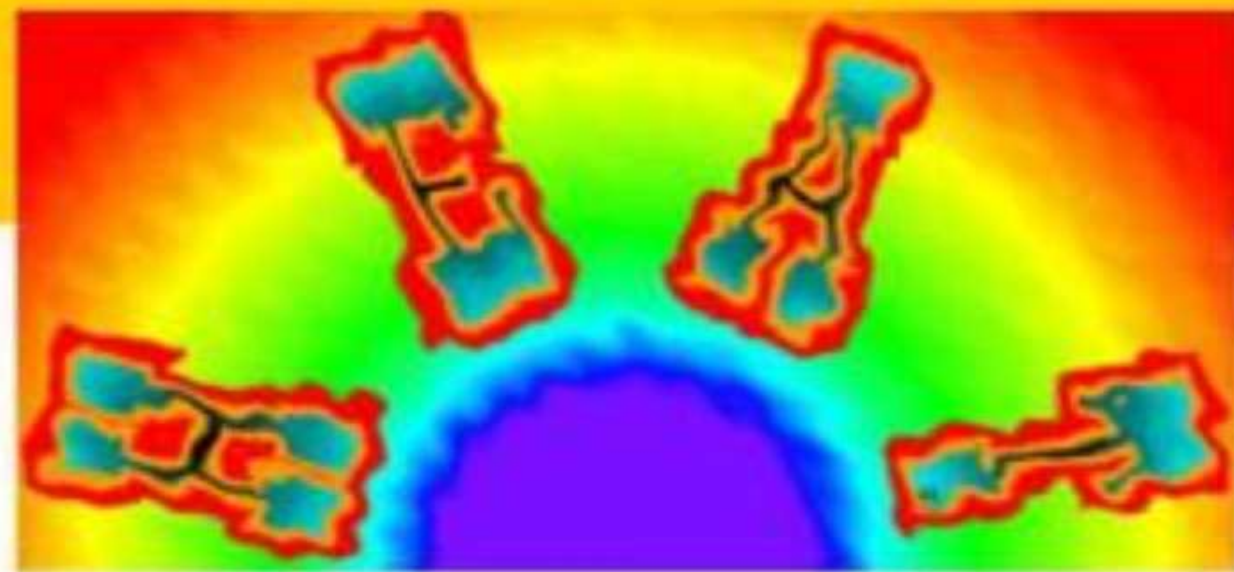
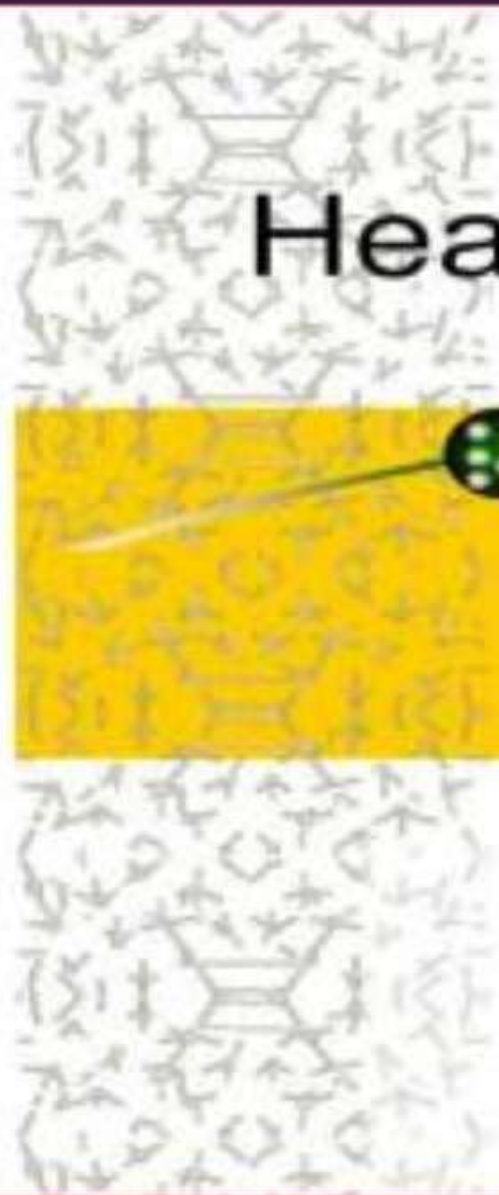


ऊष्मा और ऊष्मागतिकी के सिद्धांत

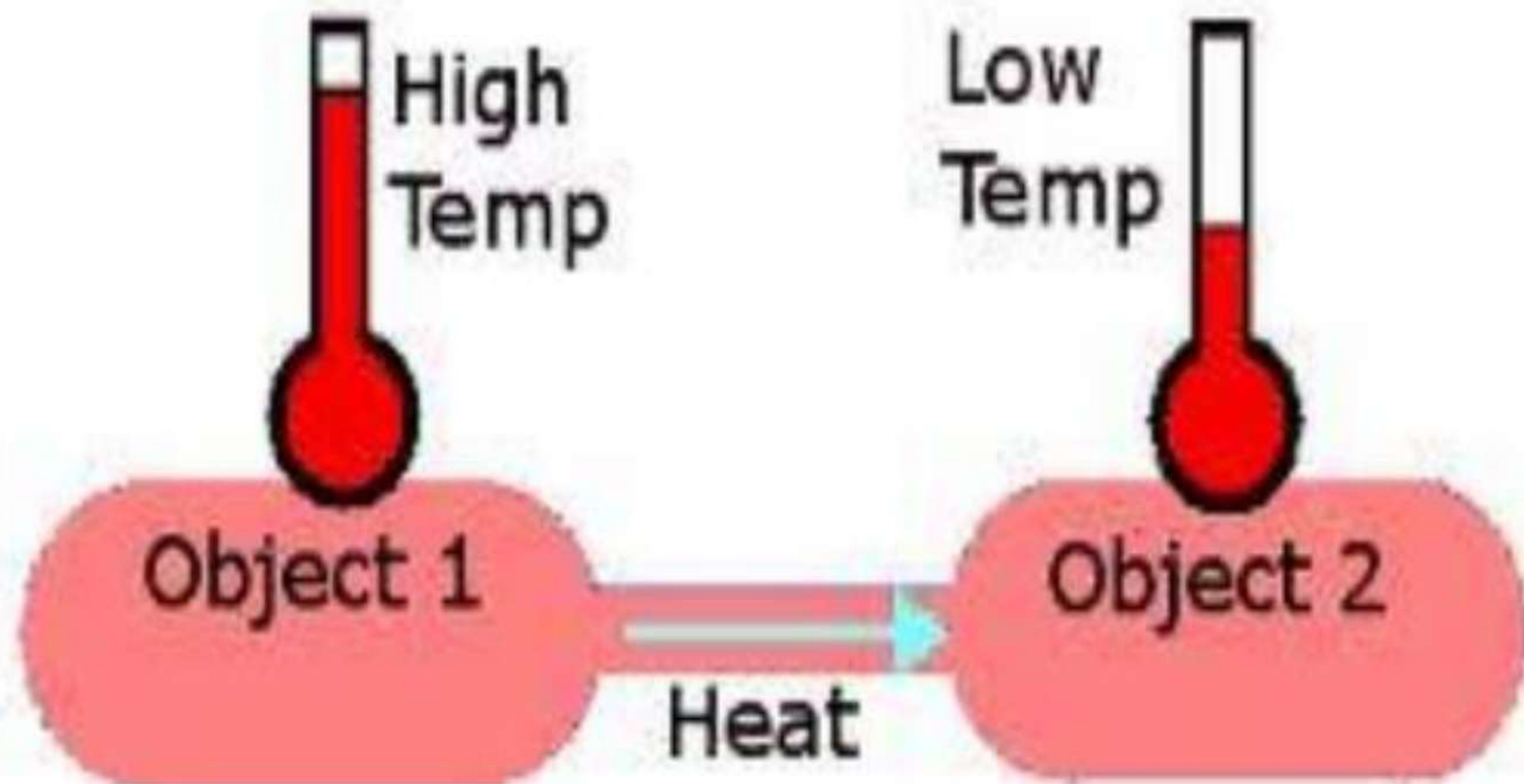
Heat & Thermodynamics



Sumit Shukla (Faculty of Science and Technology)

Trend of questions coming from Heat and Thermodynamics

ઠાણા : સામાન્ય સમજ



तापमान : सामान्य समझ

Temperature

Temperature can be a difficult property to define. In our everyday lives we use the word temperature to describe the hotness or coldness of an object. In **physics**, the temperature is the average kinetic energy of the moving particles in a substance

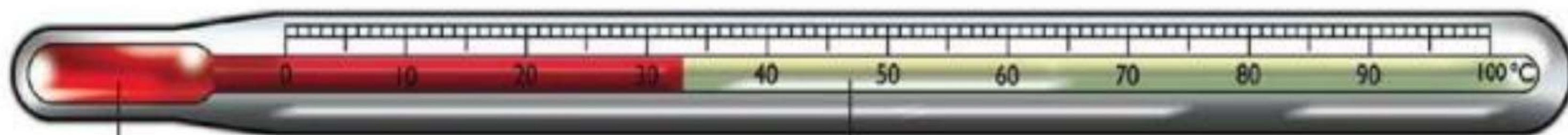


HEAT VS TEMPERATURE

Heat		Temperature
A form of energy which flows from a hotter region to a cooler region	Definition	The degree of hotness and coldness of a body
Joule (J)	Unit of measurement	Kelvin (K) Celsius ($^{\circ}\text{C}$)
Flows from a hot area to a cold area	Property	- Increases when heated - Decreases when cooled

