

States of Matter



What is matter?

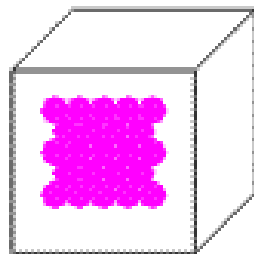
- Matter is anything that has mass and takes up space.



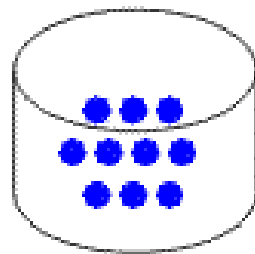


States of matter

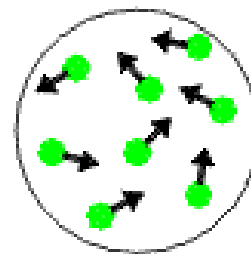
Density is the number of particles in a unit of space. The more particles there are, the less distance each is able to move. This determines the state of the matter.



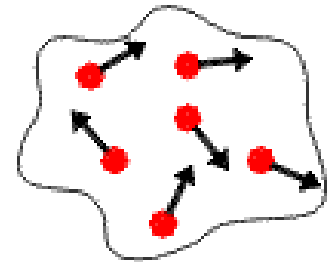
COLD
Solid
(Ice)



WARM
Liquid
(Water)



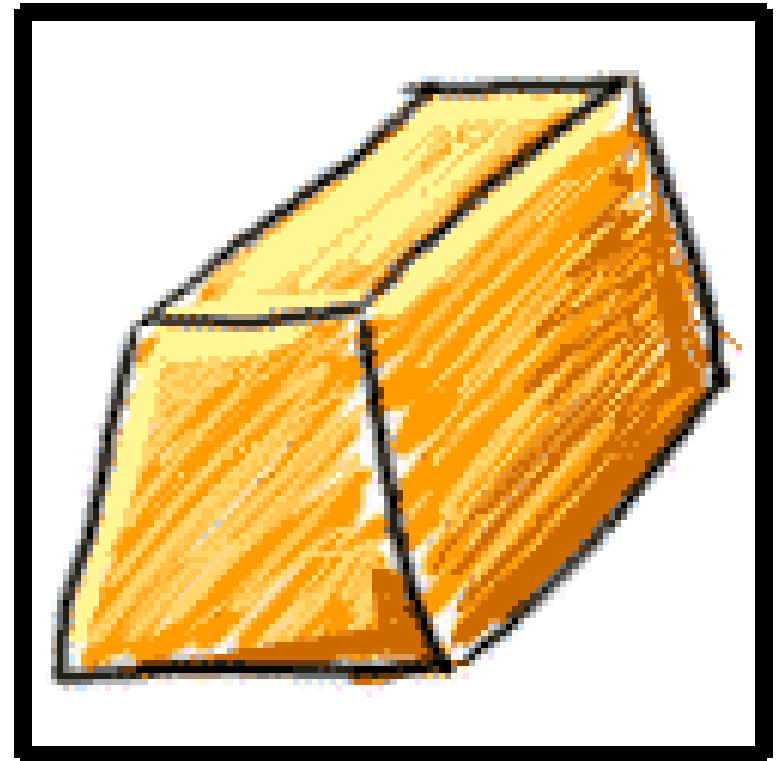
HOT
Gas
(Vapor)



VERY HOT
Plasma
(Ionized gas)

