
STATES
ASHTABULA
LAKE
GEAUGA
TRUMBULL
LUCAS
OTTAWA
CUYAHOGA
WILLIAMS
FULTON
ERIE
LORAIN
PORTAGE
WOOD
SANDUSKY
MEDINA
SUMMIT
MAHONING
DEFIANCE
HENRY
SENECA
HURON
PAULDING
PUTNAM
HANCOCK
ASHLAND
COLUMBIANA
WYANDOT
CRAWFORD
VAN WERT
ALLEN
HARDIN
CARROLL
JEFFERSON
HARRISON
MERCER
AUGLAIZE
GUERNSEY
BELMONT
SHELBY
MUSKINGUM
DARKE
MIAMI
FRANKLIN
NOBLE
MONROE
MADISON
FAIRFIELD
PERRY
MORGAN
WASHINGTON
PREBLE
MONTGOMERY
GREENE
PICKAWAY
FAYETTE
HOCKING
ATHENS
BUTLER
WARREN
CLINTON
ROSS
VINTON
MEIGS
HIGHLAND
PIKE
JACKSON
HAMILTON
CLERMONT
BROWN
ADAMS
SCIOTO
GALLIA
LAWRENCE


IF


VIRGINIA
MATTER
WINCHESTER
FAIRFAX CITY
FALLS CHURCH
ARLINGTON
ALEXANDRIA
PARK
MANASSAS
PRINCE WILLIAM
FAUQUIER
RAPPA-HANNOCK
CULPEPER
FREDERICKSBURG
KING GEORGE
MADISON
GREENE
CHARLOTTES-VILLE
ALBEMARLE
WESTMORELAND
NORTHUMBERLAND
CAROLINE
RICHMOND
LANCASTER
KING WILLIAM
KING QUEEN
ESSEX
MIDDLESEX
MATHEWS
GLOU-CES-TER
NEW KENT
WILL-IAMS-BURG
YORK
POQUOSON
HAMPTON
NORFOLK
VIRGINIA BEACH
PORTSMOUTH
CHARLES CITY
JAMES CITY
SURRY
ISLE OF WIGHT
SUSSEX
SUFFOLK
CHES-APEAKE
SOUTHAMPTON
FRANKLIN CITY
GREENSVILLE
NELSON
AMHERST
ALLEGHANY
COVINGTON
BUCHANAN
DICKEN-SON
NORTON
WISE
RUSSELL
SMYTH
WASHINGTON
BRISTOL
CARROLL
GRAYSON
GALAX
HALIFAX
MECKLENBURG
MARTINSVILLE
DANVILLE
SOUTH BOSTON