Thermometer

unit $^{\circ}\text{C}$



bulb

capillary tube



अन्य प्रकार के तापमापी

Laboratory Thermometer



द्रव तापमापी



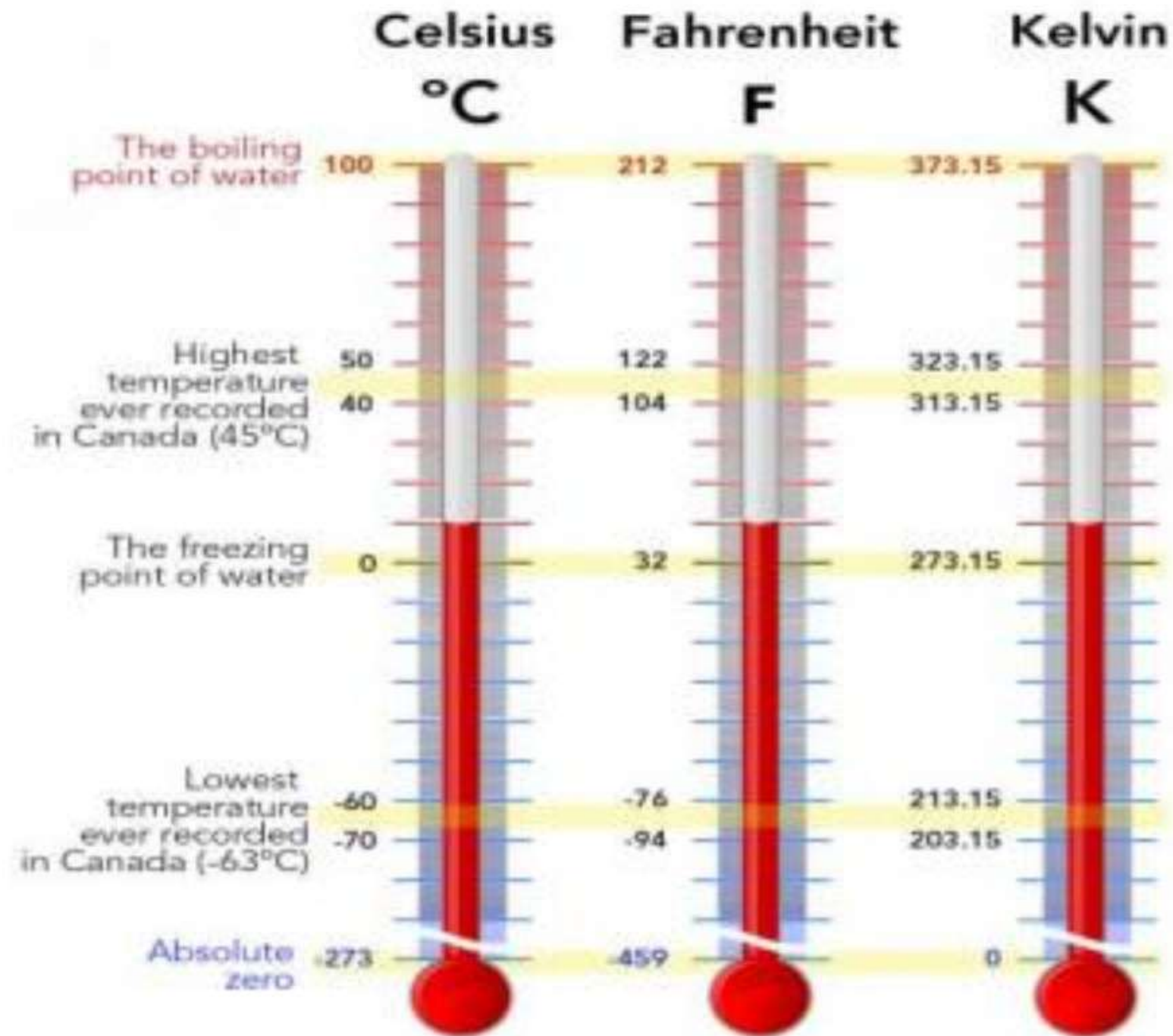
पूर्ण विकिरण तापमापी

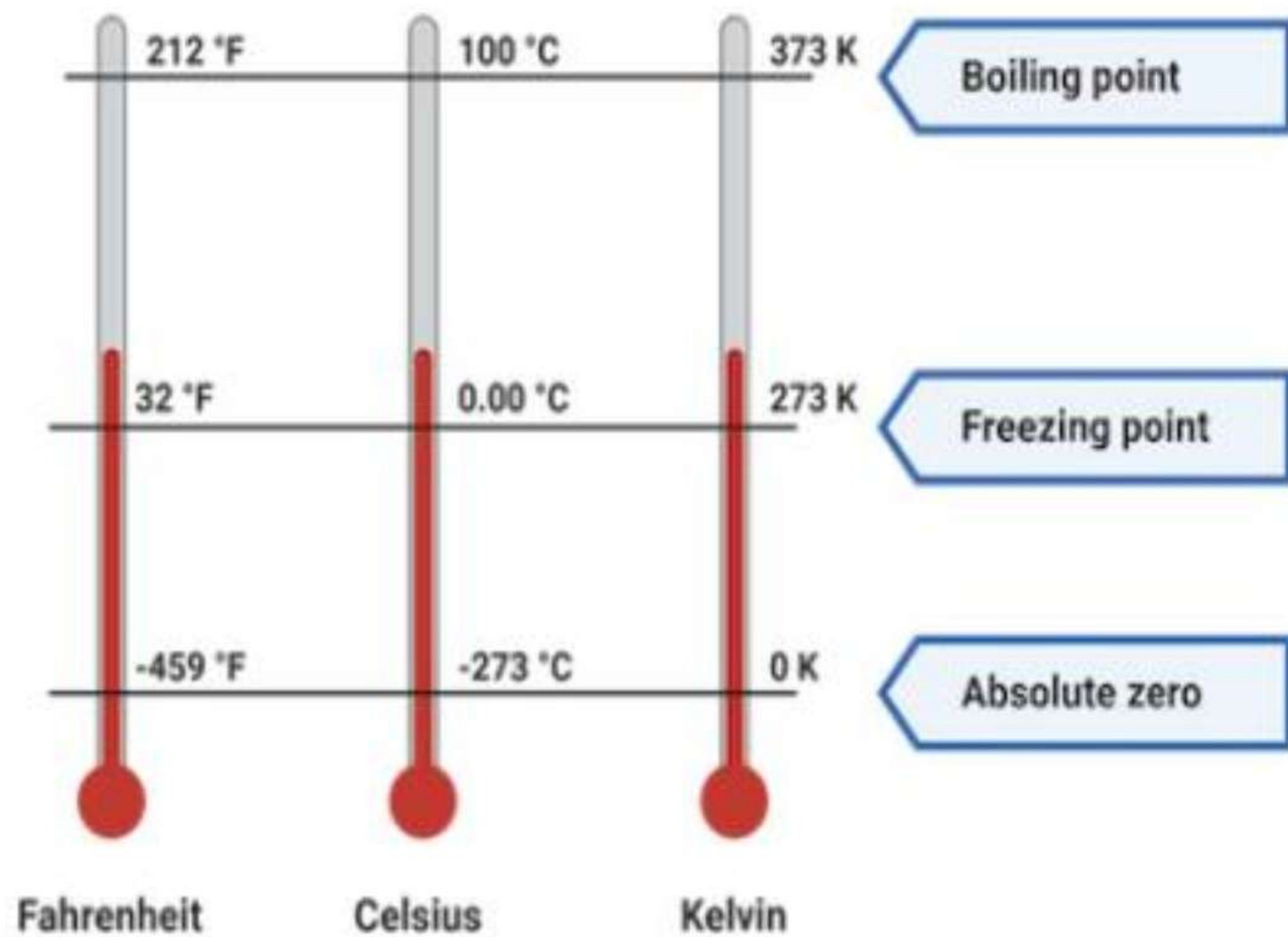


गैस तापमापी



विभिन्न तापमापी पैमाने के बीच संबंध





Absolute Temperature

Absolute Temperature

Absolute temperature is temperature on a scale where 0 is absolute zero. At absolute zero, atoms and molecules have minimum energy.

Boiling point of water — 573.15
Body temperature — 310.15
Room Temperature — 298.15
Freezing point of water — 273.15
Absolute zero — 0

Kelvin

671.67
558.27
536.67
491.67
0

Rankine

100
57
25
0
-273.15

Celsius

212
98.6
77
32
-459.67

Fahrenheit

Kelvin and Rankine are absolute temperature scales.

Celsius and Fahrenheit are relative temperature scales.

