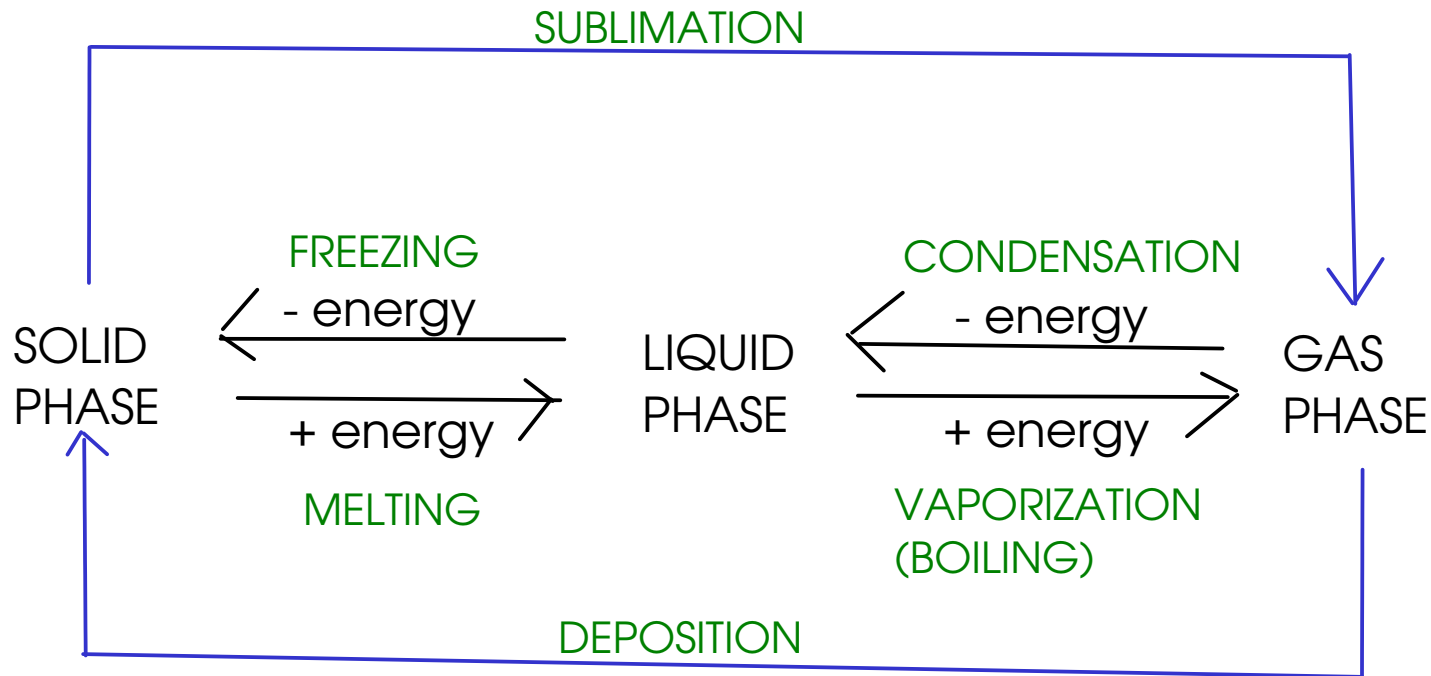


Kinetic theory

- describes matter in terms of atomic/molecular MOTION
- the energy of the molecules relates to atomic/molecular motion, and temperature



You can speed up the molecules (add energy) by heating!
You can slow down the molecules (remove energy) by cooling!

Physical and Chemical

- We classify changes in matter according to whether the identity of matter changes during the process.

PHYSICAL CHANGE

- A change in the form or appearance of matter WITHOUT a change in identity

Examples:

- Melting, freezing (all phase changes) are physical changes
- Breaking, cutting, etc. are also physical changes

CHEMICAL CHANGE

- A change in the identity of matter
- also called "chemical reactions"

Examples:

- Burning, rusting, metabolism

We classify PROPERTIES of substances by whether or not you must change the identity of a substance to obtain information about the property

PHYSICAL PROPERTIES

- can be determined without changing the identity of matter

Examples:

- size, shape, color, mass, hardness
- melting point, boiling point, density, etc.

