

RADIANT

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Physics

Heat and Energy

Lecture - 01

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Topics *to be covered*



1

CONCEPT OF HEAT (HEAT AS ENERGY)

2

CONCEPT OF TEMPERATURE

3

ANOMALOUS EXPANSION OF WATER

4

Questions



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CONCEPT OF HEAT (HEAT AS ENERGY)

Heat is the internal energy of molecules constituting the body. It flows from a hot body to a cold body.

Unit of Heat

$$1 \text{ cal} = 4.18 \text{ J}$$

$$\begin{aligned} \text{J} &\rightarrow \text{S.I.} \\ \text{erg} &\rightarrow \text{C.G.S.} \end{aligned}$$

$$1 \text{ J} = 10^7 \text{ erg}$$

The unit of heat is same as that of energy. The S.I. unit of heat is joule (abbreviated as J) and its C.G.S. unit is erg, where

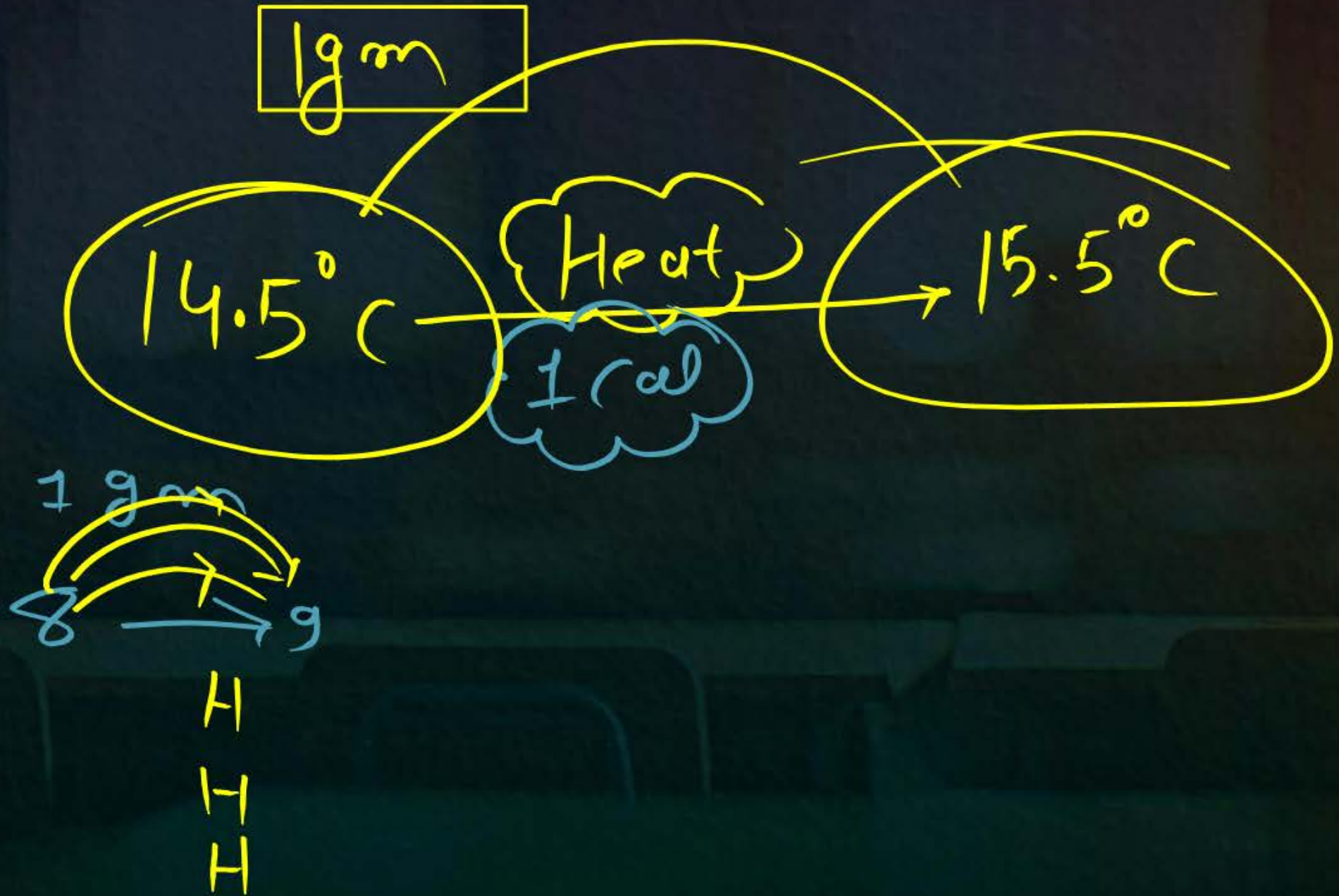
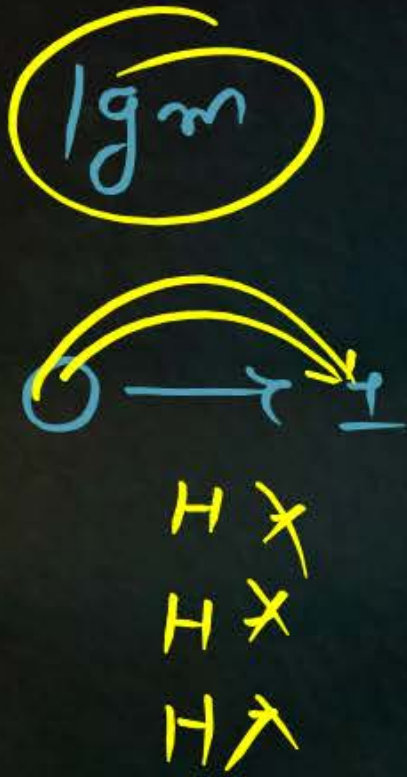
$$1 \text{ J} = 10^7 \text{ erg}$$

