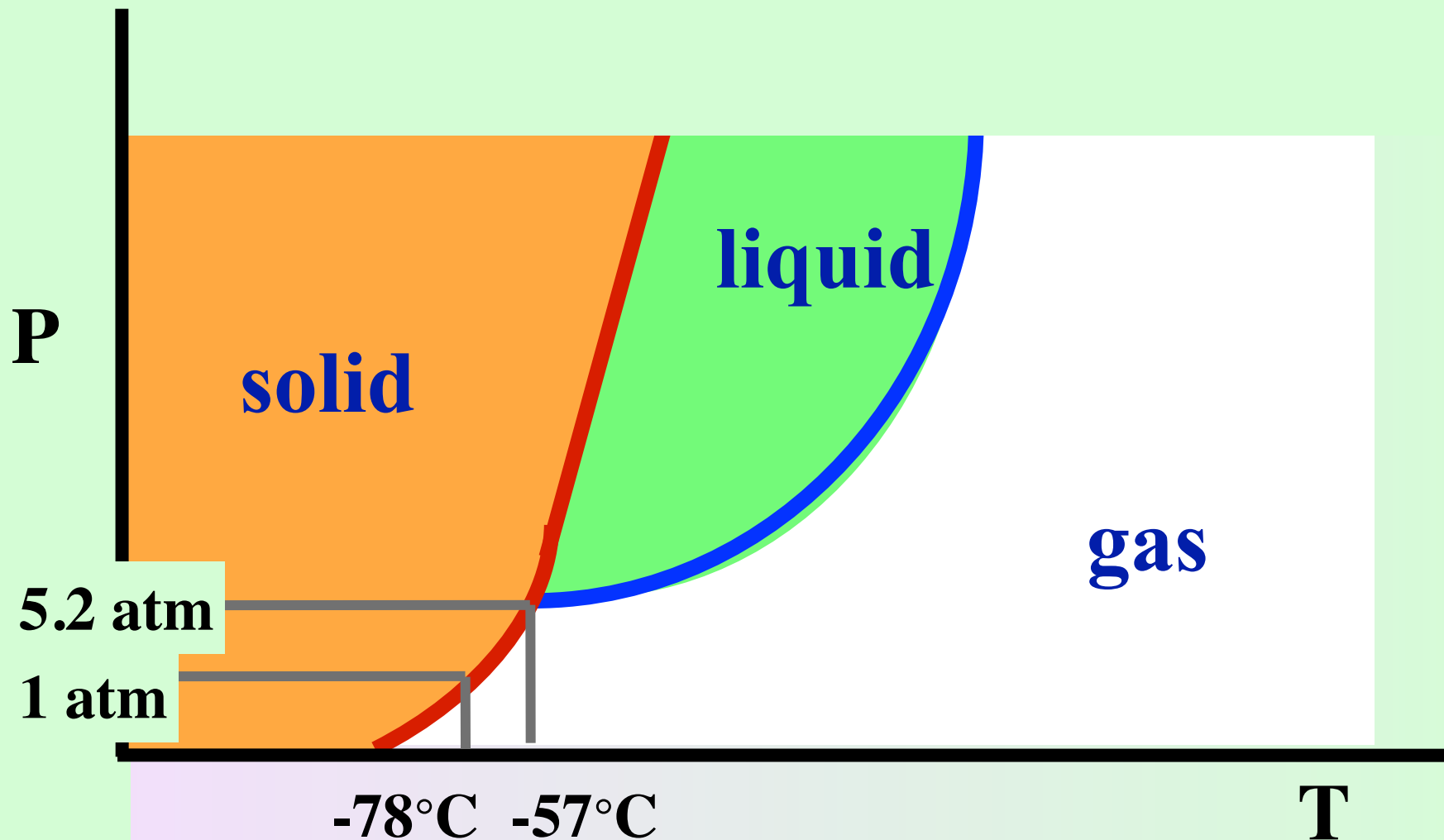


# Normal melting and boiling point of water

Pressure = 1 atm

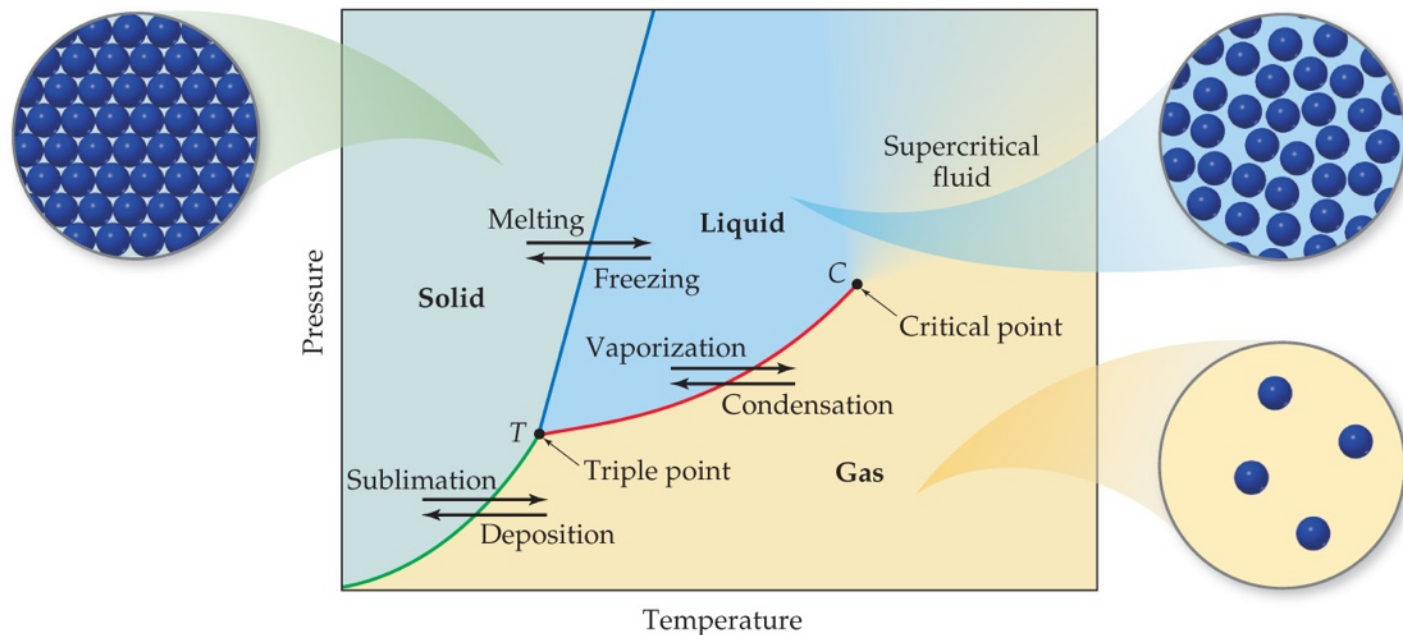


# Carbon dioxide phase diagram