CHEMICAL PROPERTIES

- can only be determined by changing the identity of matter

Examples:

- flammability, reactivity with acids, temperature at which thermal decomposition occurs

Classification of matter

- We can broadly classify matter by how difficult it is to separate

PURE SUBSTANCES

- CANNOT be separated into different materials by PHYSICAL PROCESSES

Examples:

Table salt, gold, silver, nitrogen, oxygen, carbon, hydrochloric acid, carbon dioxide, ethanol (grain alcohol), water, silicon dioxide

MIXTURES

- CAN be separated into other materials by PHYSICAL PROCESSES

Examples:

salt water, vodka, air, toilet bowl cleaner, beef, macaroni and cheese, dirt

More on PURE SUBSTANCES

- Pure substances can be further classified, depending on how easy it is to separate them by CHEMICAL PROCESSES

ELEMENTS

- Cannot be broken down into simpler substances using physical or chemical means
- Elements are the building blocks of chemistry! They are the simple things from which all other things are formed!
- Listed on the PERIODIC TABLE OF THE ELEMENTS

Examples:

gold, silver, carbon, nitrogen, oxygen

COMPOUNDS

- Can be broken down into simpler substances using chemical means
- Are made of ELEMENTS combined in simple, fixed ratios
- A compound, no matter how it was made, has a definite ratio of one atom to another (LAW OF CONSTANT COMPOSITION)

H_2O : 2 parts hydrogen to one part oxygen!

Examples:

carbon dioxide, hydrochloric acid, ethanol, water

More on MIXTURES

- Mixtures can be further classified based on uniformity

HOMOGENEOUS MIXTURES

- uniform in composition and properties throughout
- physical properties the same at any point in the mixture

Examples:

salt water, toilet bowl cleaner, vodka

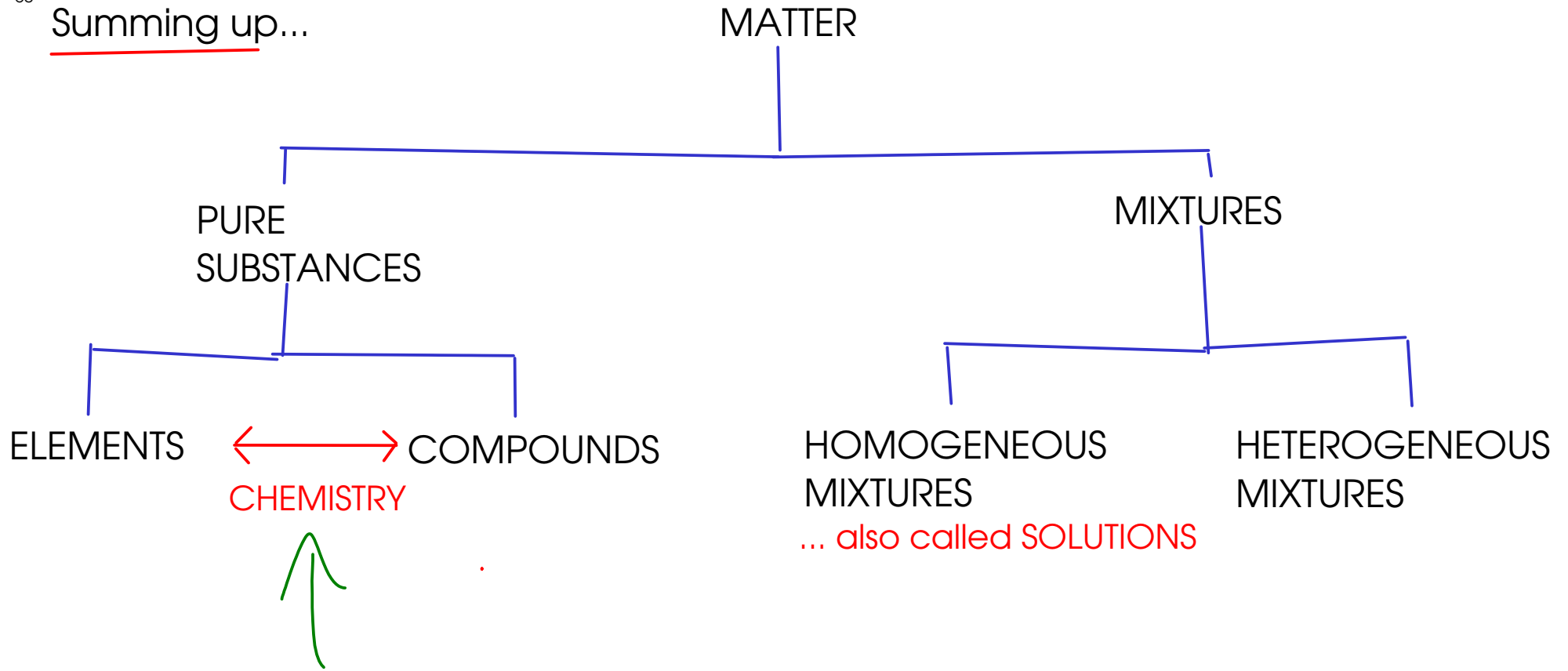
"solutions"

