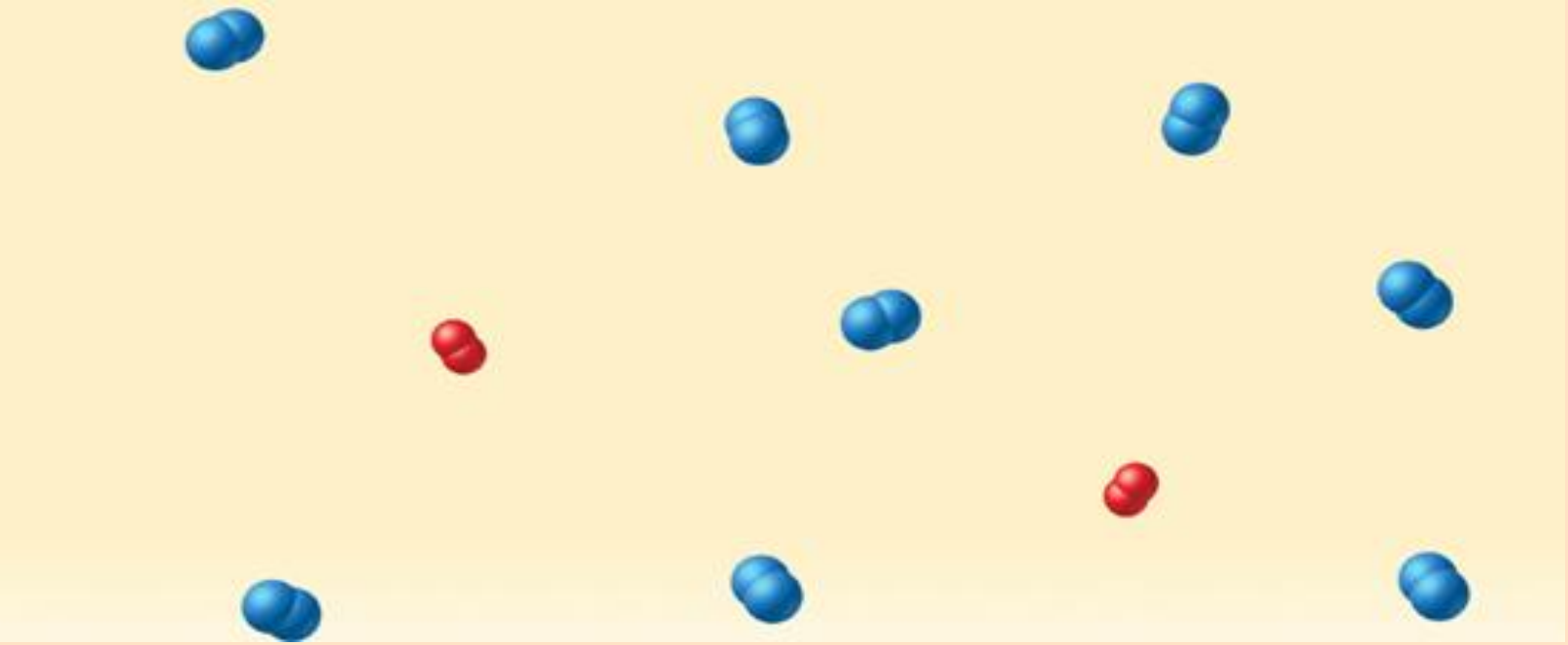
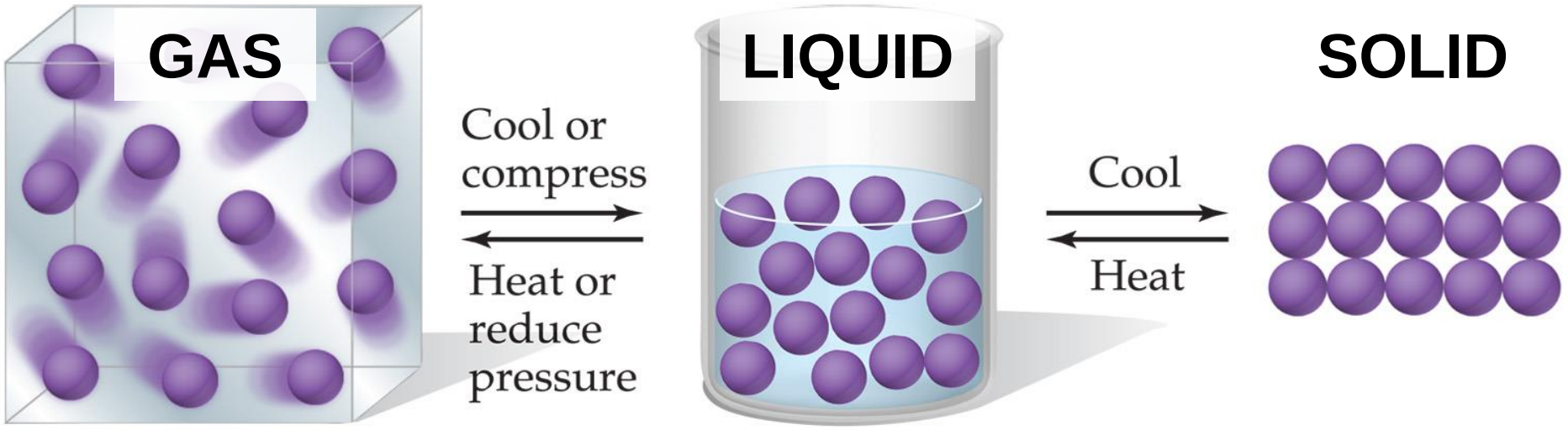
Unit 10: States of Matter