Transmission of Heat

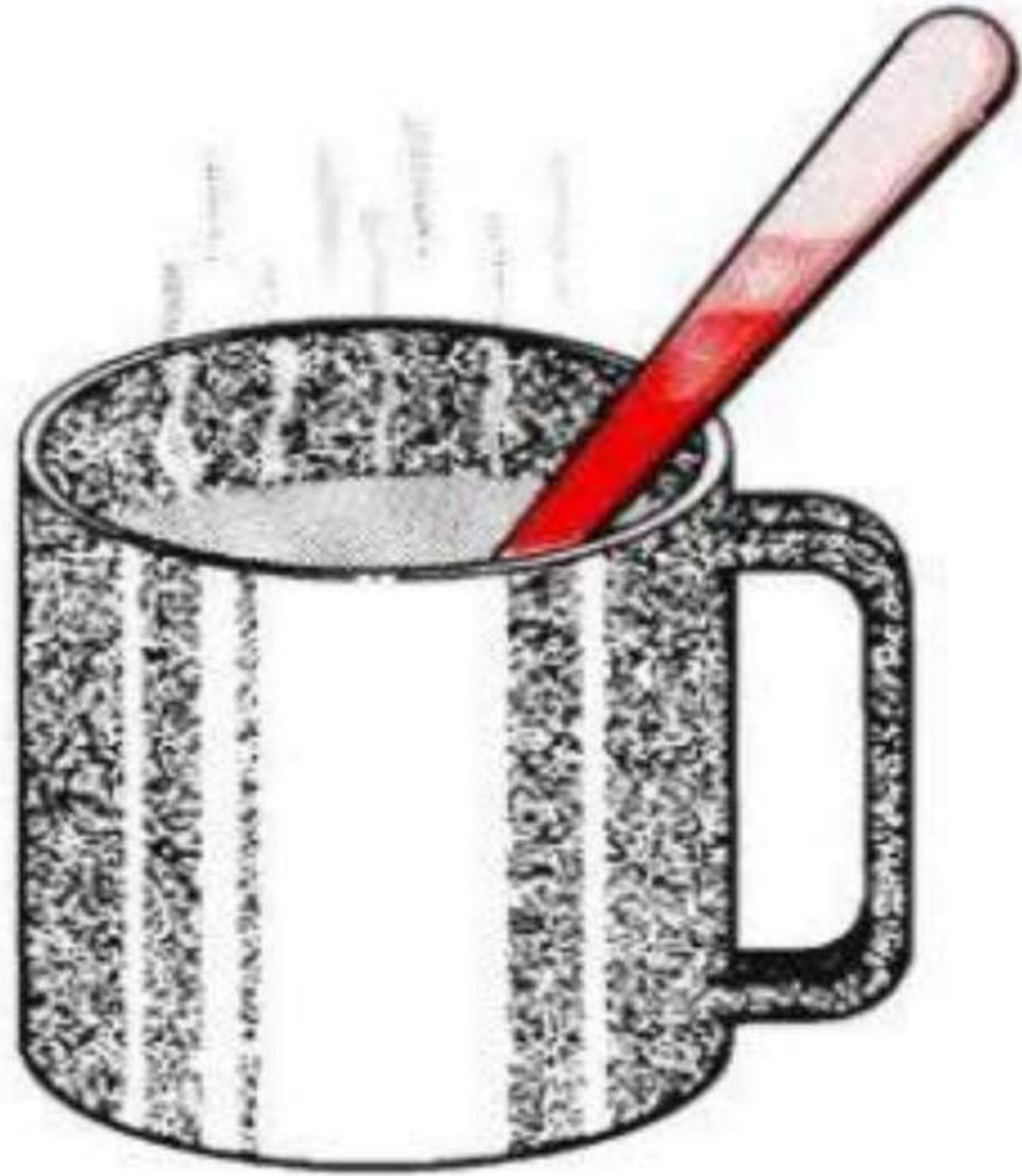


☐ **Conduction**

☐ **Convection**

☐ **Radiation**

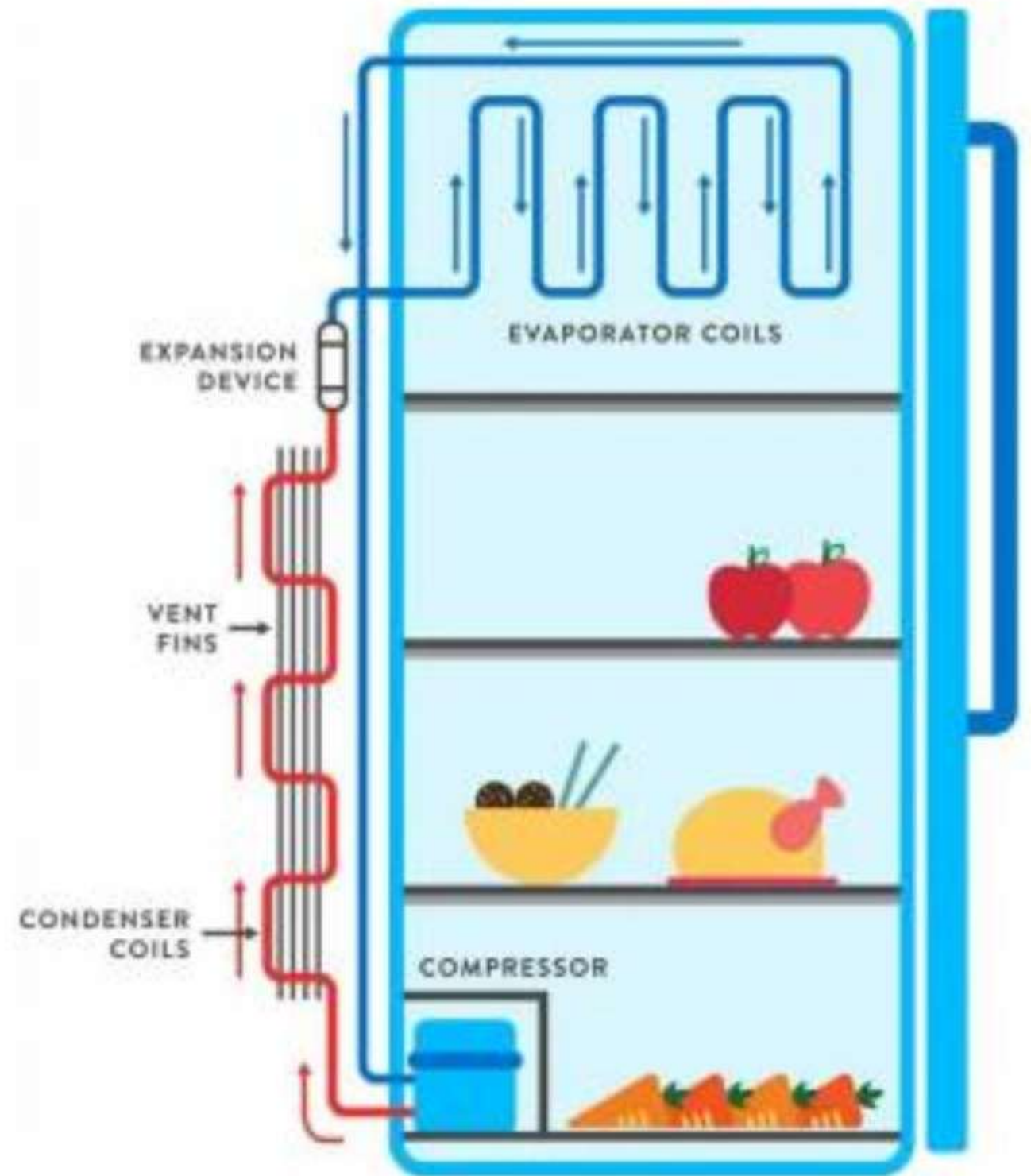
ચાલન



