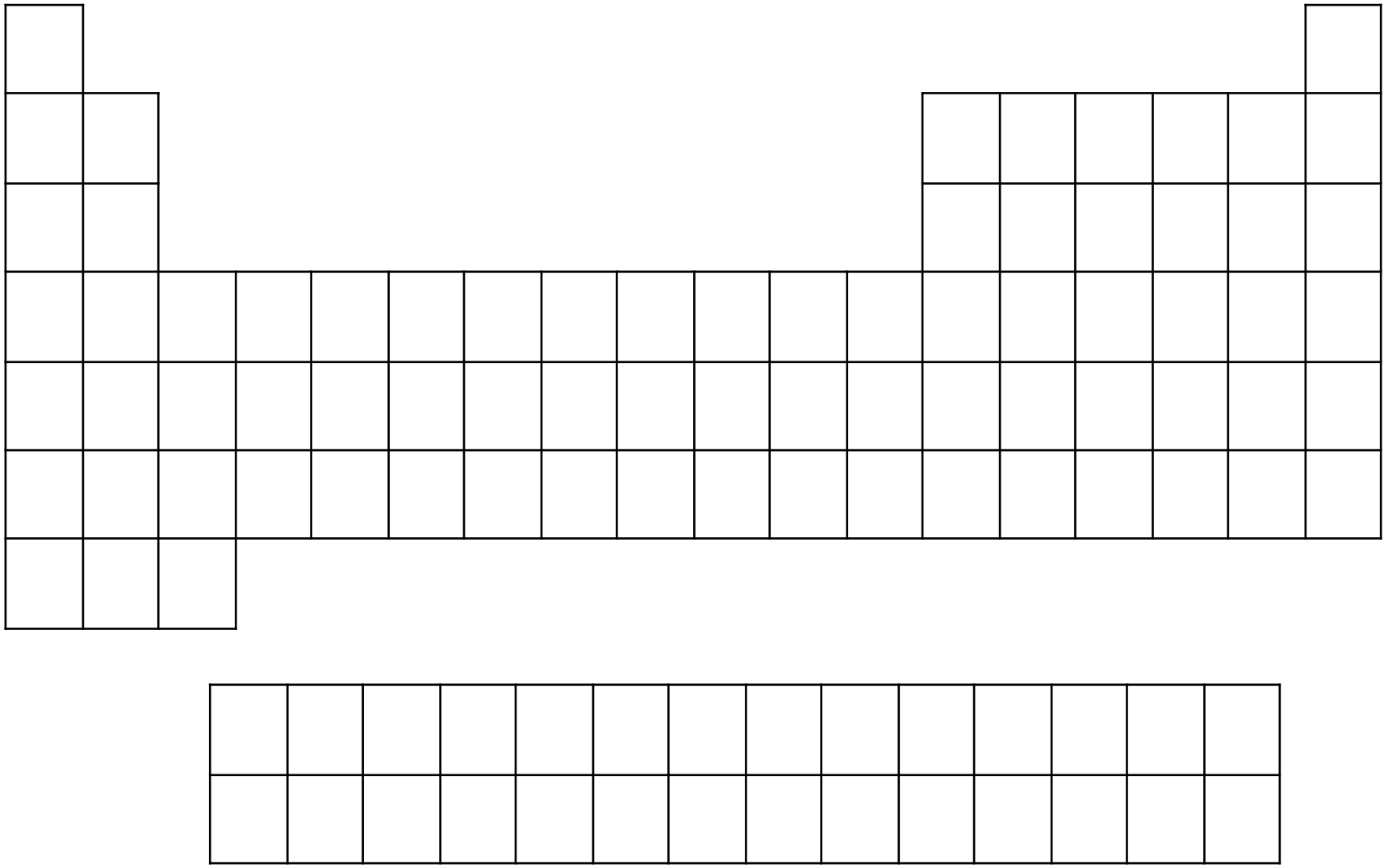
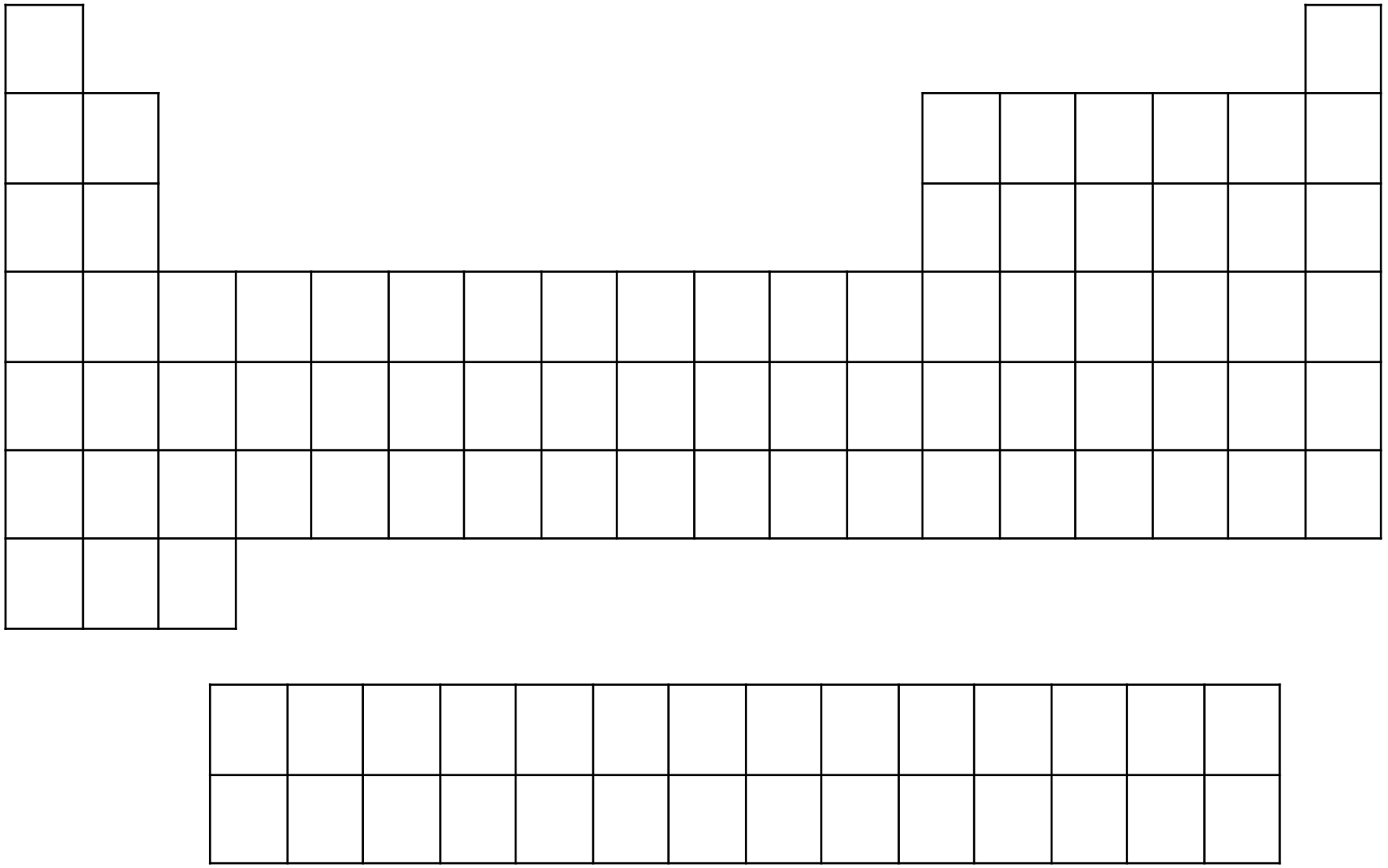