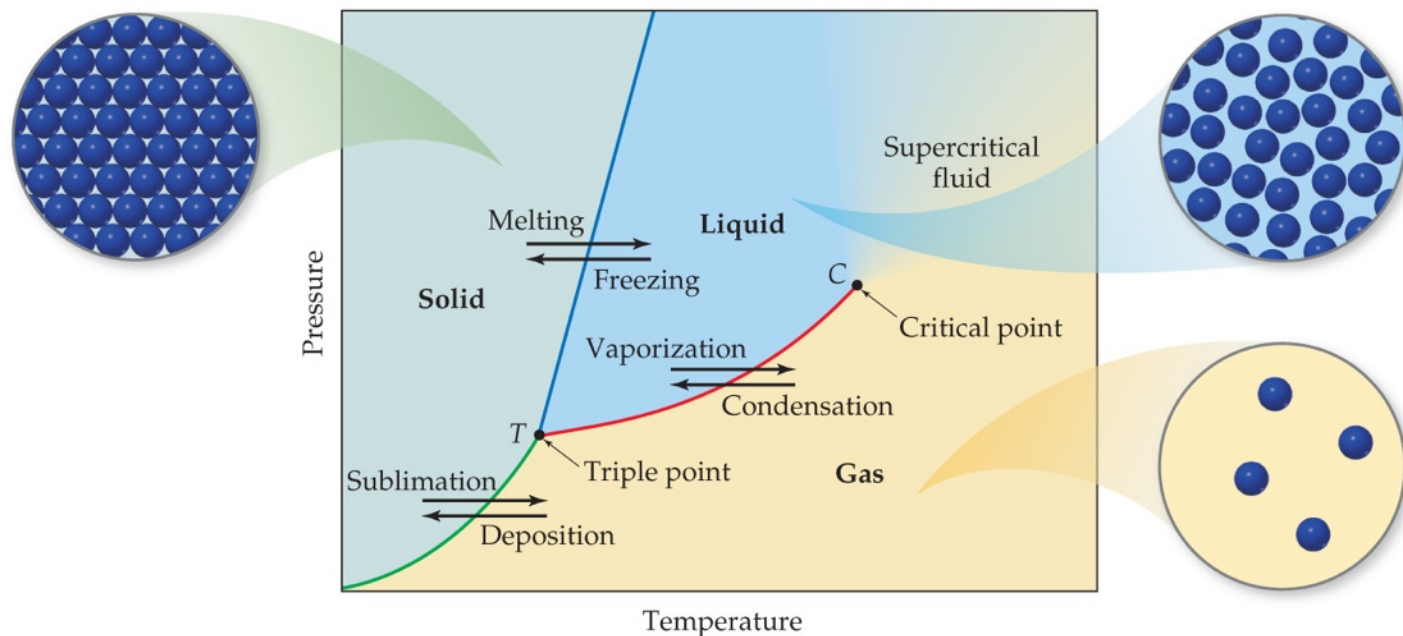
# Phase Diagrams

Phase diagrams display the state of a substance at various pressures and temperatures, and the places where equilibria exist between phases.