Section 1: Kinetic Molecular Theory



States of Matter



main **difference** between **phases** is…
the **distance** between **particles**…

…which **depends on** two ***competing*** quantities:

KE
(**k**inetic **e**nergy of the particles)

vs.

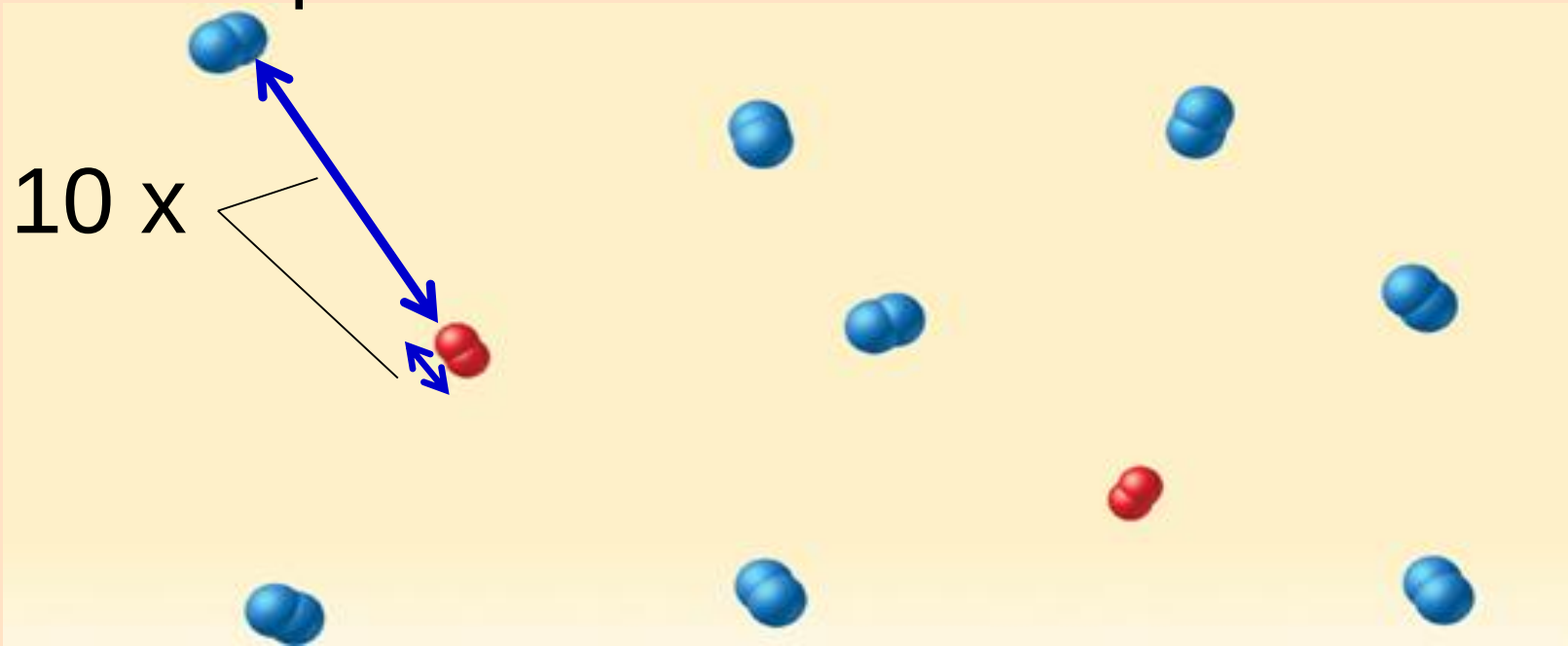
IMAFs
(**i**nter**m**olecular **a**ttractive **f**orces between particles)