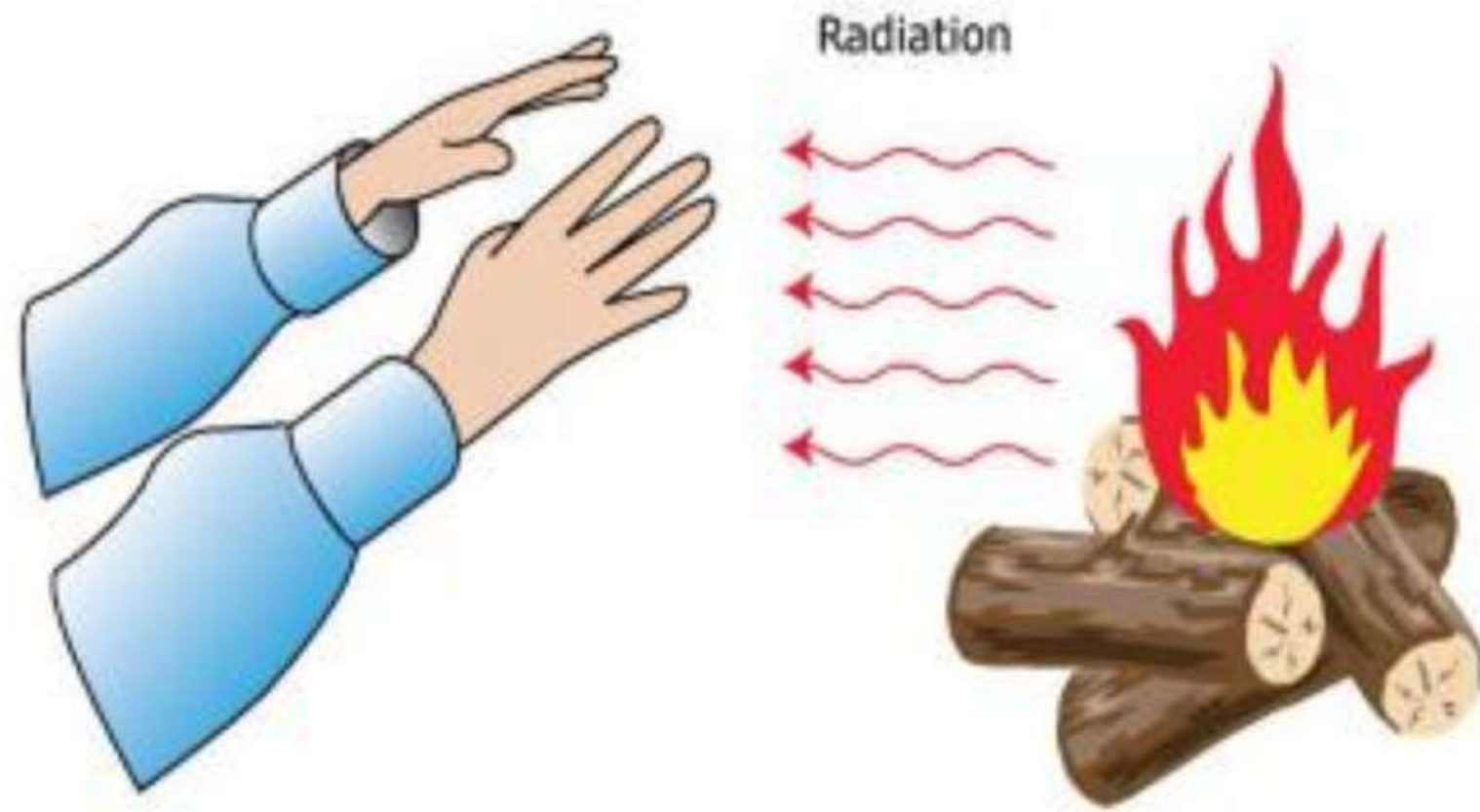


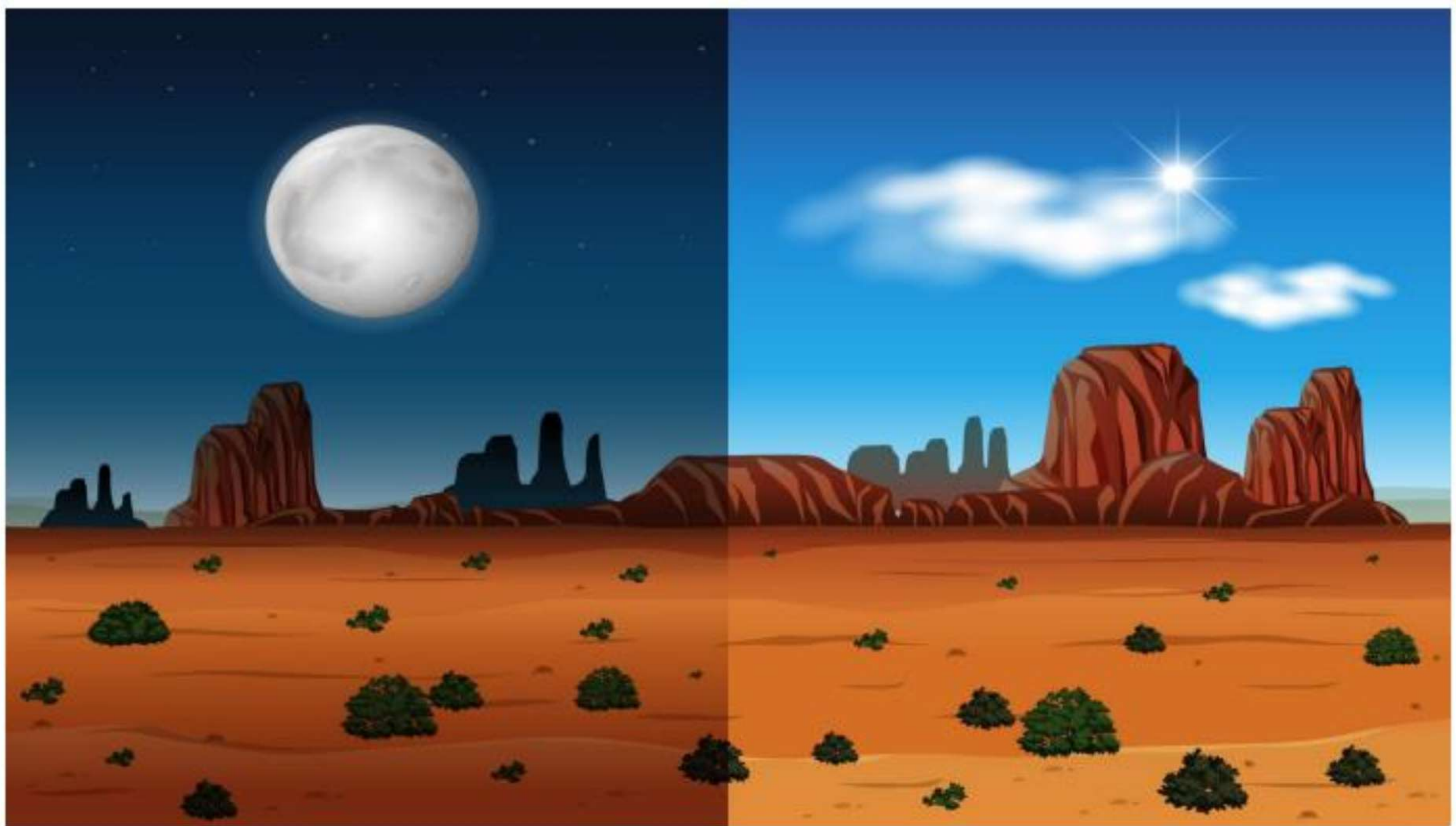
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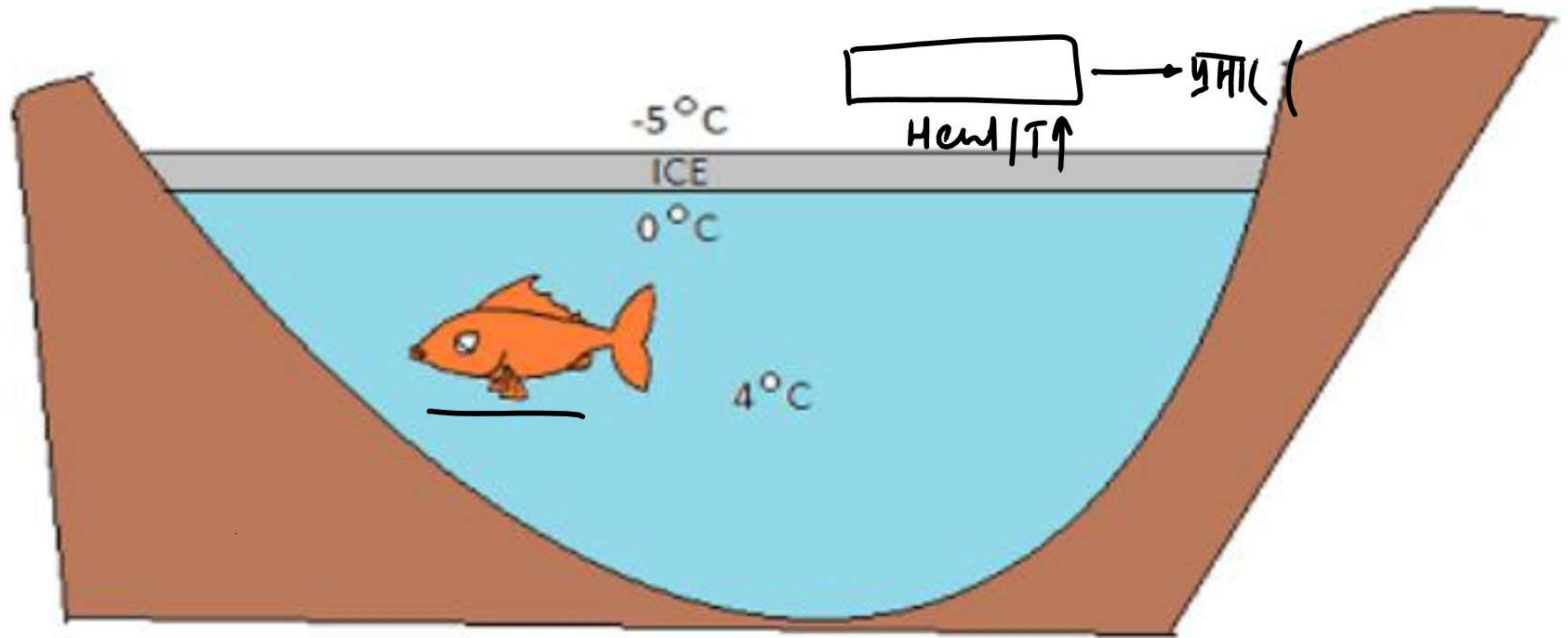