# STATES OF MATTER

- ***The Four States of Matter***

  - Four States

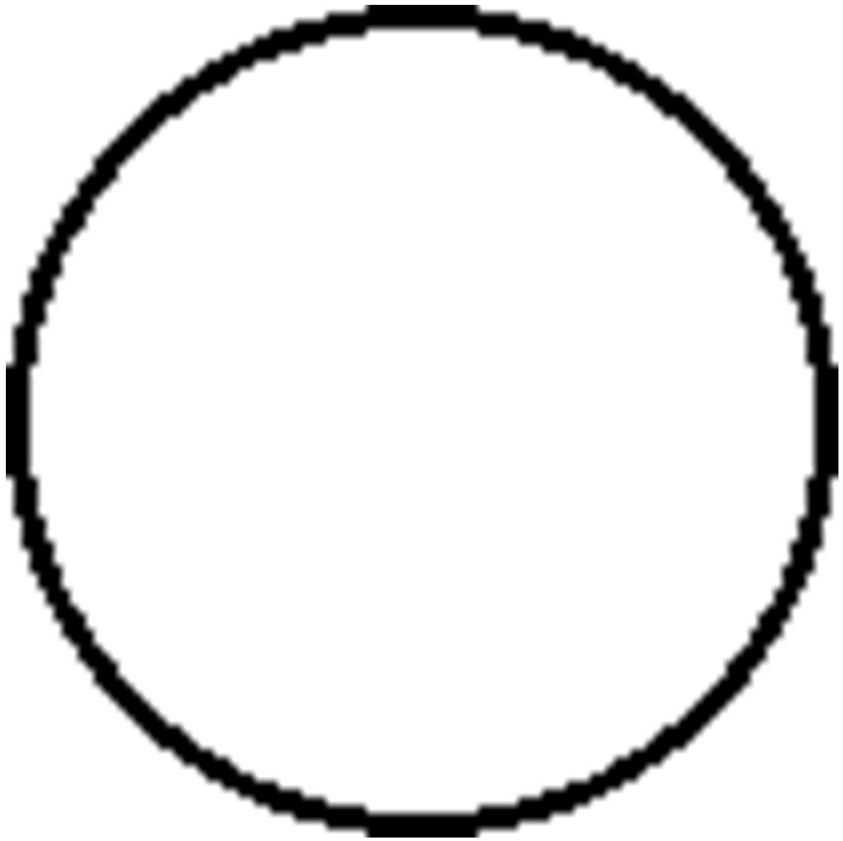
- Solid
- Liquid
- Gas
- Plasma

# STATES OF MATTER

- Based upon particle arrangement
- Based upon energy of particles
- Based upon distance between particles

# Kinetic Theory of Matter

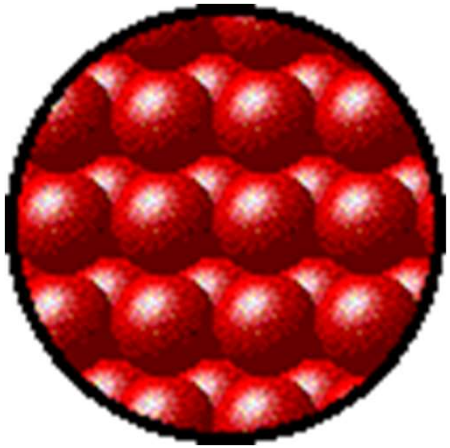
**Matter is made up of particles which are in continual random motion.**

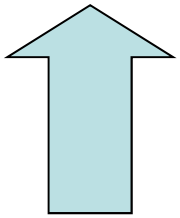


# STATES OF MATTER
## SOLIDS

- **Particles of solids are tightly packed, vibrating about a fixed position.**

- **Solids have a definite shape and a definite volume.**



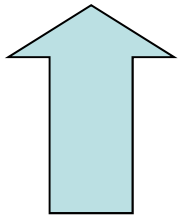


**Heat**

# STATES OF MATTER
## LIQUID

- **Particles of liquids are tightly packed, but are far enough apart to slide over one another.**

- **Liquids have an <u>indefinite</u> shape and a <u>definite</u> volume.**

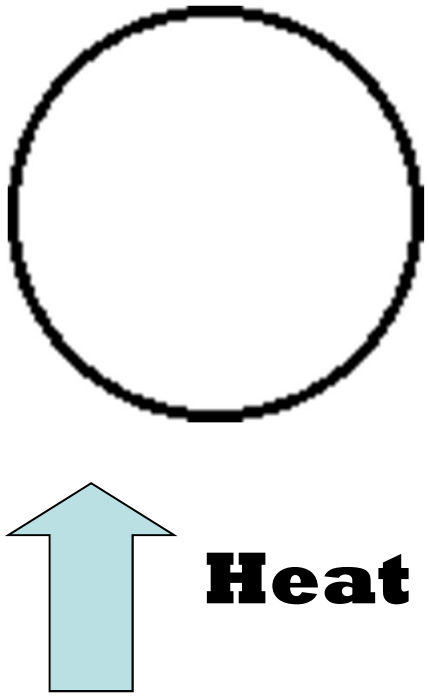


**Heat**

# STATES OF MATTER
## GAS

- **Particles of gases are very far apart and move freely.**

- **Gases have an indefinite shape and an indefinite volume.**



# PHASE CHANGES

| Description of Phase Change | Term for Phase Change | Heat Movement During Phase Change |
| --- | --- | --- |
| Solid to liquid | Melting | Heat goes into the solid as it melts. |
| Liquid to solid | Freezing | Heat leaves the liquid as it freezes. |