Kinetic-Molecular Theory (of Gases)

5 Parts of KMT

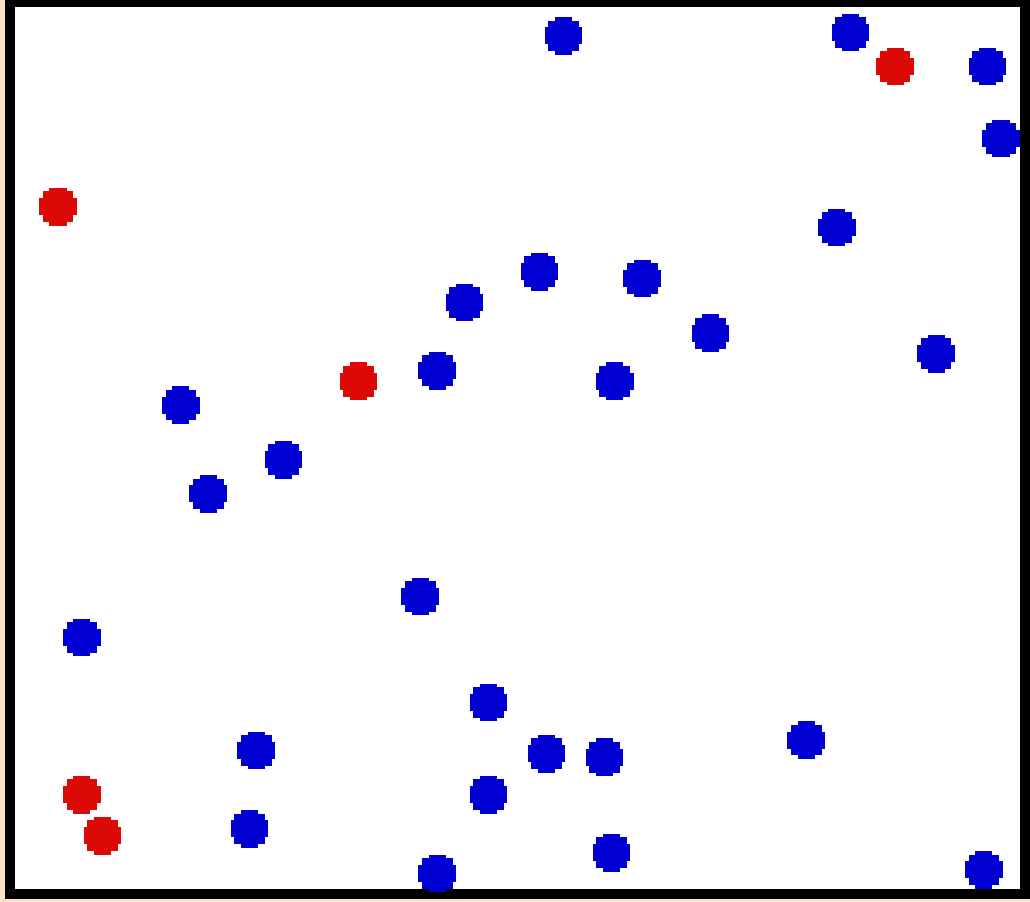
1) **have negligible volume** (are **tiny**) **compared to** the great **distance between**