HETEROGENEOUS MIXTURES

- nonuniform
- physical properties may differ (sometimes dramatically) at different points in the mixture

Examples:

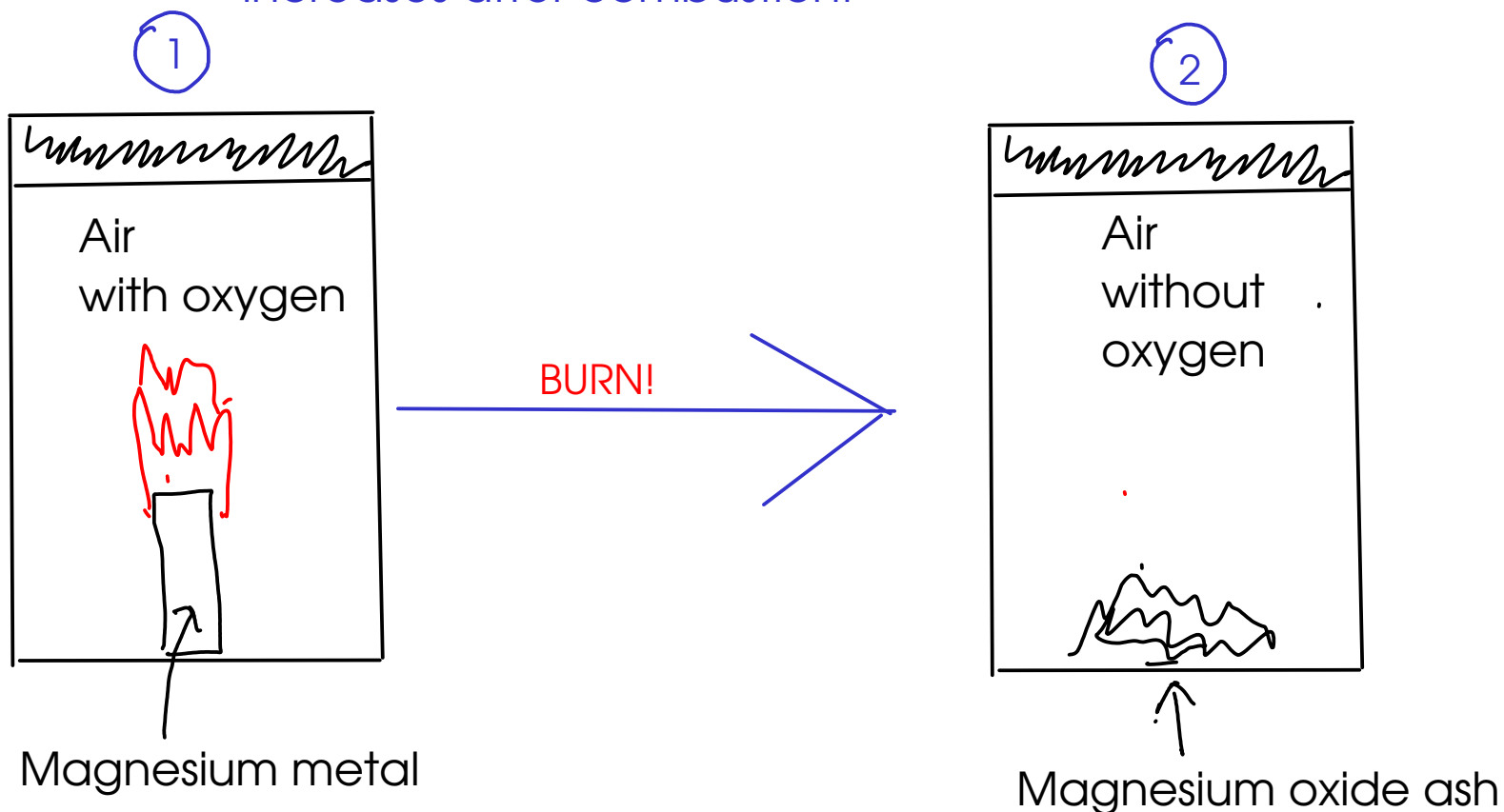
beef, dirt, macaroni and cheese

Summing up...

Conservation of mass

- During any chemical or physical process, the overall amount of mass remains constant, even if the chemical identity or physical state of the matter involved changes

* Total mass remains constant from (1) to (2), even though the mass of the GAS decreases and the mass of the SOLID increases after combustion!