विकिरण

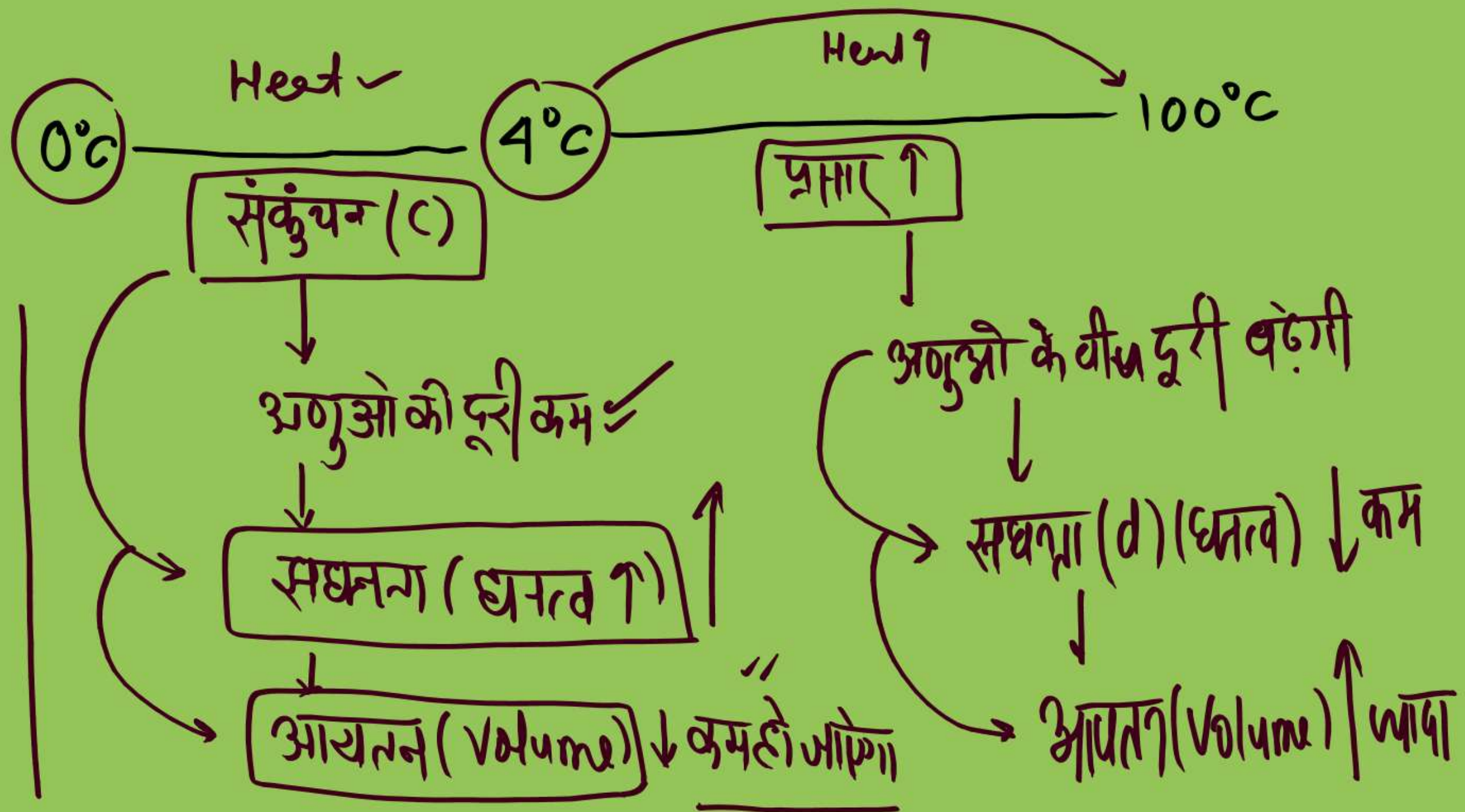


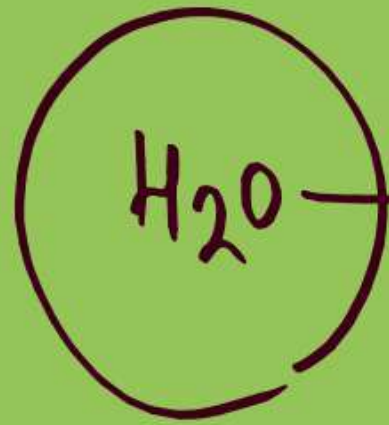




✓
Thermal expansion of water

H_2O (जल) में अम्लीय प्रसार





Hydrophobic Nano Space व हाइड्रोजन बंध पाया जाता है, इसीलिए पानी में ऊष्मीय प्रसार (Thermal Exp.)

Note: जल के विशेष ऊष्मीय गुणों के कारण अलग होता।

(A) - $[0^\circ C - 4^\circ C] \rightarrow$ संकुचन (C) $\rightarrow$ सघनता (अधिक) $\rightarrow$ आयतन (कम)

(B) $[4^\circ C - 100^\circ C] \rightarrow$ प्रसार (Exp) $\rightarrow$ घनत्व (कम) $\rightarrow$ आयतन (अधिक)

↓
जलाशयों में जब बर्फ जम जाती तो नीचे का पानी बही जमता

Freezing Point

Note: → हिमांक बिंदु (FP), वास्तव में गलनांक बिंदु (MP) हिमांक बिंदु अलग-अलग पदार्थों के अलग-अलग होते हैं।

यह निर्धारित तापमान जिस पर कोई द्रव ठोस अवस्था में बदल जाते



है → हिमांक बिंदु

H_2O → $0^\circ C$

Hg → $-38.8^\circ C$

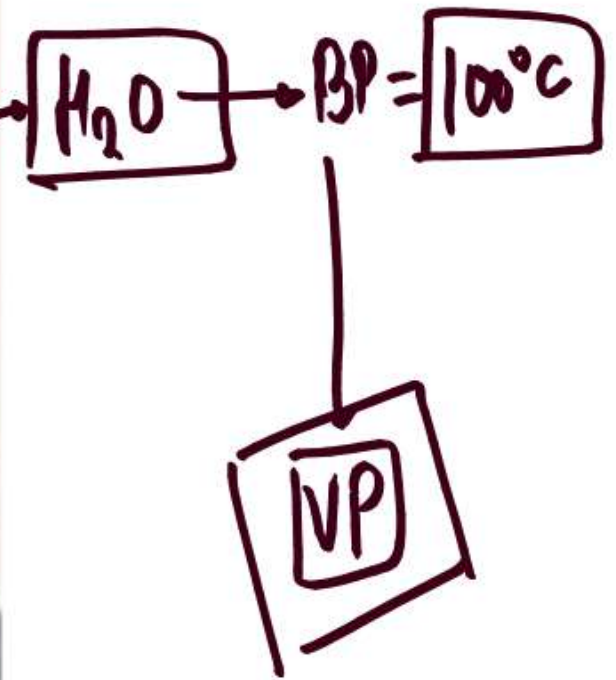
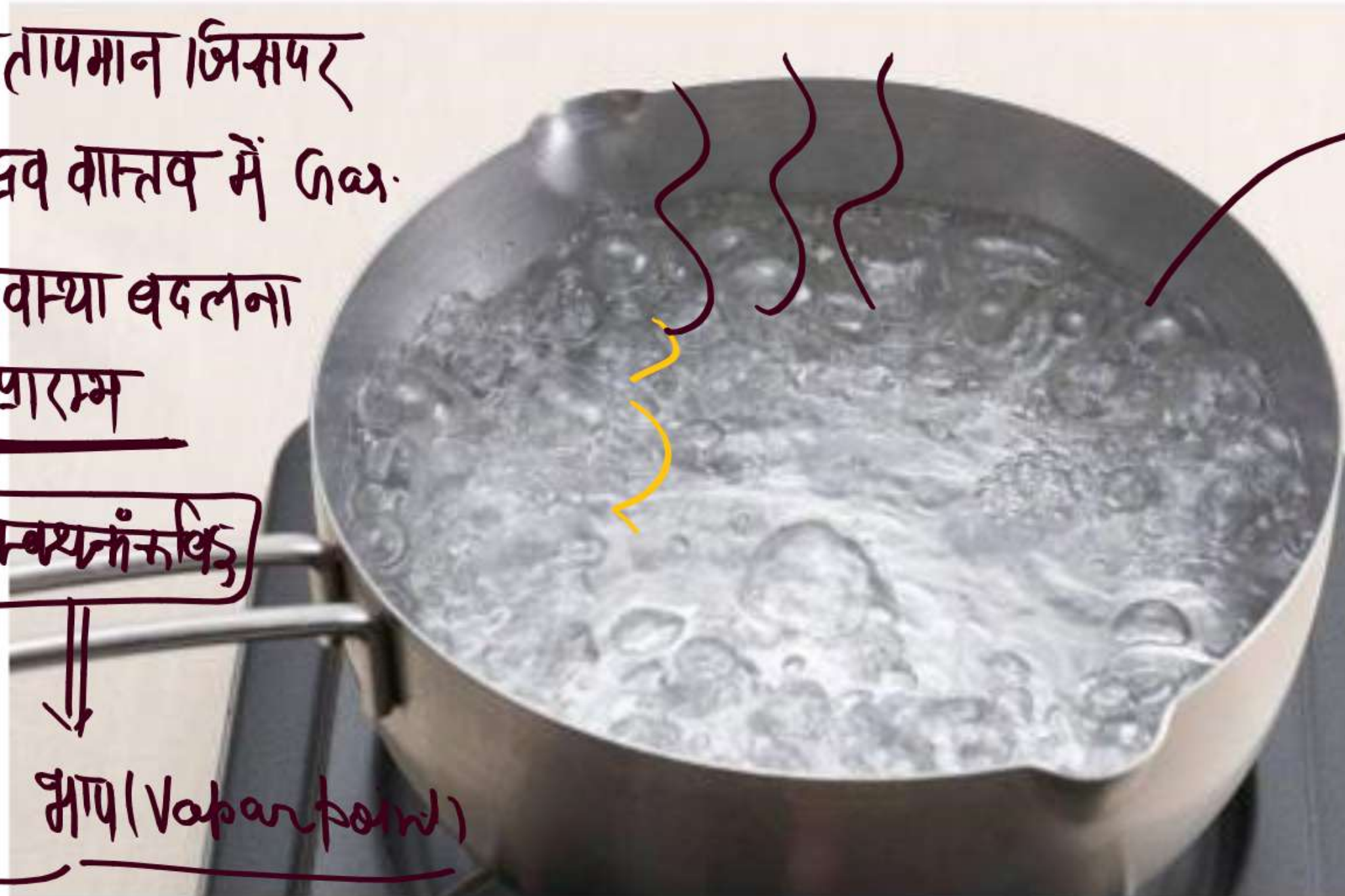
$CHCl_3$ → $-76^\circ C$