2) **have negligible attractions** because they are so far apart

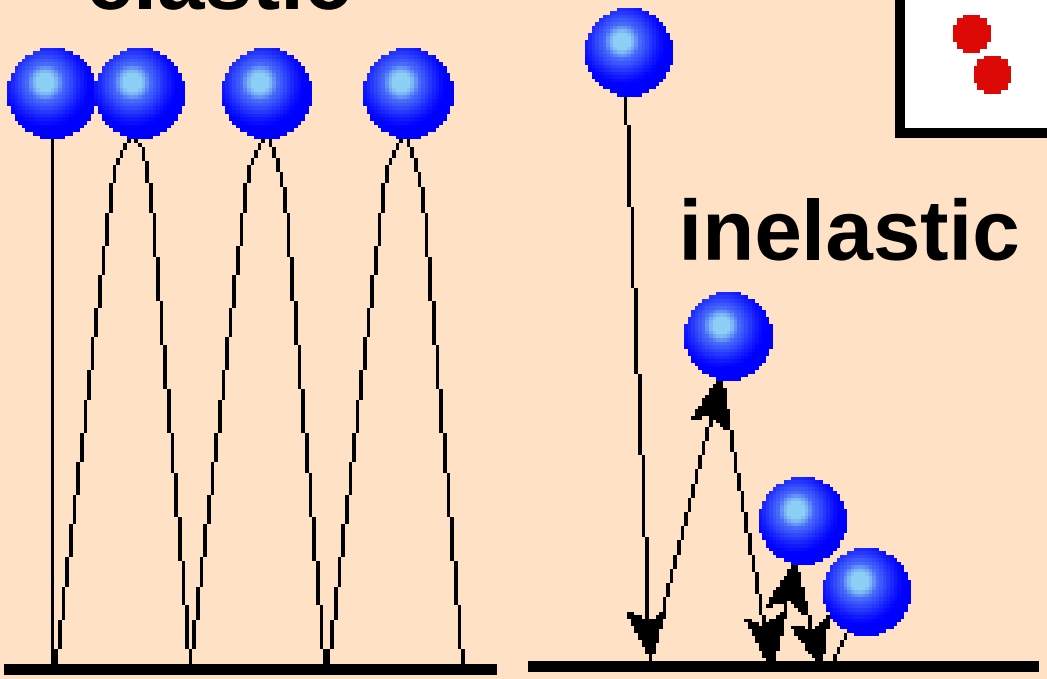


5 Parts of KMT

3) are in **constant**, **random motion**



