Lecture 26 - Phys 203

May 11, 2021

CHAPTER 12

HEAT AND TEMPERATURE

Sections: 12.1 - 12.2 - 12.6 - 12.7 - 12.8

Temperature → Heat

$\rho = \frac{m}{V}$, $P \rightarrow$ $\frac{F}{A}$

$V \leftrightarrow N$

T

(T, P, V)

↓ equation of state of an "ideal gas"

↓ Thermodynamics.

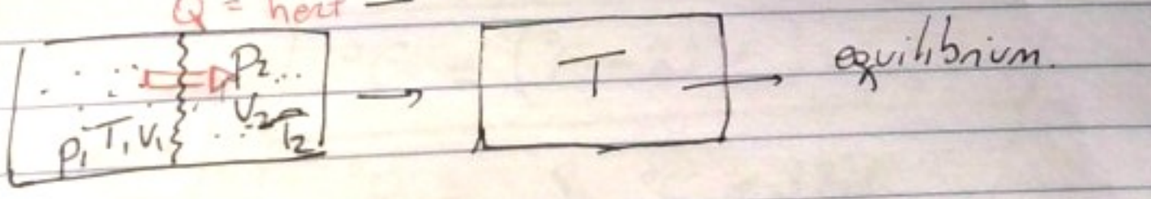
thermal equilibrium

↓

$T_1 = T_2$

energy → $[Q]$ = Joules = J

Q = heat



$T_1 > T_2$

1. Temperature scale.

Absolute temperature Kelvin scale	Celsius scale.	Fahrenheit scale.
0 Kelvin	$-273.15^\circ C$	$-459.67^\circ F$
	melting point ice melting.	
273.15 k	$0^\circ C$	$32^\circ F$
100 k	$100^\circ C$	$180^\circ F$
373.15 k	$100^\circ C$.	boiling point of water 1 atm. $212^\circ F$

$$T_{[k]} = T_c + 273.15k$$

$$^\circ C = (^\circ F - 32^\circ F) \times \frac{100^\circ C}{(212^\circ F - 32^\circ F)}$$

$$^\circ C = \frac{(^\circ F - 32^\circ F)}{(212^\circ F - 32^\circ F)} \times 100^\circ C$$

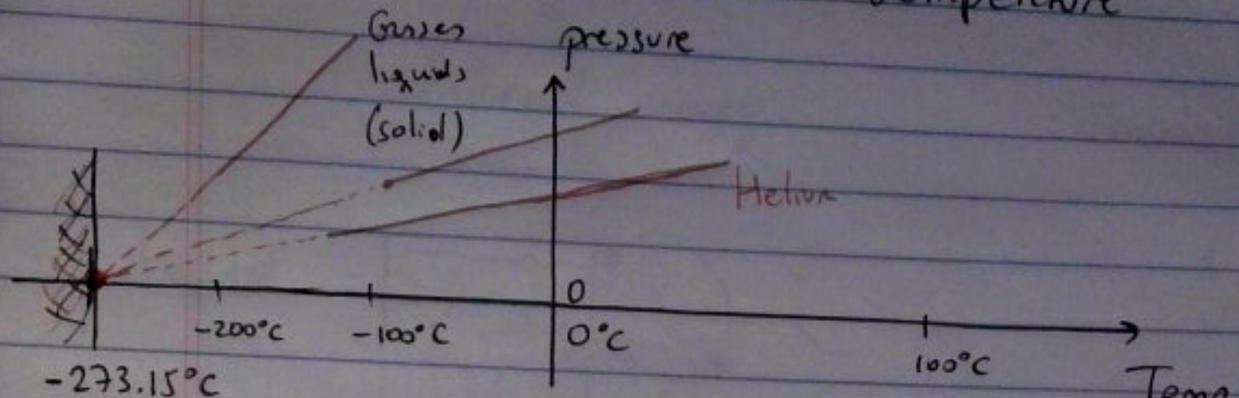
$$^\circ C = (^\circ F - 32^\circ F) \times \left(\frac{5}{9}\right)$$

$$^\circ F = \frac{9}{5}\,^\circ C + 32^\circ F$$

$$T = T_c + 273.15k$$

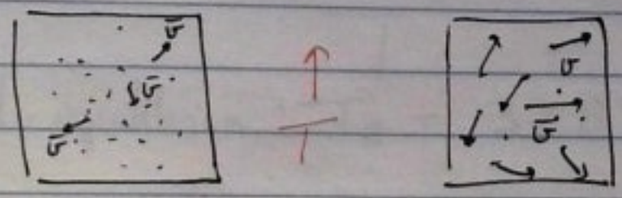
↑ Lord Kelvin →

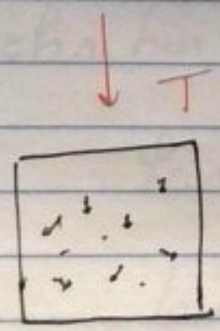
Kelvin → Absolute temperture



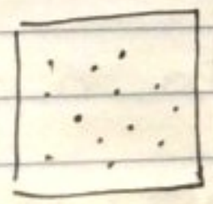
absolute zero-temperture → Kelvin scale

↳ no motion ~~of the~~ at T = 0 K





T = 0 Kelvin



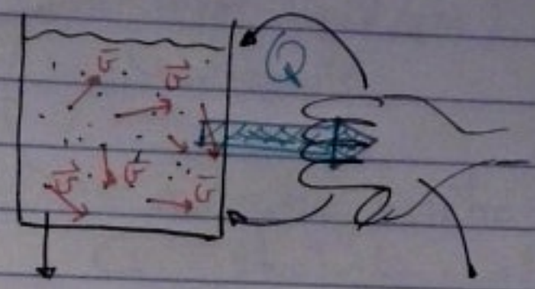
→ no motion of the particles.

Heat and temperature.

↓ internal energy.

Thermodynamics

liquid



$T_1 = 40\,^\circ C$ $T_2 = 37\,^\circ C$

ρ, p, T
↓
Q = heat.
↓
energy flow

$T_1 > T_2$

↓

Thermal equilibrium : $T_e = 37.8\,^\circ C$ → no more energy flow

Definition of heat : energy that flows from high-T object to low-T object because the difference in T.

Q is extensive quantity → proportional to the number of particles N, V

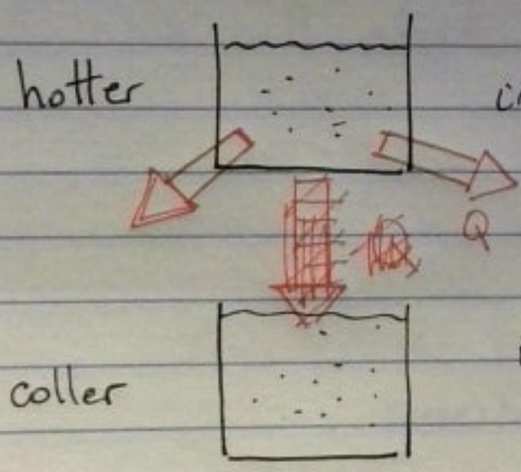
T is intensive quantity → independent on N

Q = heat

T = temperature

↳ internal energy
(motion of molecules
in liquid/gas)
↳ example

molecular kinetic energy.
↳ fluctuations of
random velocities of molecules



Review for Final

20 questions in [illegible]

1 hour and 15 minutes.

Chapter 7 → 12.

May 25 at 8:00 AM → be ready.

we will start at 8:15 AM
↓
9:30 AM

This is the last lecture of the semester.

The semester ends here →.