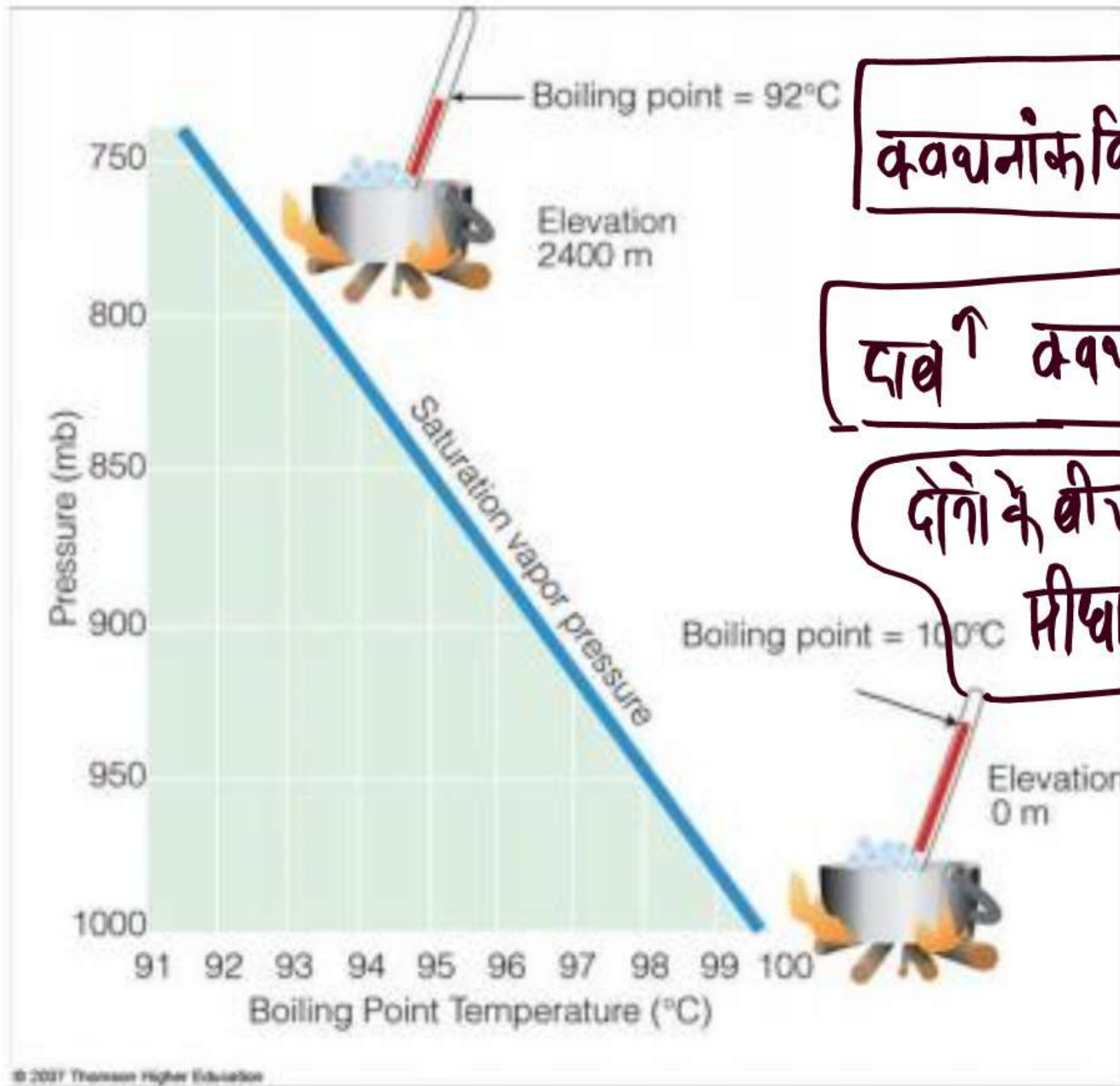
Boiling Point

वह निश्चित तापमान जिसपर
कोई द्रव वास्तव में द्रव-
वाष्प अवस्था बदलना
प्रारम्भ

क्वथनांक बिंदु

गैस (Vapor point)