Other units of heat are calorie (cal) and kilocalorie (kcal), where

$$1 \text{ kilocalorie} = 1000 \text{ calories}$$

The units calorie and joule are related as:

$$1 \text{ cal} = 4.186 \text{ J (or nearly 4.2 J)}$$



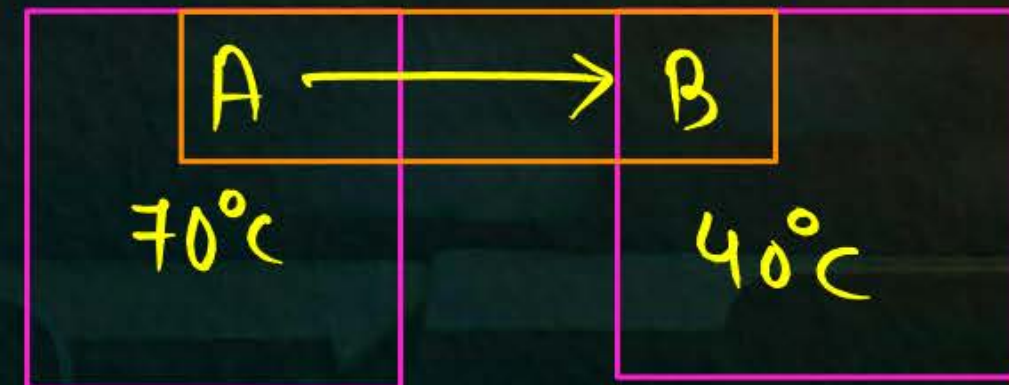


CONCEPT OF TEMPERATURE



- Temperature is a quantity which tells the thermal state of a body (i.e., the degree of hotness or coldness of the body).
- It determines the direction of flow of heat when two bodies at different temperatures are placed in contact.

of
°C
K
R





UNIT OF TEMPERATURE



❖ The S.I. unit of temperature is kelvin (symbol K). The other most common unit of temperature is degree Celsius (symbol °C) and degree Fahrenheit (symbol °F).

SI

❖ The temperature on Celsius scale and Kelvin scale are related as:

$$\frac{C}{5} = \frac{F - 32}{9}$$

$$T K = 273 + t ^\circ C$$

❖ Thus, by adding 273 to the temperature in degree Celsius, we get the temperature in Kelvin. Actually a degree on both the Kelvin and Celsius scales is equal.



UNIT OF TEMPERATURE

	FP	BP
C	0°C	100°C
K	273K	373K
F	32°F	212°F

- ❑ The ice point is 0°C on Celsius scale, 32°F on Fahrenheit scale and 273 K on the Kelvin scale. The steam point is 100°C on Celsius scale, 212°F on Fahrenheit scale and 373 K on the Kelvin scale.
- ❑ Thus there are 100 equal degrees between the ice point and steam point on both the Celsius and Kelvin scales, but 180 equal divisions on the Fahrenheit scale. Thus 1 degree on Celsius scale is $\frac{9}{5}$ degree on Fahrenheit scale.





UNIT OF TEMPERATURE



- The zero of the Kelvin scale is called absolute zero and it is at a temperature when molecular motion ceases. It is at -273°C i.e.
- $0\text{ K} = -273^{\circ}\text{C}$.
- The temperature on Celsius and Fahrenheit scales are related as:

$$\frac{C}{5} = \frac{F-32}{9}$$

Question



S.I unit of temperature is:

- A** Cal
- B** joule
- C** celsius
- D** kelvin





Thank You