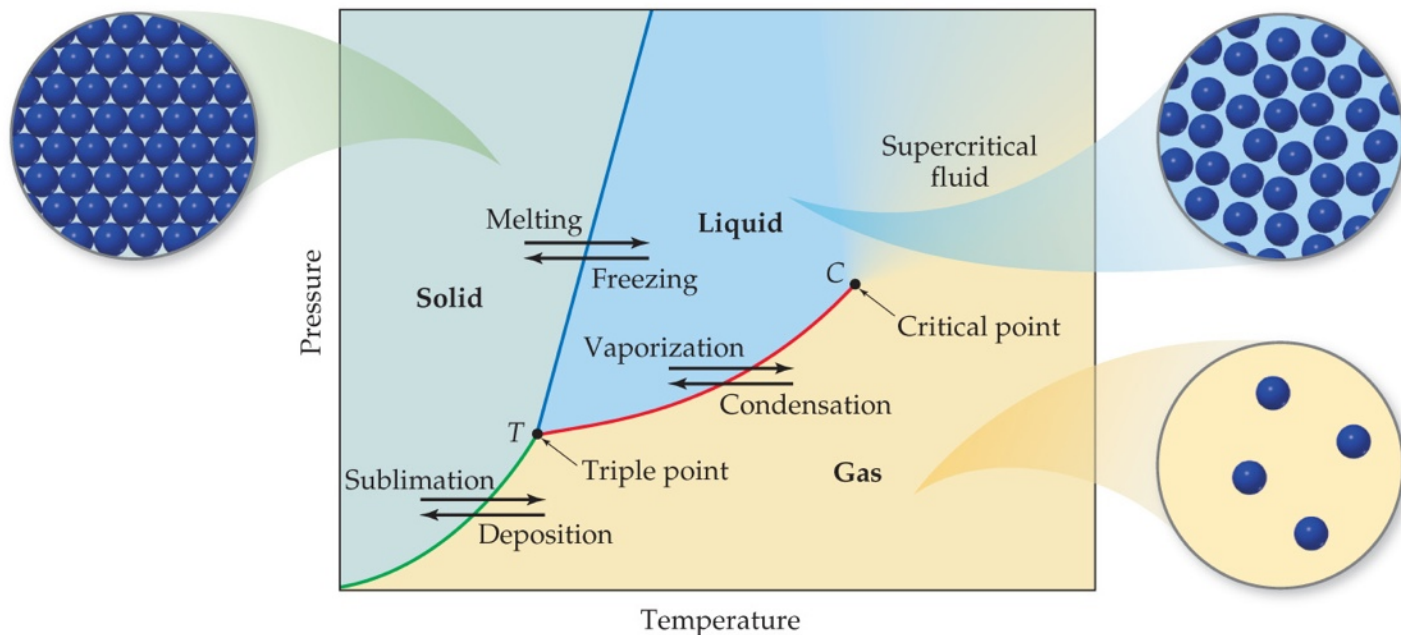
# Phase Diagrams

The liquid–vapor interface starts at the triple point ( $T$ ), at which all three states are in equilibrium, and ends at the critical point ( $C$ ), above which the liquid and vapor are indistinguishable from each other.



# Phase Diagrams

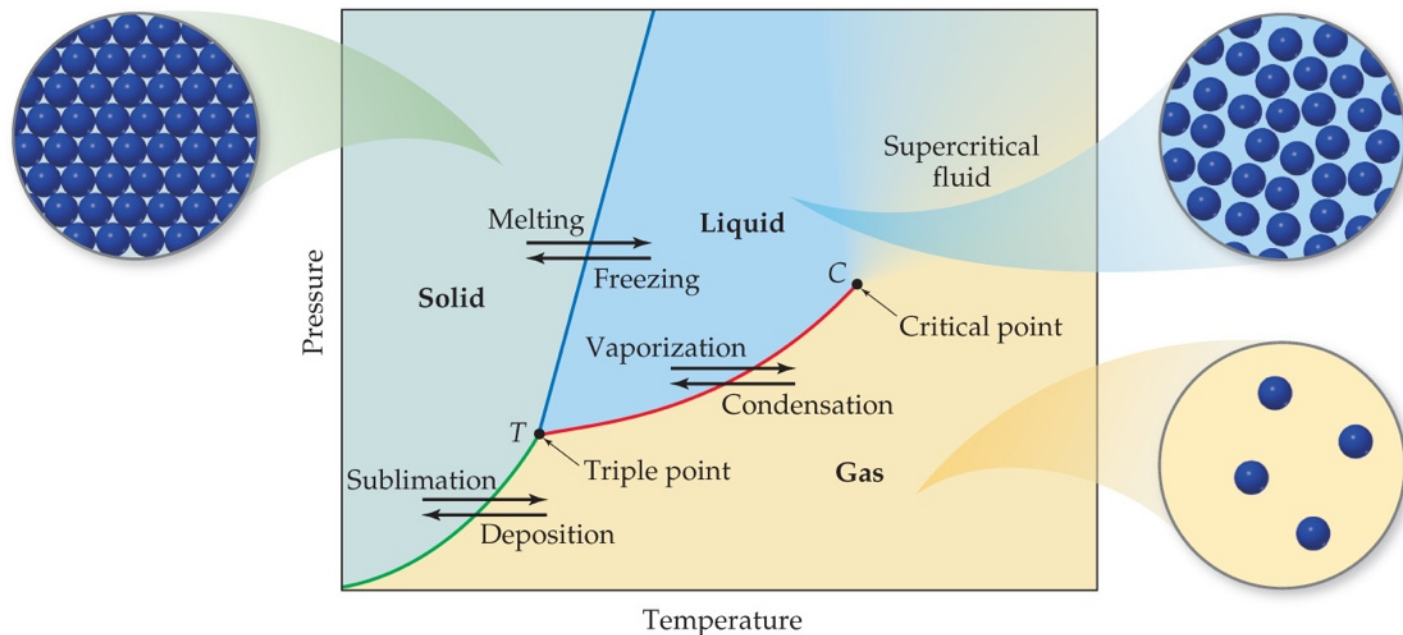
Each point along this line is the boiling point of the substance at that pressure.





# Phase Diagrams

The interface between liquid and solid marks the melting point of a substance at each pressure.



# Phase Diagrams

- Below the triple point the substance cannot exist in the liquid state.
- Along the solid–gas line those two phases are in equilibrium; the sublimation point at each pressure is along this line.