elastic



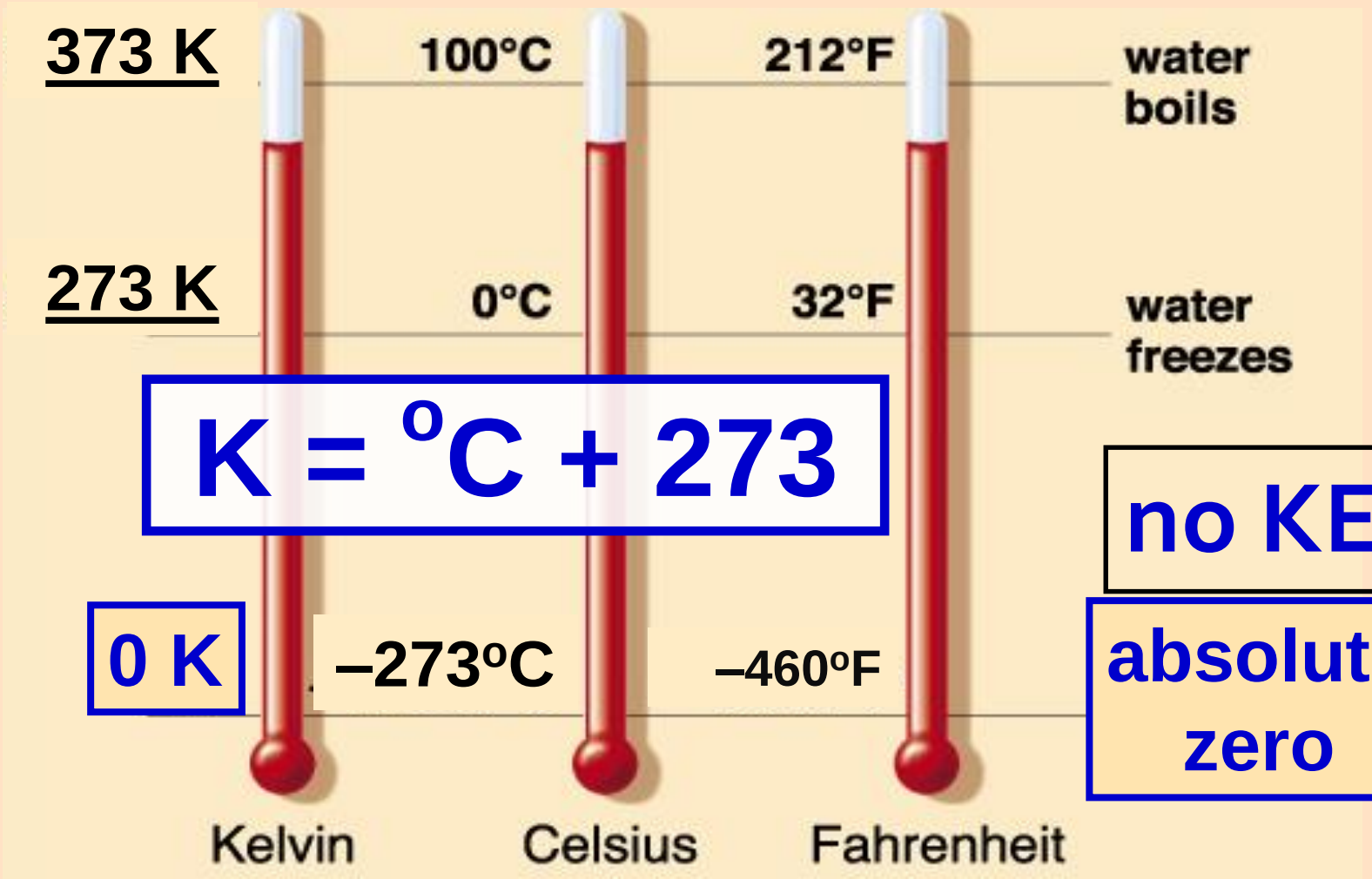
inelastic

4) have **perfectly elastic collisions** (transfer KE without loss)

