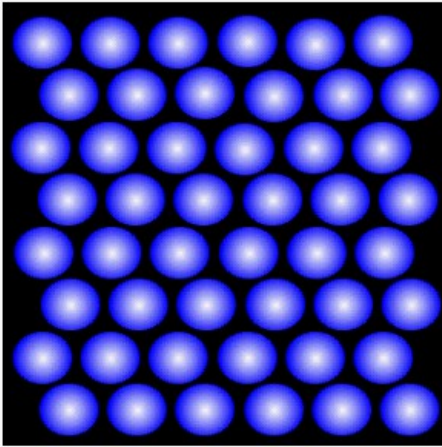


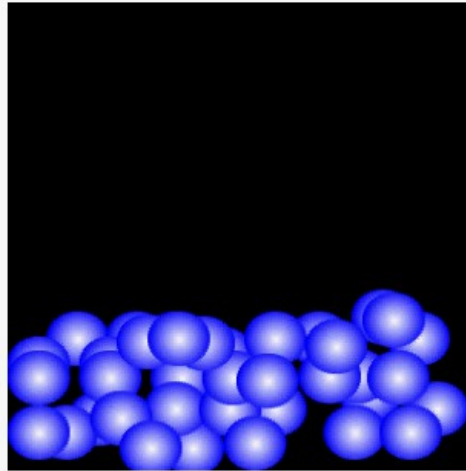
State Changes

States of Matter



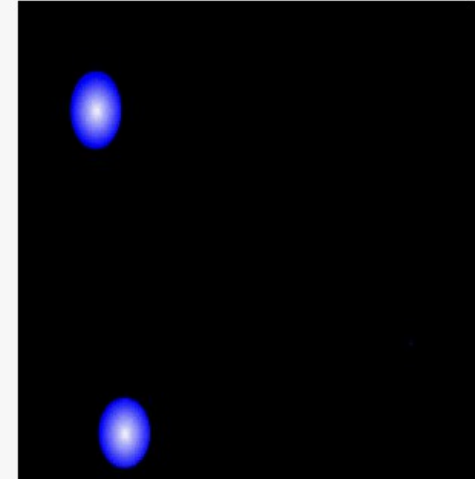
Solid

**Fixed volume
and shape.**



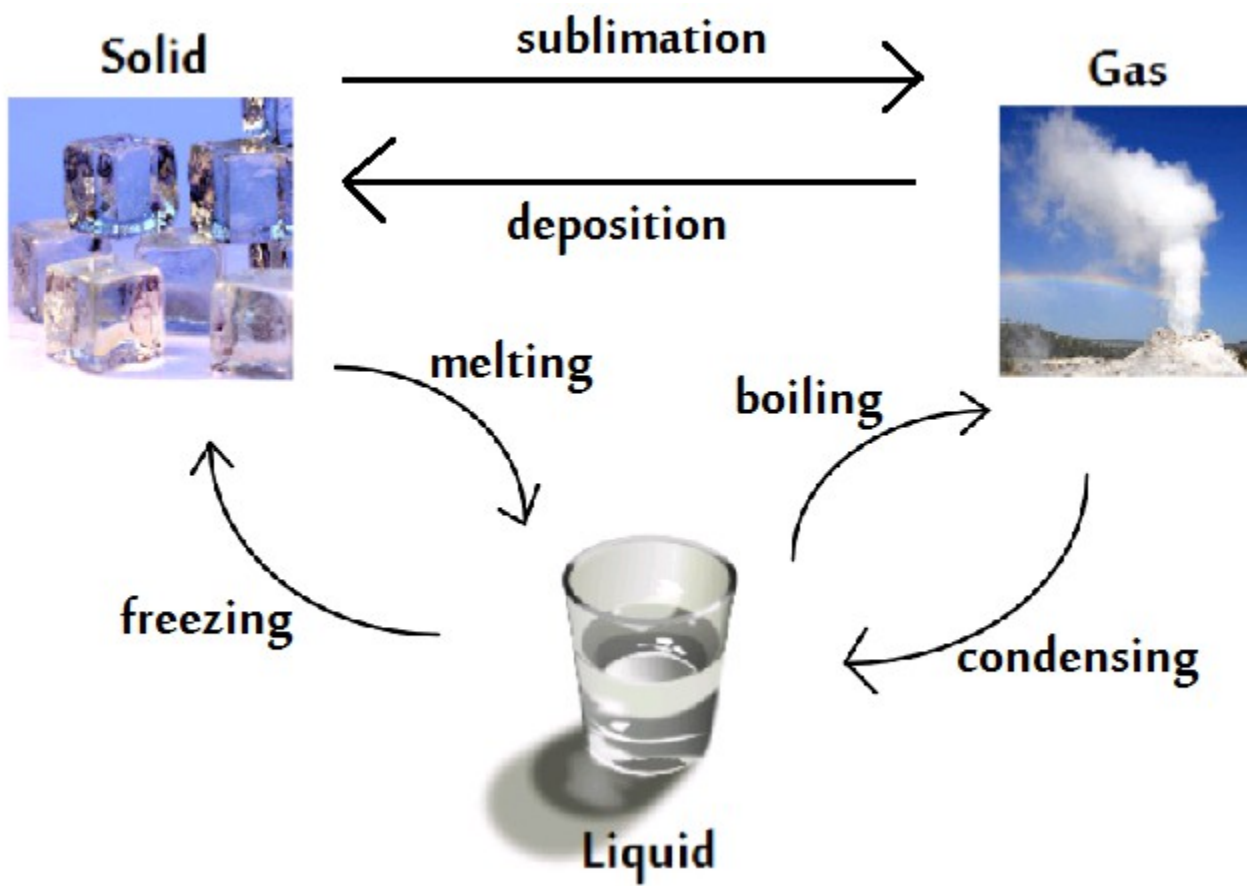
Liquid

Fixed volume.