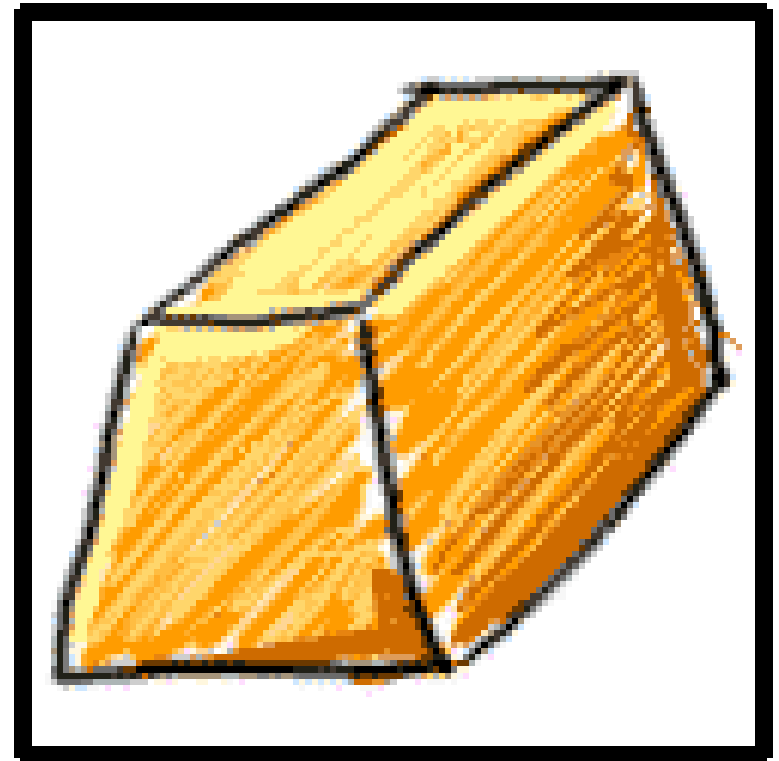
Solids

- Solids have definite shape and definite volume.



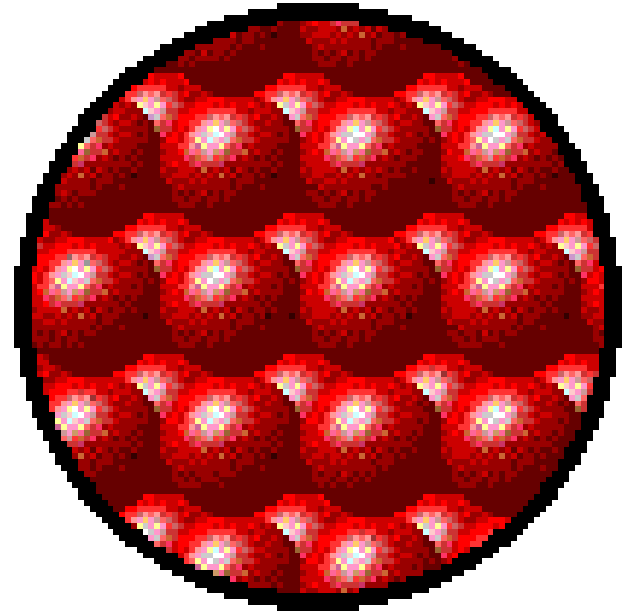
Solids

- There are two types
 - Crystalline: characteristic melting point. Melt at that point, then vaporize, but don't burn
 - Amorphous: get soft and melt slowly as heat increases, and eventually burn.



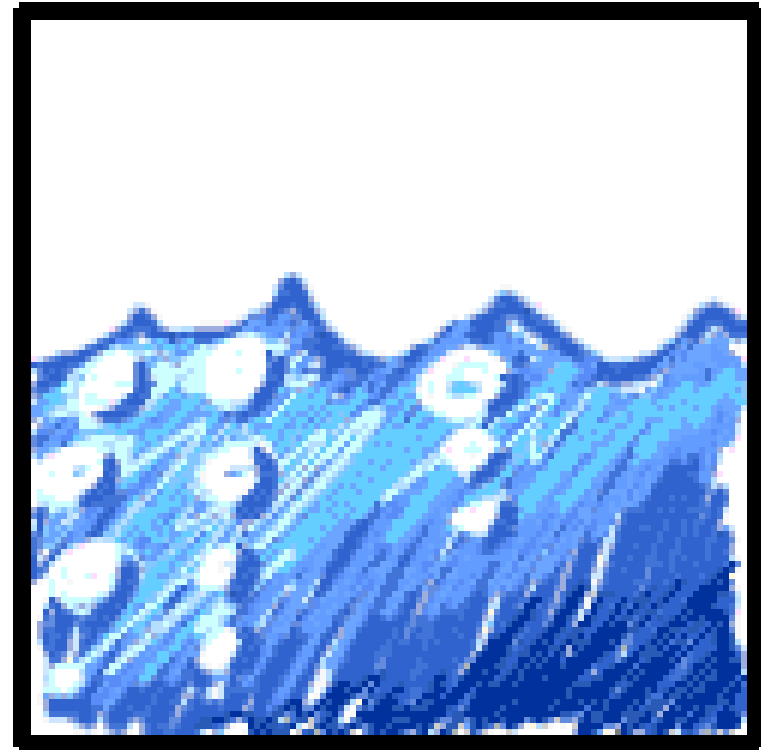
Particles in Solids:

- Are packed tightly together
- Have very little energy (movement)
- Vibrate in place