Energy

- can be defined as the ability to do work.

Work?

- the ability to move matter

This material is covered in Sections 10.1-10.5 in your textbook ... Pages 288-301

Kinds of energy

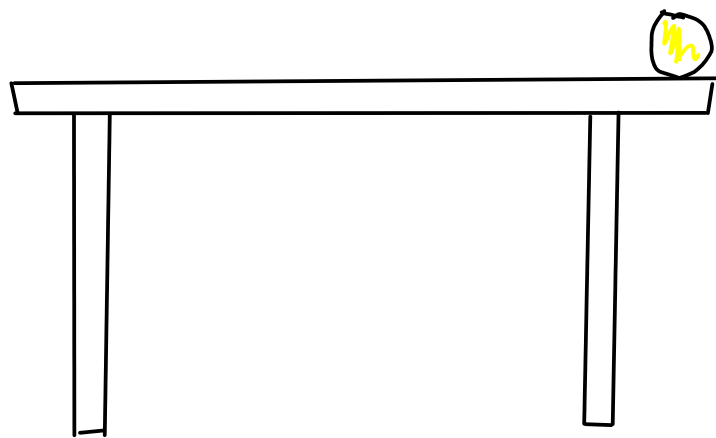
① KINETIC ENERGY is the energy of matter in motion



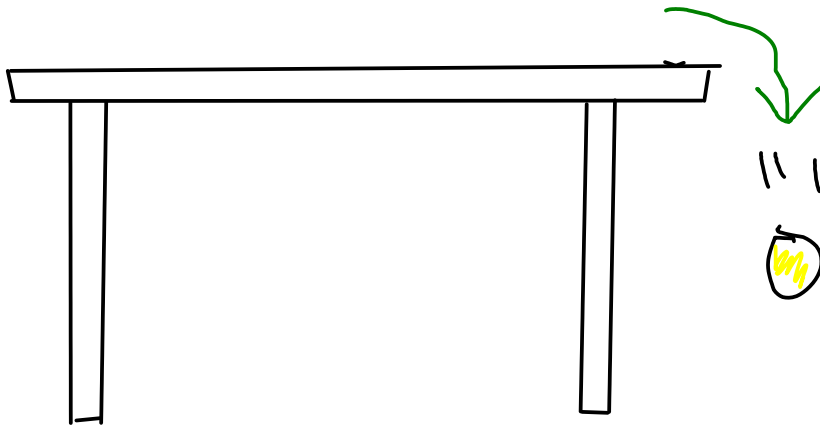
Throwing a ball gives it kinetic energy!

② POTENTIAL ENERGY is energy of matter that is being acted on by a FIELD OF FORCE

- Fields of force may be things like gravity, magnetism, electricity, etc.



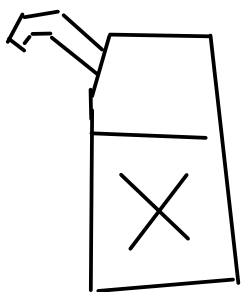
A ball on a table has POTENTIAL ENERGY because it is being acted on by GRAVITY



When the ball falls, the POTENTIAL ENERGY is converted to KINETIC ENERGY

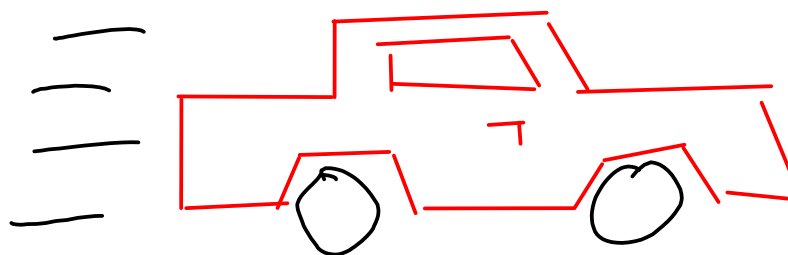
- 3 CHEMICAL ENERGY is energy stored in matter. Think of chemical energy as the sum of the kinetic and potential energy of the atoms in a chemical

CHEMICAL ENERGY may be converted to other forms of energy during chemical reactions



Gasoline

+



Car's internal combustion engine

The chemical energy of the gasoline is CONVERTED to thermal and kinetic energy when the gas is burned in the engine of the car.


Conservation of energy

- Like mass, energy is conserved in physical and chemical changes.
- During a chemical or physical process, the overall amount of energy remains constant, even if there is a change in the type of energy.

"Law of conservation of energy"

is usually called the

"First Law of Thermodynamics"

 study of energy
transfer

More simply put ... "all the energy has to go SOMEWHERE..."