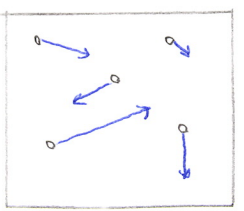


MICROSCOPIC VIEW OF MATTER

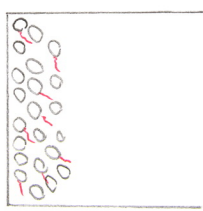
PHASES

- GAS



- EVENLY DISTRIBUTED THROUGHOUT CONTAINER
- RANDOM DIRECTION
- DISTRIBUTION OF SPEEDS } RANDOM MOTION
- WEAK OR NO LONG RANGE INTERACTIONS BETWEEN PARTICLES
- LOTS OF FREE SPACE
- COMPRESSIBLE

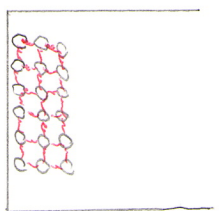
- LIQUID



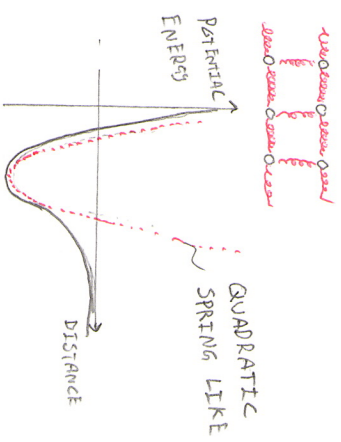
- CONFORMS TO SHAPE OF CONTAINER
- LESS RANDOM MOTION
- VIBRATE AND "ROLL"
- WEAK BONDING - MOLECULES "ROLL" AROUND EACH OTHER

- LITTLE FREE SPACE
- NOT EASILY COMPRESSIBLE

- SOLID

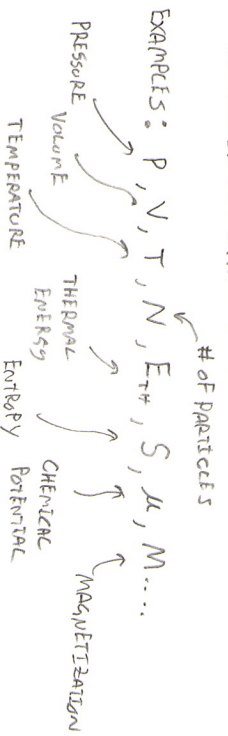


- CRYSTALLINE LATTICE
- MOTION IS VIBRATION ABOUT A FIXED POINT
- STRONG SPRING-LIKE BONDS



STATE VARIABLES

- PROPERTIES THAT DESCRIBE THE EQUILIBRIUM STATE OF MATTER



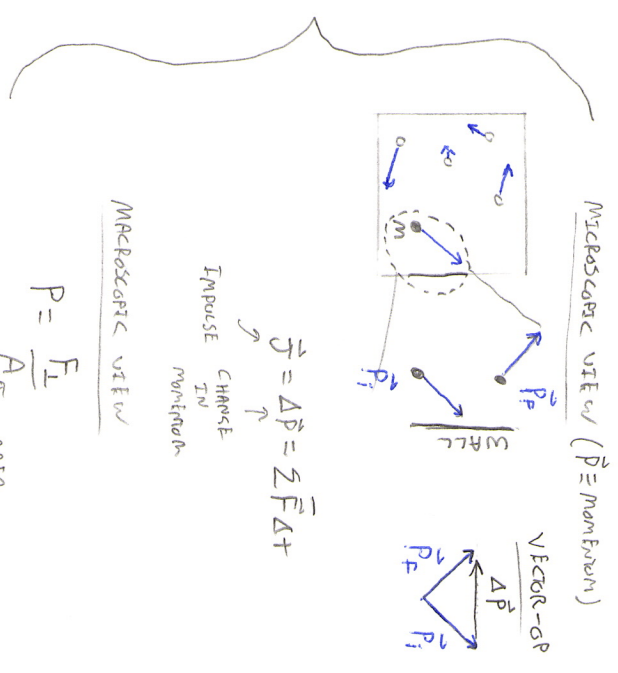
- CHOOSE STATE VARIABLES RELEVANT TO THE PHYSICS

NUMBER OF PARTICLES [units] $\equiv N$

1 mole (n) = 6.022×10^{23} PARTICLES (NA)

$N = \frac{N}{N_A}$ $Nk_B = nR$ constants

PRESSURE EXAMPLE FOR GASES



PRESSURE $\frac{[M]}{[L][T]^2} \equiv P$ * SI UNITS \rightarrow PASCAL (Pa)

- COLLECTIVE FORCE PER AREA FROM IMPULSES DUE TO THE COLLISIONS OF THE PARTICLES WITH THE CONTAINER WALLS.

VOLUME [L]^3 $\equiv V$

- MEASURE OF PHYSICAL LENGTH SCALED

- OPEN - SYSTEM CAN EXCHANGE MASS AND ENERGY (HEAT) WITH SURROUNDINGS
- CLOSED - SYSTEM CAN NOT EXCHANGE MASS, BUT CAN EXCHANGE ENERGY (HEAT) WITH SURROUNDINGS

- ISOLATED - SYSTEM CAN NOT EXCHANGE MASS OR ENERGY (HEAT) WITH SURROUNDINGS