# PHASE CHANGES

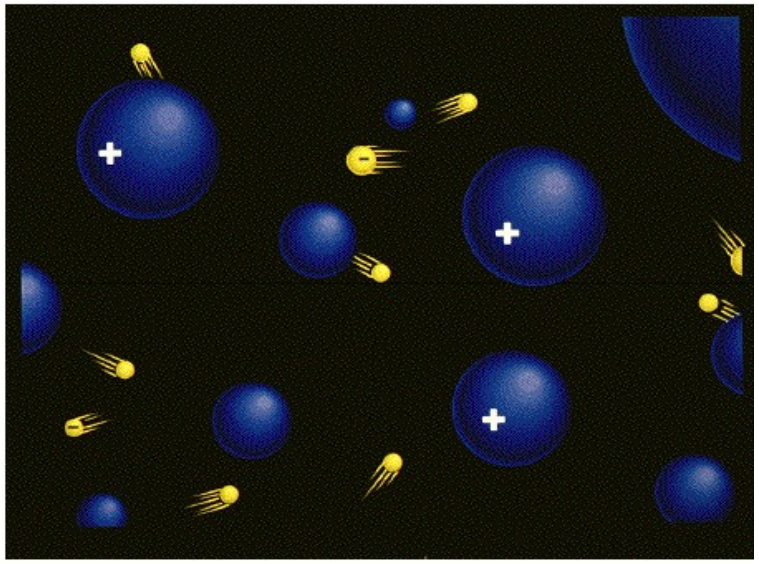
| Description of Phase Change | Term for Phase Change | Heat Movement During Phase Change |
|---|---|---|
| Liquid to gas | Vaporization, which includes boiling and evaporation | Heat goes into the liquid as it vaporizes. |
| Gas to liquid | Condensation | Heat leaves the gas as it condenses. |
| Solid to gas | Sublimation | Heat goes into the solid as it sublimates. |

But what happens if you raise the temperature to super-high levels... between 1000°C and 1,000,000,000°C ?

Will everything just be a gas?

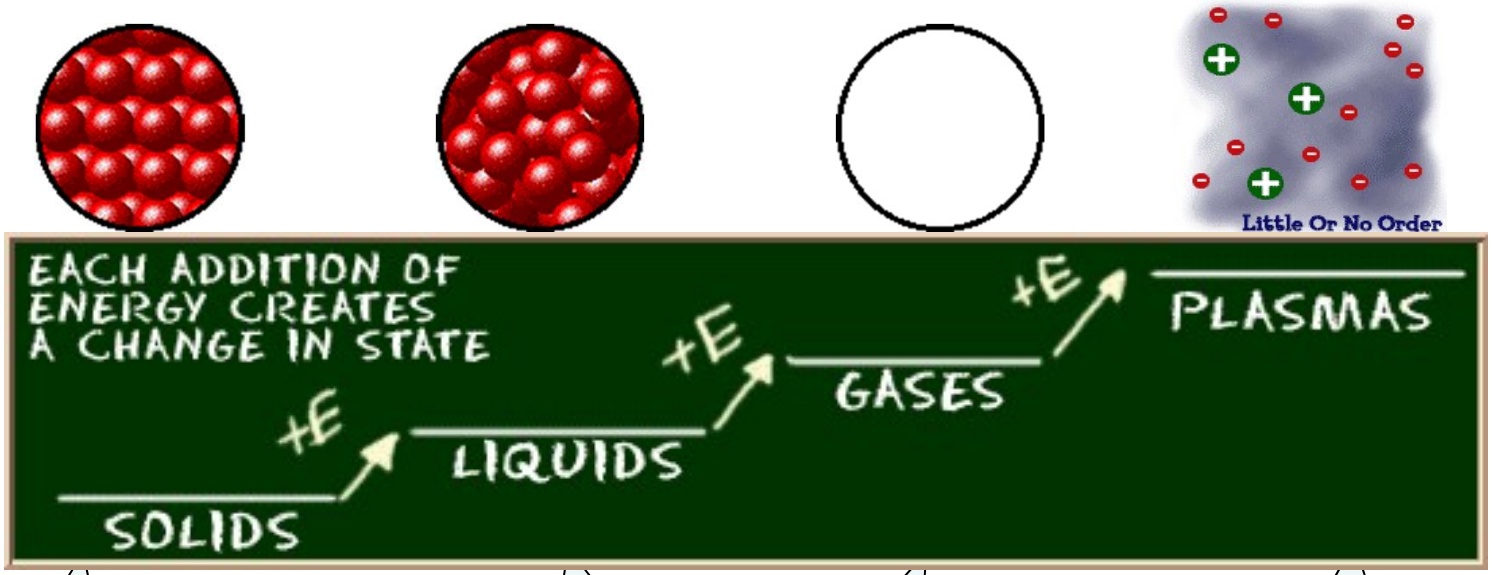
# STATES OF MATTER
## PLASMA

- **A plasma is an ionized gas.**
- **A plasma is a very good conductor of electricity and is affected by magnetic fields.**
- **Plasmas, like gases have an indefinite shape and an indefinite volume.**



- **Plasma is the common state of matter**

# STATES OF MATTER




**SOLID**

Tightly packed, in a regular pattern Vibrate, but do not move from place to place

**LIQUID**

Close together with no regular arrangement. Vibrate, move about, and slide past each other

**GAS**

Well separated with no regular arrangement. Vibrate and move freely at high speeds