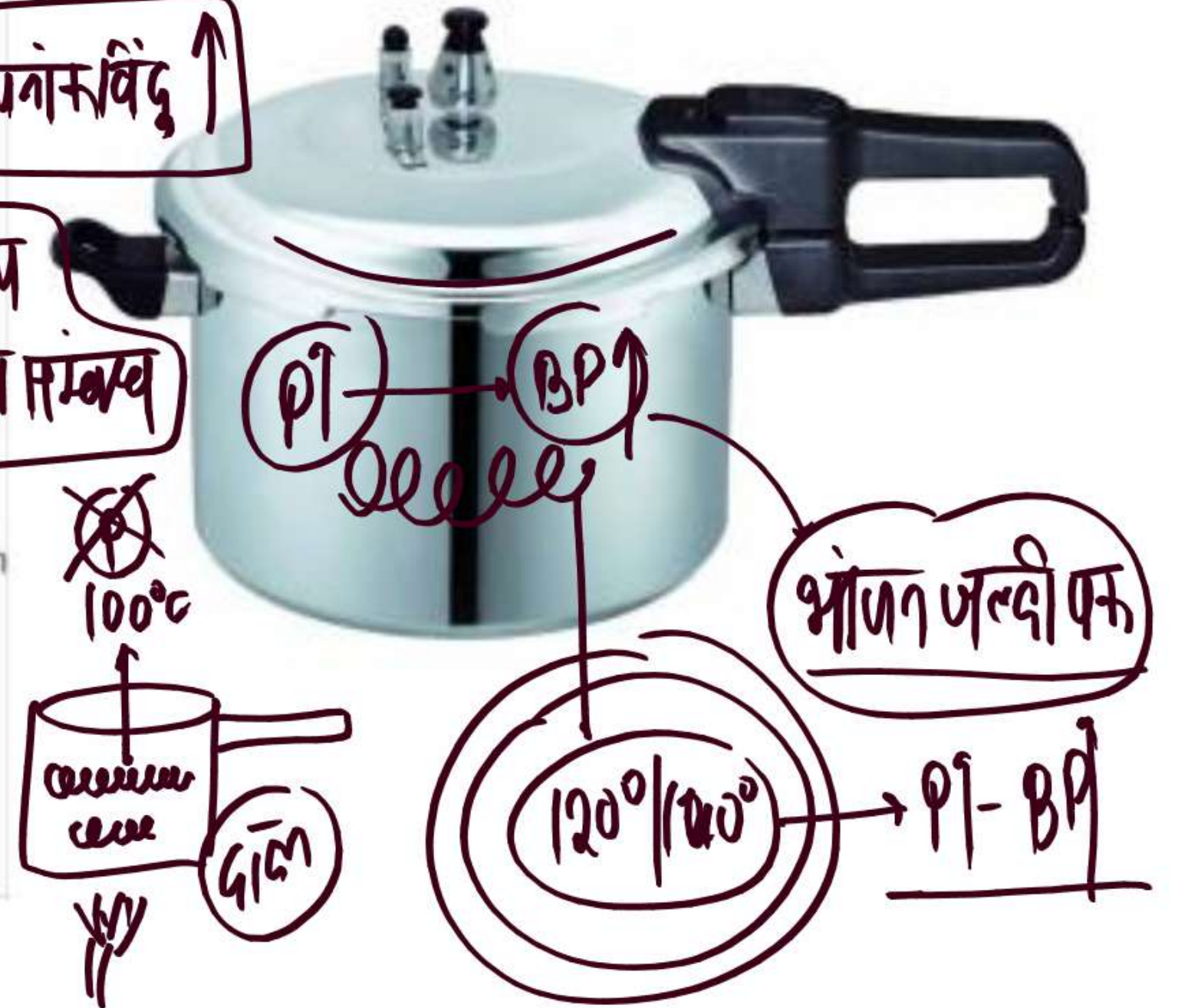


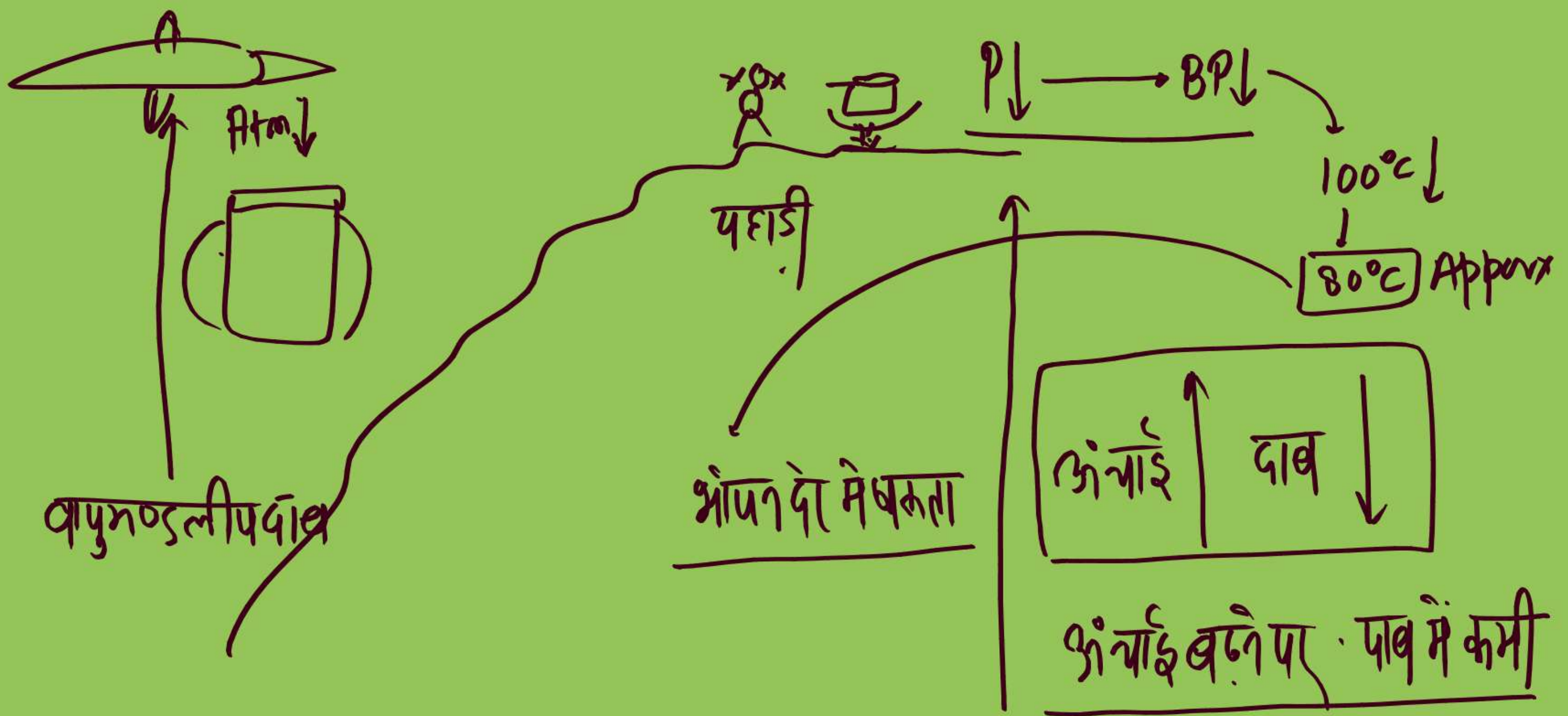


ਕਵਚਨਾਂਕਵਿੰਦੁ ਵ ਧਾਬ ਕਾ ਸੰਬੰਧ

ਧਾਬ ↑ ਕਵਚਨਾਂਕਵਿੰਦੁ ↑

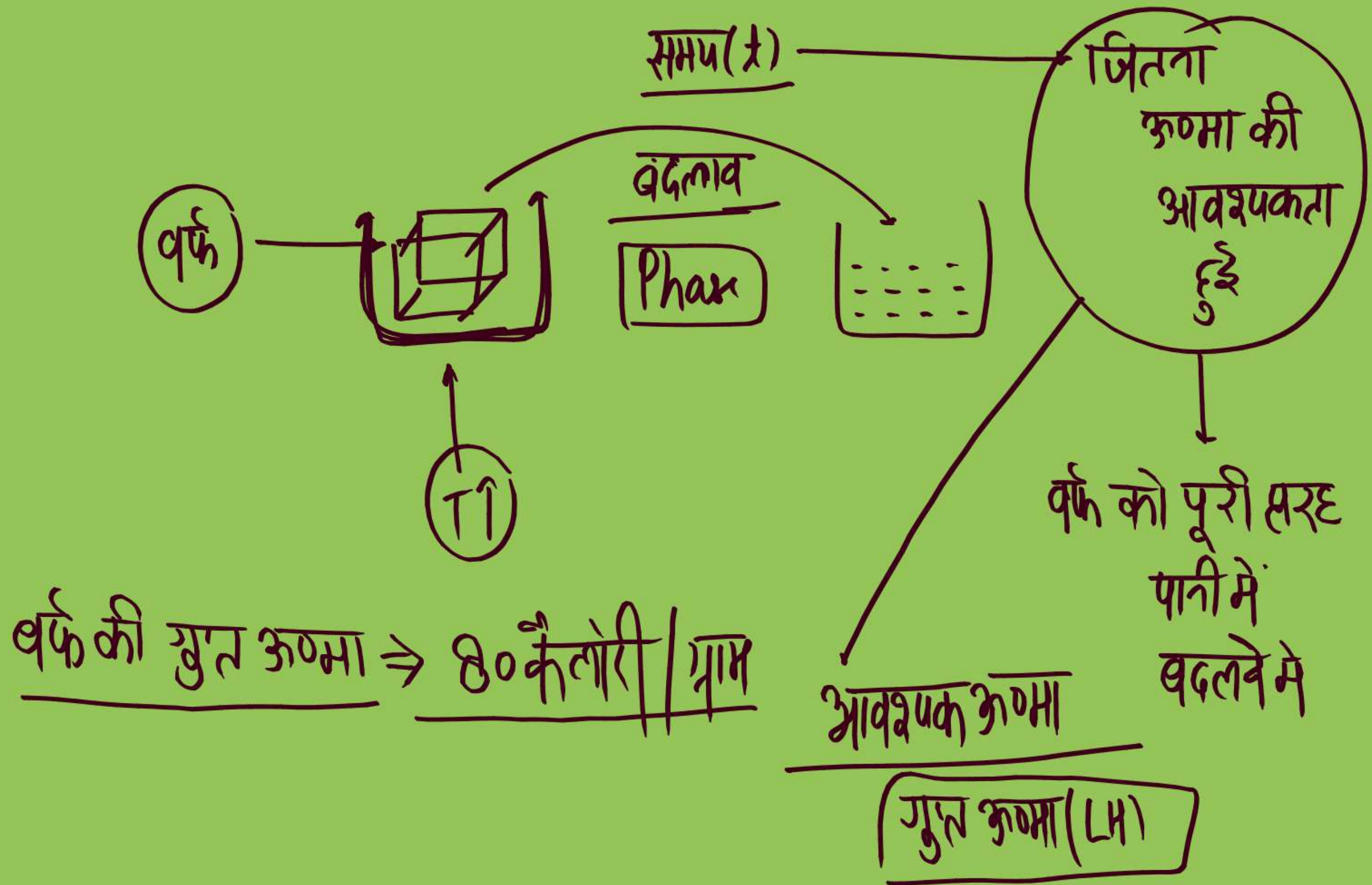
ਦੋਨੋ ਕੇ ਥੀਚ ਸੀਧਾ ਸੰਬੰਧ

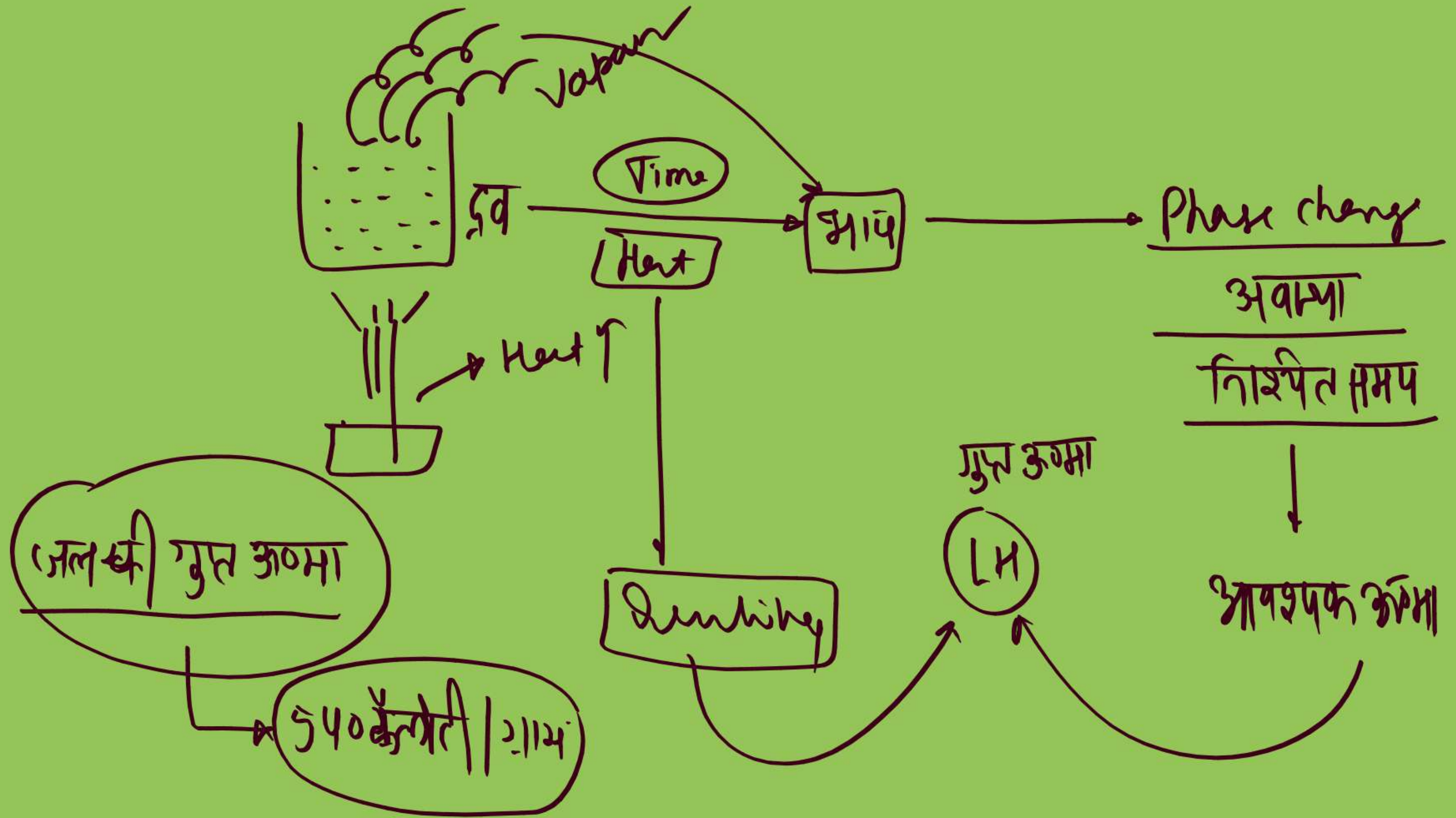




Latent Heat







Note: गुप्त अण्मा के कारण → (भाप) → से हमें ज्यादा
जलन ✓

Sublimation



उर्ध्वपातन (Sublimation) $\longrightarrow$ ठोस (Solid) $\xrightarrow{\text{Heat}}$ Gas