PERIODIC TABLE IA



PERIODIC TABLE IA

V. MATTER-Matter is anything that occupies space and has mass.

Symbols and Formulas

Symbols represent individual atoms of an element:

H O Cl Br Ag

Formulas represent molecules or units of a compound

H_2O CO_2 C_2H_5OH $Ca(NO_3)_2$

Molecular mass is the sum of the atomic masses of all of the atoms in the molecule

A. PHYSICAL STATES OF MATTER

	SOLID	LIQUID	GAS
Attraction between molecules			
Movement of molecules			
Shape			
Density			
Expansion when heated			
Ability to flow Or diffuse			
Distance between particles			
Compressibility			
Made of:			

Types of solids

B. PHYSICAL PROPERTIES

Each substance has a unique set of properties. *Physical properties* can be seen or measured with out changing the chemical composition.

Other Properties of liquids

- Surface tension
- Viscosity
- Cohesion
- Adhesion
- Diffusion

Other Properties of gases

- Pressure
- Temperature

VI. KINETIC MOLECULAR THEORY

A. Gases are composed of such extremely tiny atoms or molecules that are widely separated by empty space.

B. Gas particles move in a random, rapid, and continuous motion, thus has kinetic energy.

C. Gas particles move so rapidly and are so far apart the there is essentially no force of attraction between the particles.