5 Parts of KMT

5) ***average* KE** is directly **proportional to temperature**

Temp↑ as KE↑

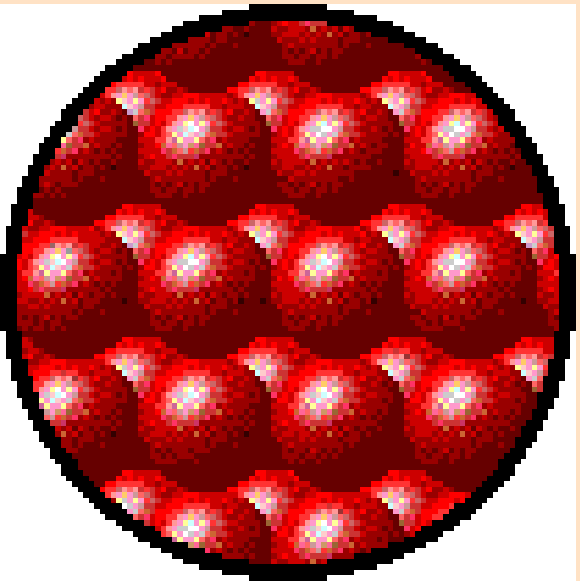


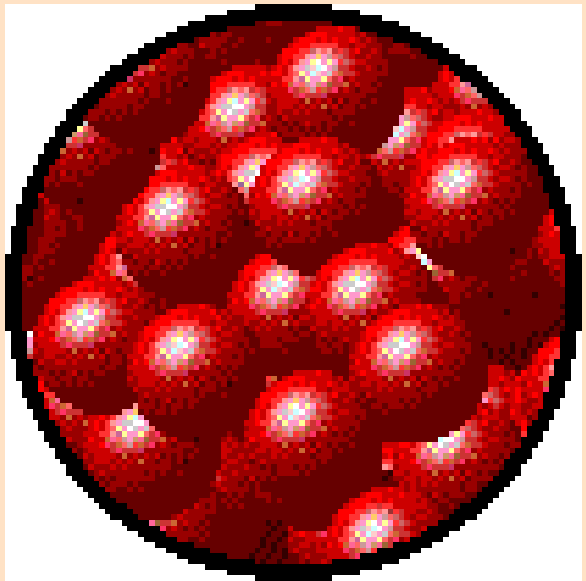
video clip

low KE, vibrates

higher KE, flows

highest KE, expands





compressible

Phase Changes

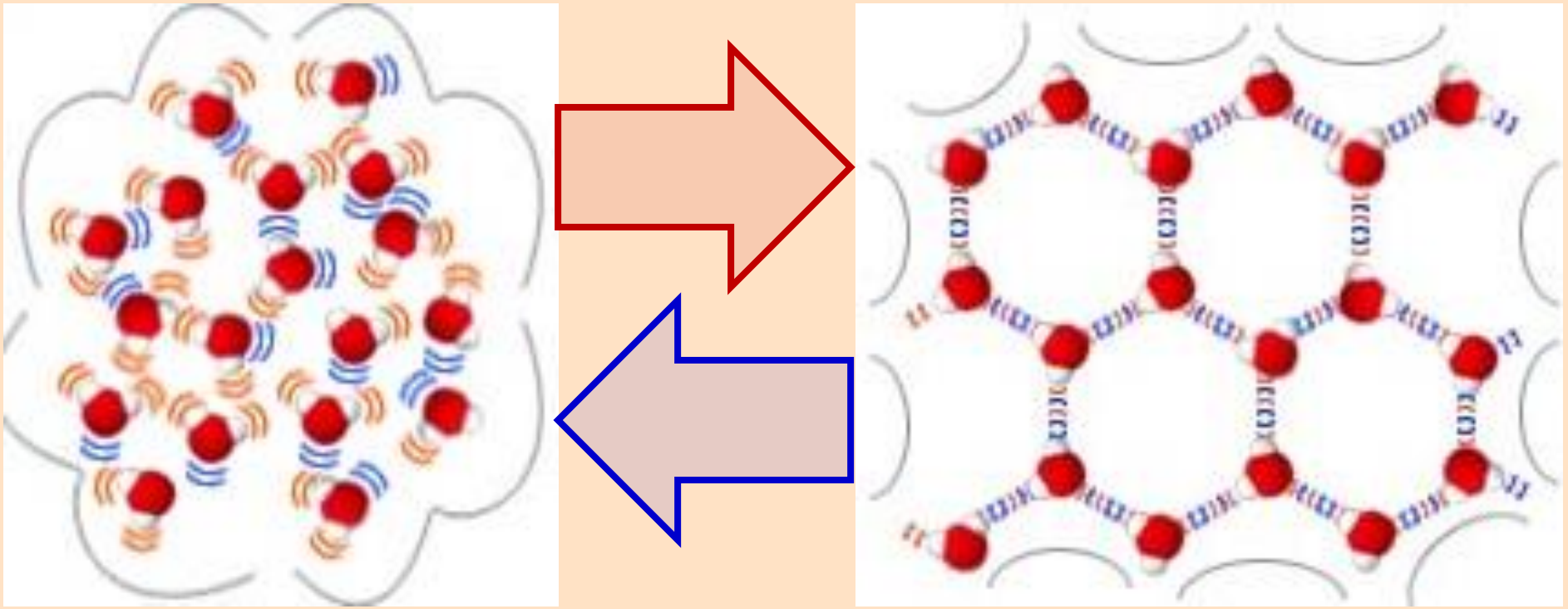
Energy Absorbed

Energy Released

freezing:

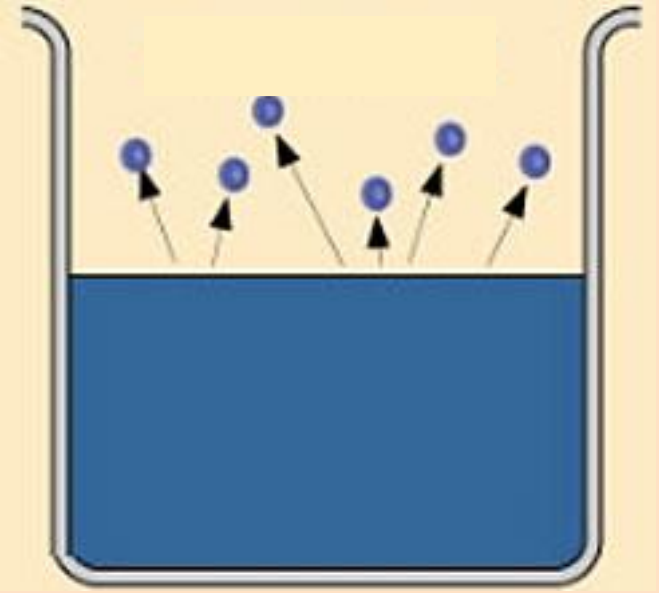
l to s (lose KE)

liquid → solid + energy



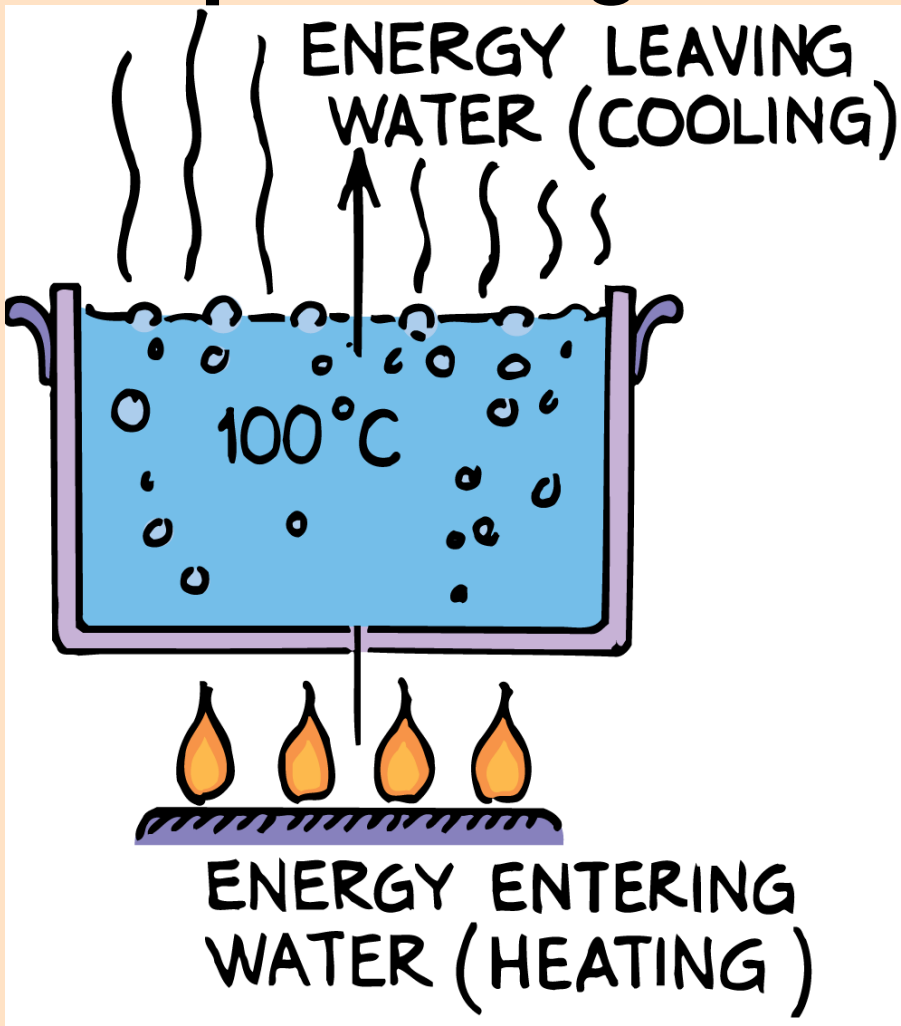
melting: liquid ← solid + energy

s to *l* (gain KE)