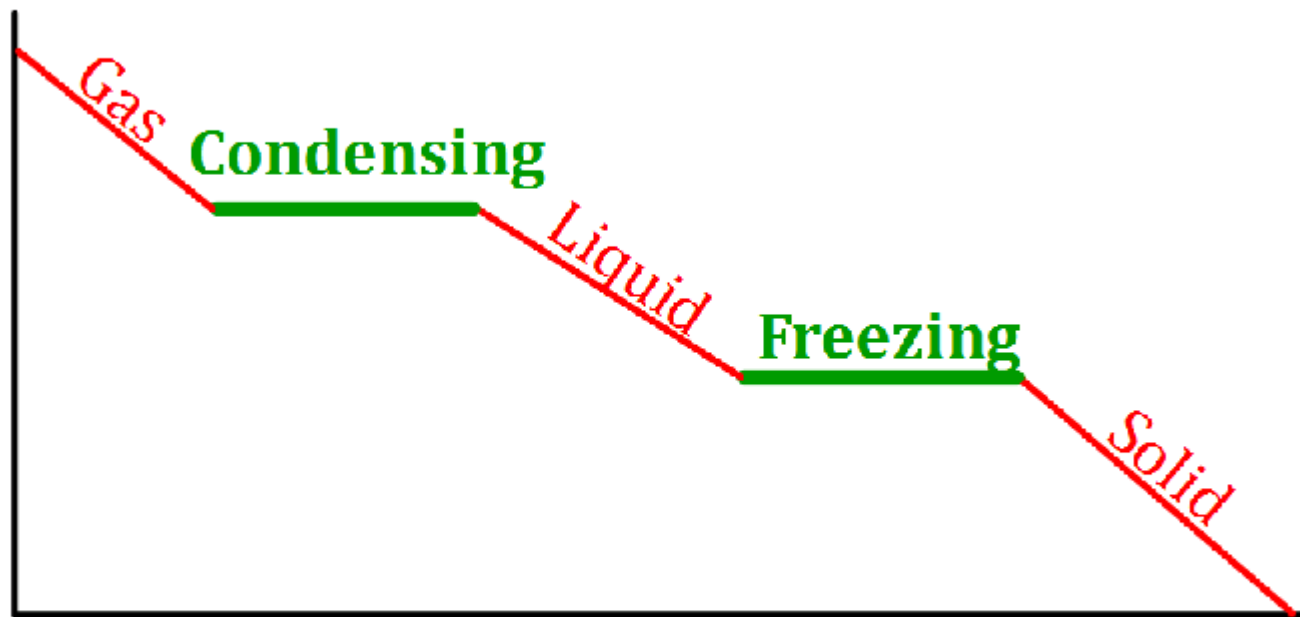


Gas

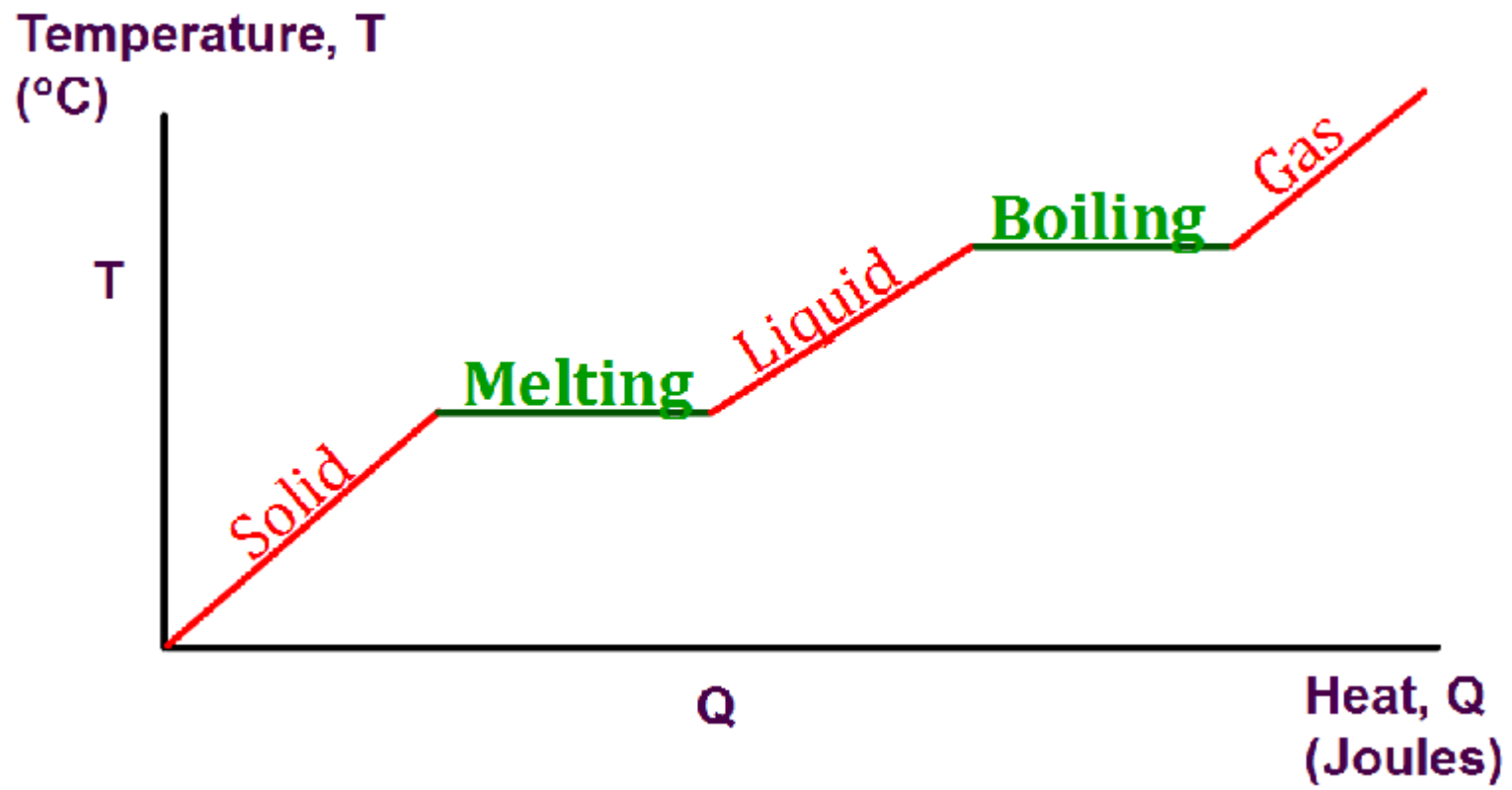
**Expands to fill
container.**



Temperature, T
(°C)



Heat, Q
(Joules)





$$Q = mc\Delta T$$

Q = amount of heat (joules)

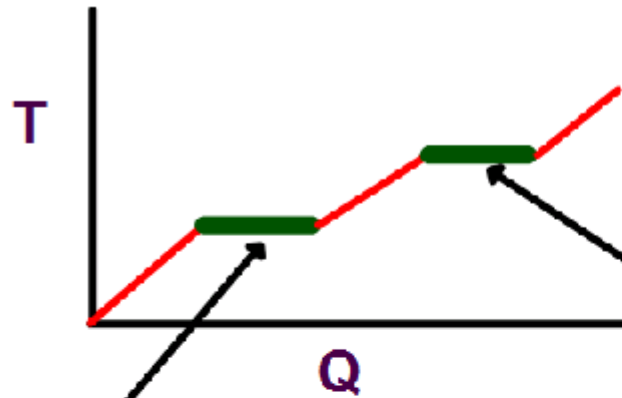
ΔT = change in temperature

m = mass

c = specific heat: the amount of heat needed to raise the temp of 1 kg of a substance 1°C

c (water) = 4187 J/K \cdot C

c (ice) = 2090 J/K \cdot C



$$Q = mh_f \quad \text{or} \quad mh_v$$

Q = amount of heat (joules)

m = mass

h_f = heat of fusion

The amount of heat needed to melt a solid (or freeze a liquid).

h_v = heat of vaporization

The amount of heat needed to vaporize a substance to gas (or condense a gas to a liquid).