**PLASMA**

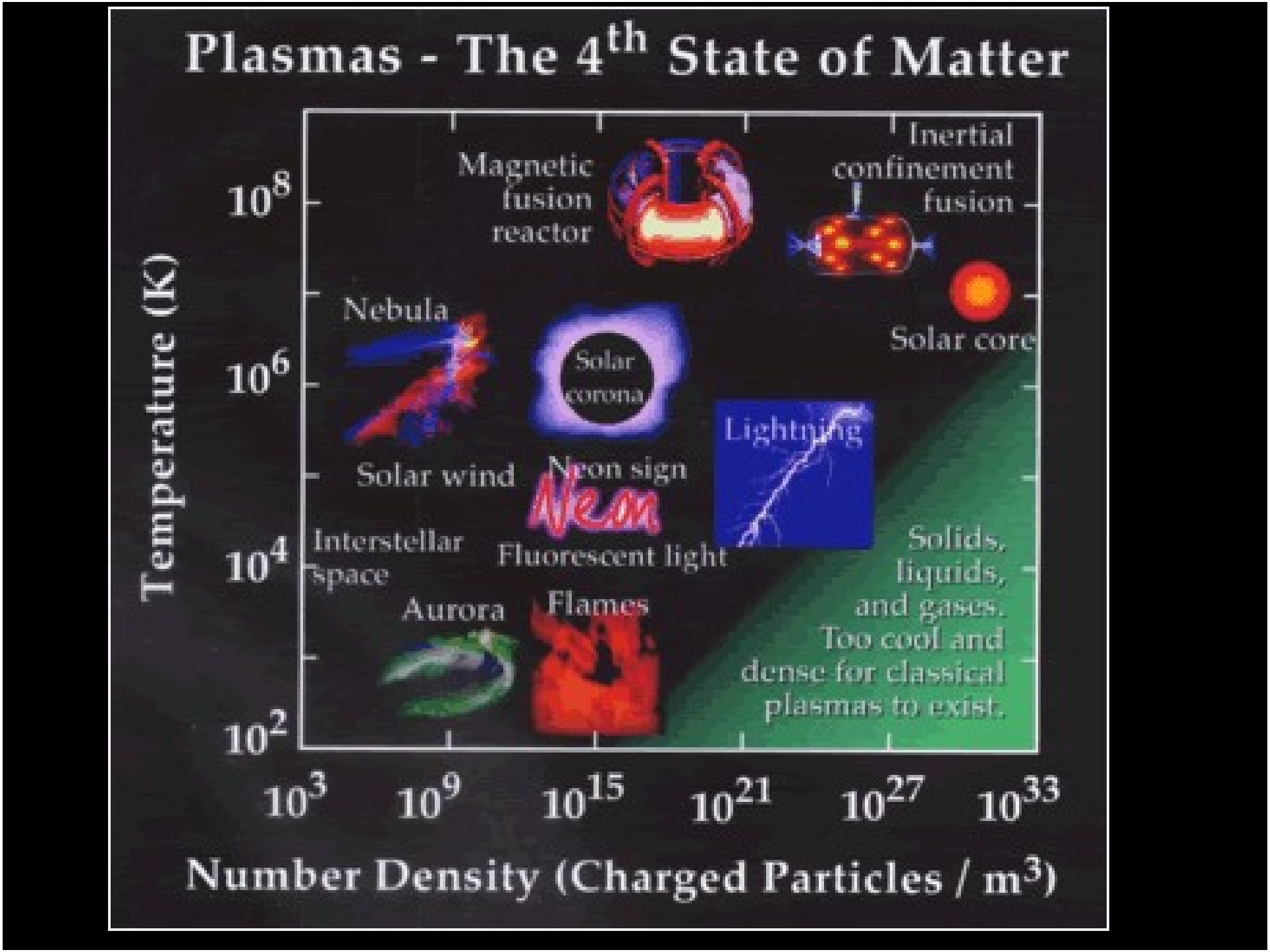
Has no definite volume or shape and is composed of electrical charged particles

# Some places where plasmas are found...


2. Lightning

# 3. Aurora (Northern Lights)


The Sun is an example of a star in its plasma state


Plasmas - The 4th State of Matter
Magnetic fusion reactor
Inertial confinement fusion
Solar core
Nebula
Solar corona
Solar wind
Neon sign
Lightning
Interstellar space
Fluorescent light
Aurora
Flames
Solids, liquids, and gases. Too cool and dense for classical plasmas to exist.
Temperature (K)
10^8
10^6
10^4
10^2
10^3
10^9
10^15
10^21
10^27
10^33
Number Density (Charged Particles / m^3)

# COLD PLASMA

# COLD PLASMA PEN