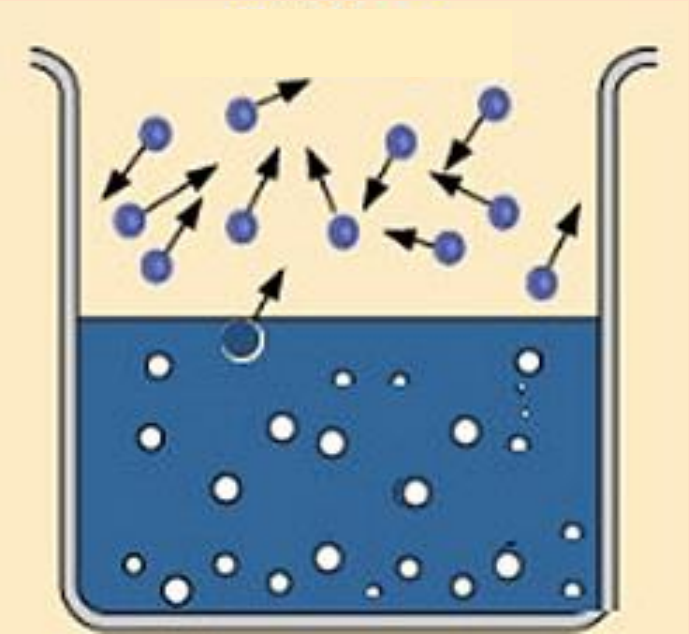
vaporization:

energy + liquid → gas



evaporation:

***l* to *g* at surface**



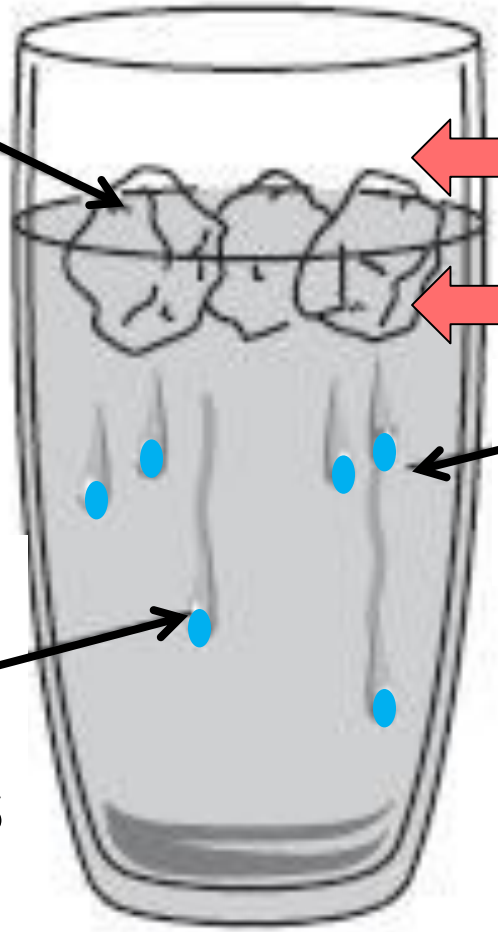
boiling:

***l* to *g beneath* surface**

condensation:

g **to** ***l*** **(lose KE)**

gas ⟶ **liquid** + **energy**



ice cubes

warm water vapor in air

cold water inside glass

condensed drops outside glass

Is water in glass cooler or warmer?

Quick Quiz!

1) According to the kinetic molecular theory, gas particles...

A) are attracted to each other.
B) are in constant random motion.
C) have the same kinetic energy .
D) have a significant volume.

Quick Quiz.

2) The average kinetic energy of the particles in a substance is directly proportional to the

A) molar mass
B) density
C) temperature
D) size

Quick Quiz.

3) Compared to liquids and solids, gases are easily compressed because the particles in a gas…

A) attract each other significantly

B) are spaced relatively far apart

C) are extremely small

D) move in constant, random motion

Quick Quiz.

4) What is $-88^{o}C$ in Kelvin temperature?

A) 185 K
B) 361 K
C) –361 K
D) 273 K

$$K = {}^{o}C + 273$$

$$K = -88 + 273$$

Quick Quiz.

5) Put a cup of water on a table.
A process that will occurs is…

A) evaporation.

B) condensation.

C) BOTH A and B

D) NONE of the above