कपूर

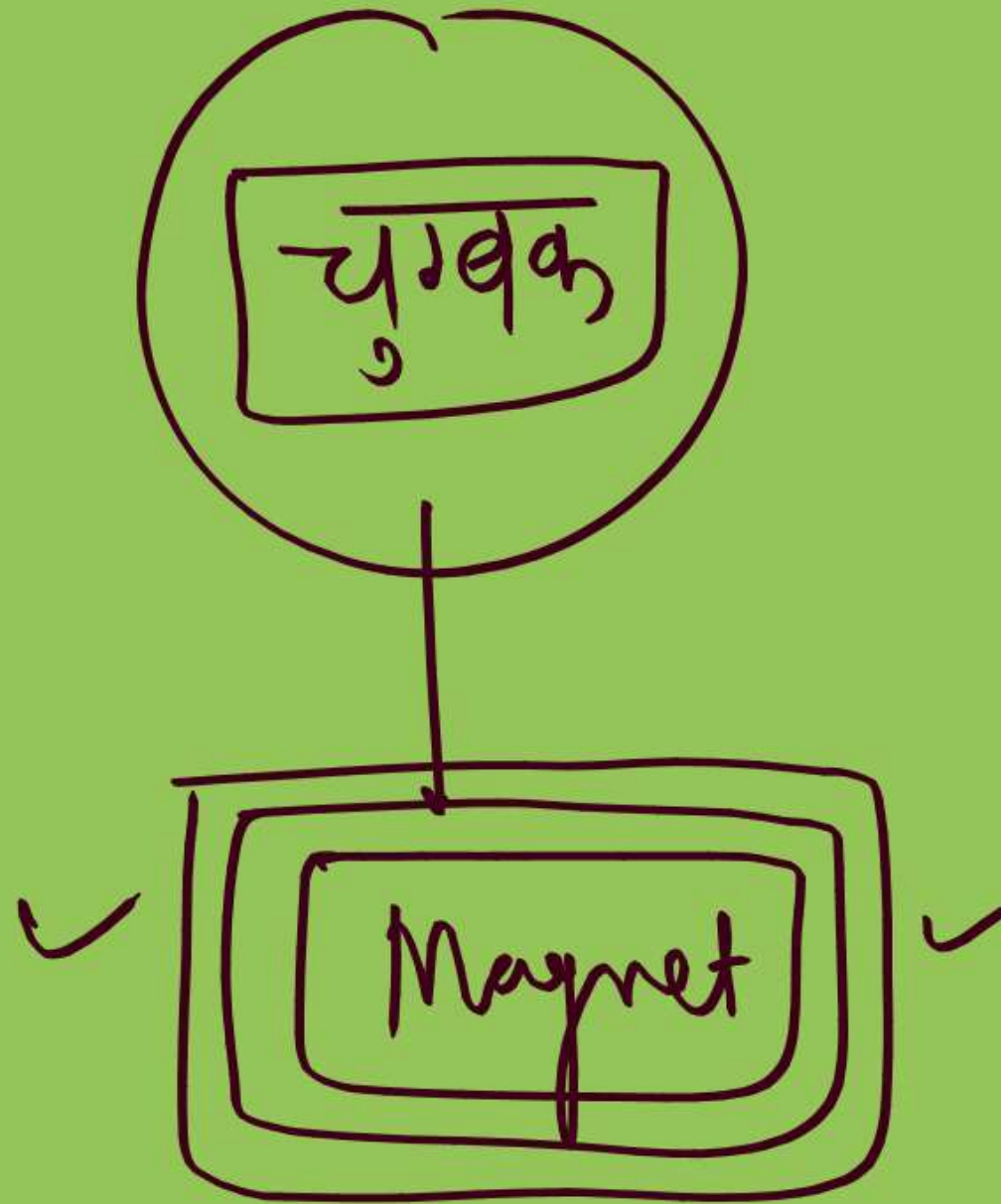
आपोडीन

ठोस (O₂)

अमोनियम क्लोराइड

Solid $\xleftarrow{\text{Cooling}}$ Gas

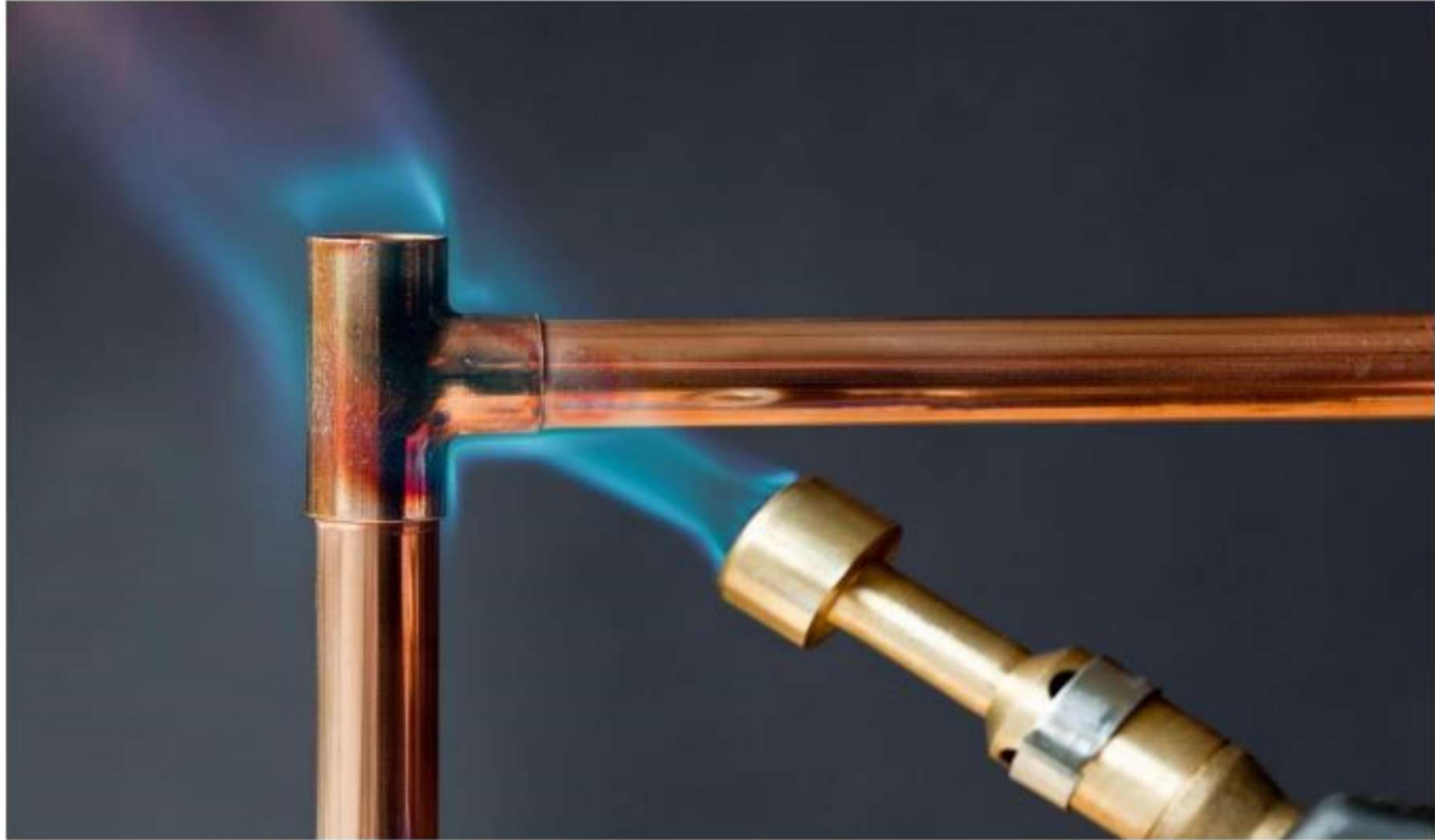
उर्ध्वपातन अवस्था



Specific Heat

Specific Heat Capacity

$$\Delta Q = mc\Delta T$$



Kirchhoff's Law

Thermodynamics

Thermodynamics