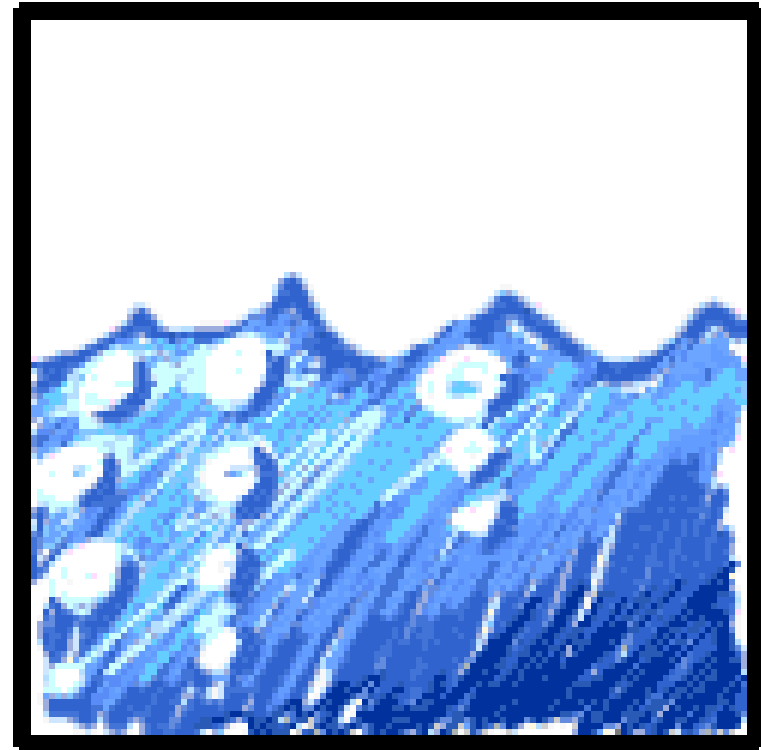
Liquids

- Liquids take the shape of their container because they have no defined shape.
- Have definite volume.



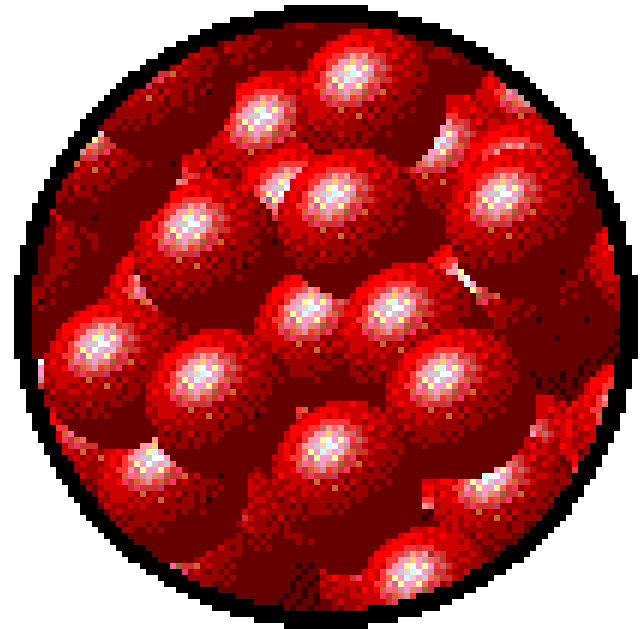
Liquids

- The more dense a liquid is, the thicker it is.
- The thicker a liquid is, the more slowly it flows.
- Viscosity is the resistance that a liquid has to flowing.



Particles in Liquids:

- Are loosely packed
- Have medium energy levels (movement)
- Particles flow around each other





Gases

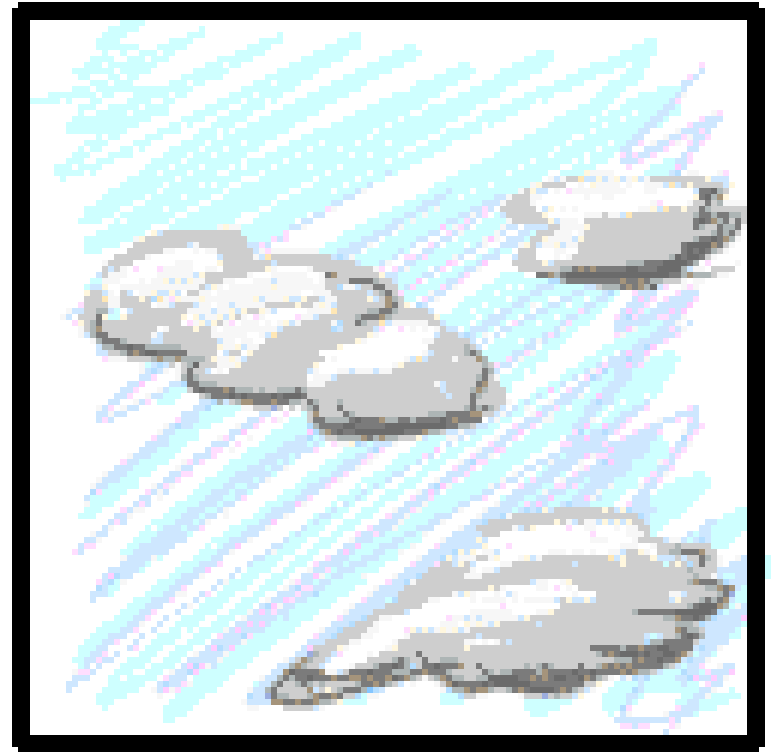
- Gases spread out to fill the entire space given and do not have definite volume.
- Since gas molecules have no definite volume, they are compressible.