D. Particles collide frequently with each other and with the walls of the container, the collisions are perfectly "elastic" - (No net loss of energy as a result of a collision)

Describing Gases

Each of the measurable quantities below can be used to describe a gas. Each of these quantities is related to all of the other quantities. So if one quantity is changed the others can be caused to change. There are four gas laws that describe how gases change.

The four quantities are

Pressure
Temperature
Volume

Number of molecules

Charle's law says that if the temperature of a gas is increased without changing the pressure or number of molecules, the volume of the gas will increase The Kelvin temperature is directly proportional to volume at constant pressure and number of molecules.

P Constant
V↑
n Constant
T↑

Boyle's law says that if the pressure of a gas is increased at constant temperature and constant number of molecules the volume will decrease. The pressure is indirectly proportional to the volume at constant pressure and number of molecules

P
V
n
T

Gay-Lussac's law says that if the _____ of a gas is increased at constant _____ and constant number of molecules the volume will _____. The pressure is _____ proportional to the _____ at constant _____ and number of molecules

P
V
n
T

Avogadro's law says that if the _____of a gas is increased at constant _____ and constant _____ the volume will increase. The _____ is _____ proportional to the volume at constant pressure and _____.

The ideal gas law lets us relate all four quantities:

PV is directly proportional to nT or PV α nT

P	V	α	n	T
↑	C	α	C	?
		α		
		α		
		α		
		α		
		α		
		α		

C. PHYSICAL CHANGES

A physical change alters the physical properties of a substance without altering its chemical composition. There is no new substance

Usually when:

1. Changing a sample of matter from one physical state to another

solid -> liquid

liquid -> solid

liquid -> gas

gas -> liquid

solid -> gas

2. Changing the size or shape of the substance

3. Mixing or dissolving two or more substances

D. CHEMICAL PROPERTIES

Chemical properties are observed or measure only when it is undergoing a chemical reaction.

E. CHEMICAL CHANGES

A chemical change is a process that changes the chemical composition of a substance

1. Examples of chemical reactions

2. Evidence of a chemical reaction occurring
   A

   B

   C

   D

3. Chemical equations

F. EXAMPLES OF PHYSICAL VS CHEMICAL CHANGES

1. Paper burns to produce CO_2 and H_2O

2. Gasoline evaporates

3. The statue of liberty turns green

4. Tearing paper

5. A tree stump rots

6. Dissolving a package of jello in water

VII. Types of Particles

A. Atoms are the smallest units/particles that can exist that will have the characteristics of the element.

B. Molecules are the smallest unit of two or more atoms covalently bonded together. (more later)

C. An ion is a positively or negatively charged atom or group of atoms

VIII. Types of Matter

A. Pure Substances Matter with a definite composition

a. Element - an element cannot be broken down by simple chemical means.

Symbols of Elements:

b. Compound - a compound can be broken down into two or more elements. Two or more elements chemically bonded together.

(1) Ionic compounds - (+) and (-) charged ions bonded together by the force of their positive and negative charges

Formulas of Compounds:

(2) Molecular compounds - Two or more atoms covalently bonded together (more later)

Formulas of Compounds:

B. Mixture – Physical mixture of two or more substances.

a. Homogeneous mixture is uniform in appearance and properties throughout.
-could consist of 2 or more substances.

b. Heterogeneous mixture has 2 or more physically distinct phases.

Examples:

Compounds	Mixtures
Pure	**Not pure**
One kind of particle	**More than one kind of particle**
Can be broken down into component elements only by chemical change	**Can be separated by physical change**
Elements are combined chemically by chemical bonds	**Parts can be elements or compounds and are not held together by chemical bonds, only by physical attractions**
Elements no longer have their original properties	**Elements or compounds that make up the mixture retain their own properties**
Elements are bonded in a set or definite ratio	**Element or compound parts can be mixed in any ratio**

IX. Scientific Law and Theory

1. Scientific Law

2. Scientific Theory

Kinetic theory

X. Conservation of Mass

In a chemical change matter cannot be created nor destroyed.
Example:

XI. Conservation of Energy

XII. Electrical Character

Oppositely charged objects attract each other

Objects that are the same charge repel each other

Electrostatic Force

XIII. Energy - Chemical, electrical, heat or light

a. Kinetic energy - Energy due to the motion of the object

b. Potential energy - due to the position or chemical composition of the object

Examples:

c. Thermal energy

(1) Endothermic Reaction - Heat is absorbed in a reaction

(2) Exothermic reaction - Heat is released in a reaction