Gases

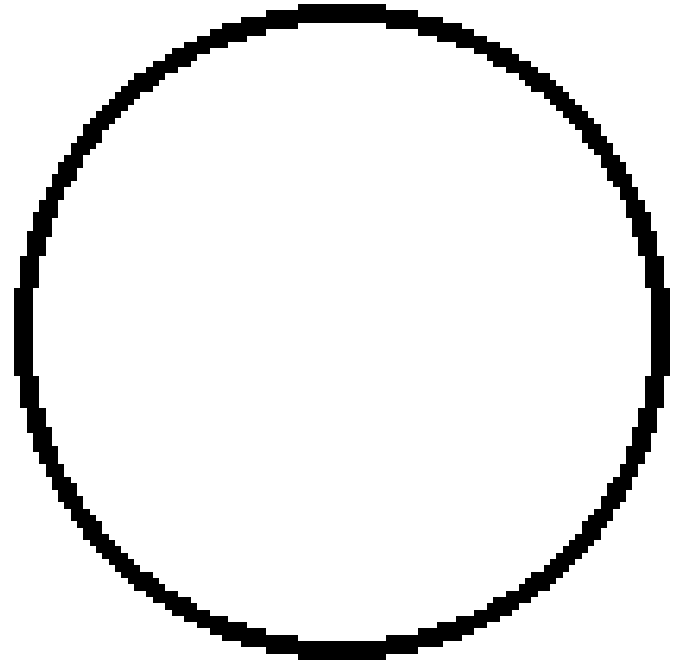
- Many substances exist as a gas.
 - Air is a mixture of Oxygen, Nitrogen, Carbon Dioxide, and some trace gasses
 - Water vapor is a gas.
 - Helium, Neon, and Argon are all gasses.





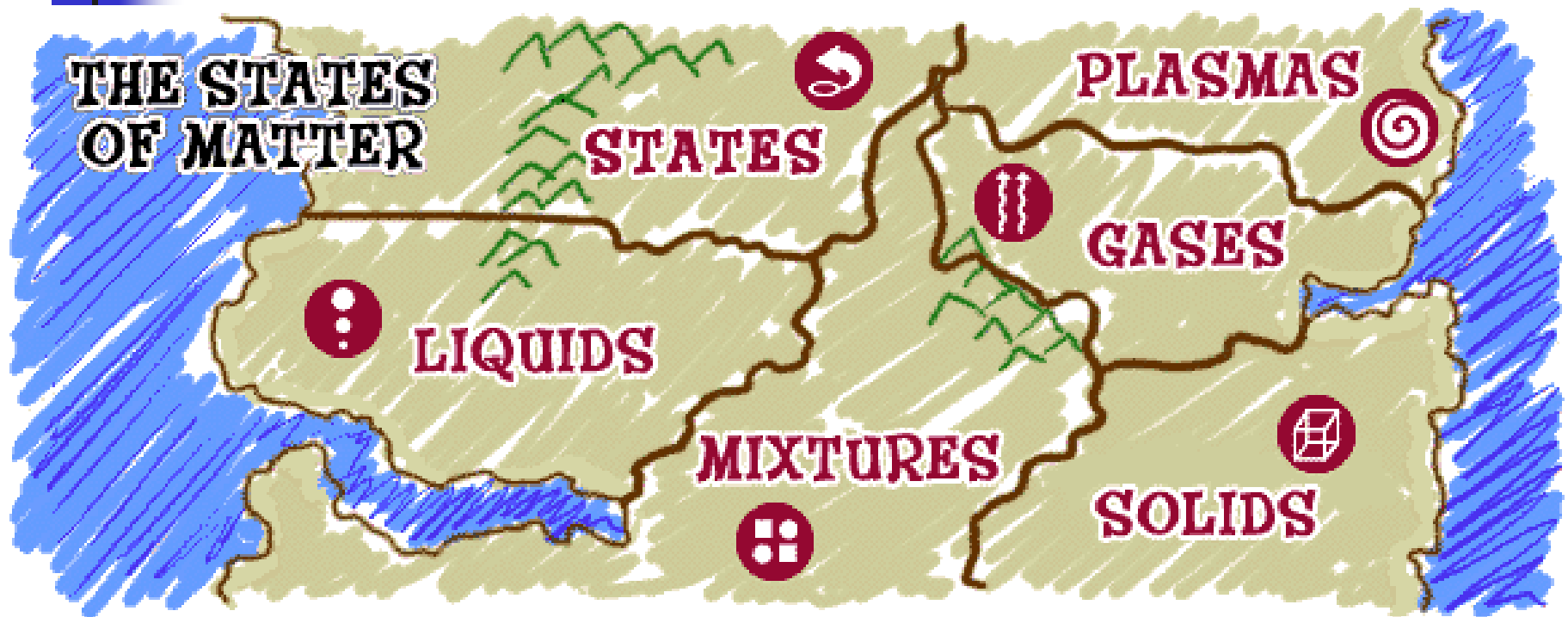
Particles in Gases:

- Move freely
- Have LOTS of energy (movement)





STATES of matter?



What would it take for matter to move from one state to another?

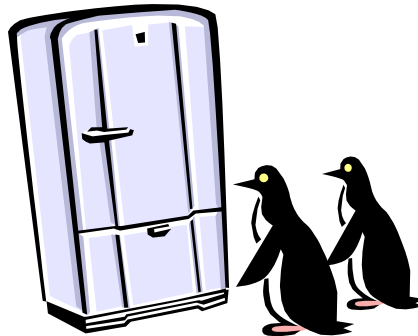


Add or Subtract Energy. . .

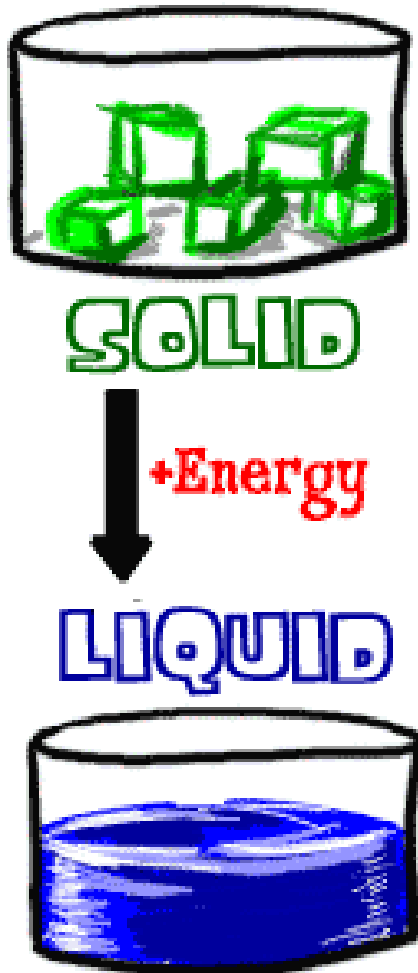
When energy is added, particles move faster!



When energy is taken away, particles move slower!



Solid + Energy = ?

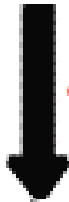


- When energy is added to **solids**, they become **liquids**!
- Examples?

Liquid + Energy = ?

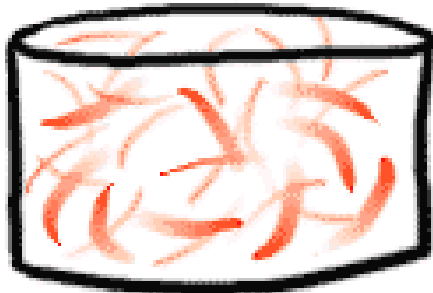


LIQUID



+Energy

GAS



- When energy is added to liquids, they become gases!
- What examples can you think of?



Energy determines the state!



Changing States

- There are several names for matter changing states:
 - State change
 - Phase change
 - Physical change





So, did we get something new?

- Ice cream and melted ice cream?
- Chocolate and melted chocolate?
- Ice and water vapor?
- Water & water vapor?



Review Questions

1. What state of matter has definite volume and definite shape?
2. Describe the properties of liquids.
3. Describe the differences between gases and plasma.
4. What is needed for states of matter to change phase?