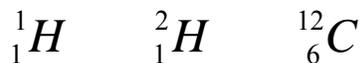


Shorthand Notation of an atom



Atomic number (Z) of an atom: the number of protons in an atom

Mass number (A) of an atom: the total number of protons and neutrons in an atom.

Mass number (A) = number of proton + number of neutron

Since the atomic number is known if the element symbol is given, the notation can be simplified:



Isotopes



Atoms of the same element with different number of neutrons are called **isotopes** of the element.

Information available from the Periodic Table

6	Atomic number (# of protons)
C	Symbol of the element
12.01	What is this number?

Atomic weight: how much an atom of the element weighs, on average.

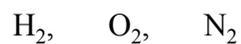
Molecules

❖ **Molecule** is another type of fundamental building block of matter.

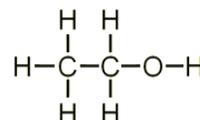
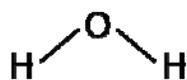
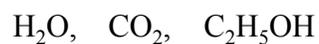
❖ A molecule forms when two or more atoms bond together.

❖ A molecule can form by

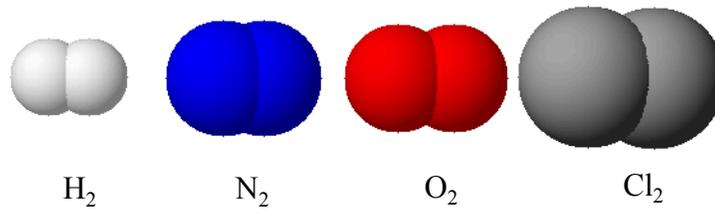
☐ the same type of atoms:



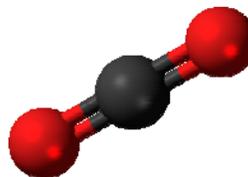
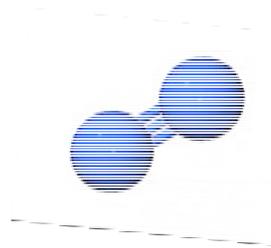
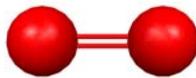
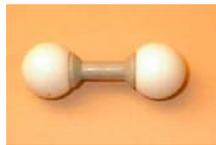
☐ different types of atoms:



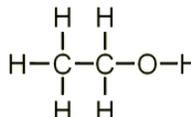
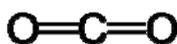
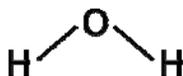
Many nonmetals occur as diatomic molecules
(made up of two atoms).



Ball-and-Stick Model of molecules



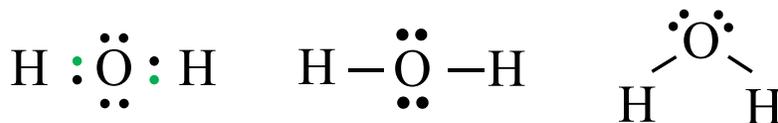
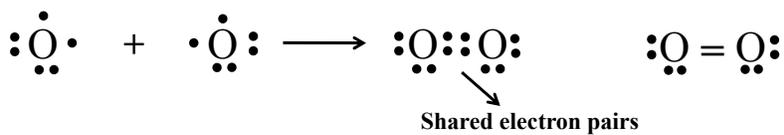
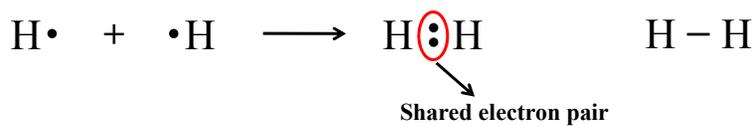
Covalent Bond



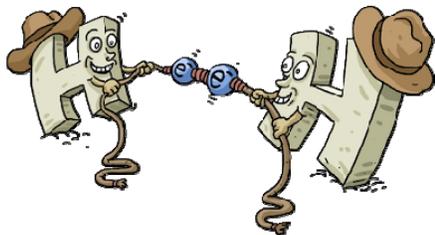
❖ The “stick” between atoms represents a covalent bond, which is formed when two atoms share electrons.

❖ Each “stick” represents TWO electrons shared between the atoms.

What is a Covalent Bond?



Non-Polar Covalent Bond



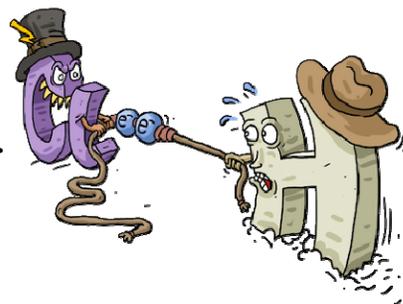
Some electron are shared equally.

— nonpolar covalent bond

Polar Covalent Bond

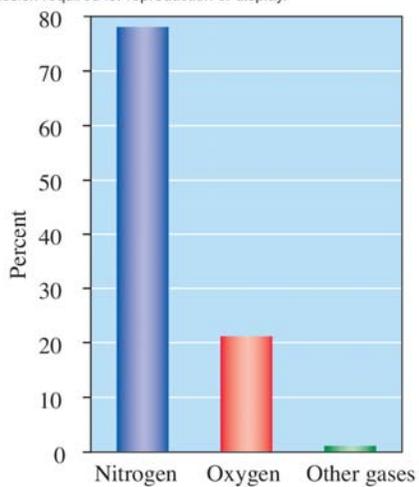
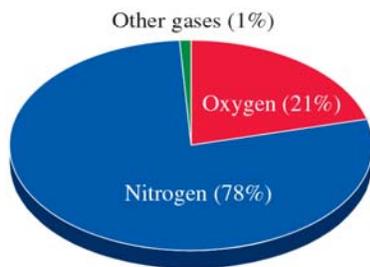
Some electrons are shared unequally.

— Polar covalent bond



The Composition of Air

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What Type of matter is Air?

- A. Element
- B. Compound
- C. Mixture

What's the 3rd most abundant gas in the air?

- A. carbon dioxide
- B. water vapor
- C. argon
- D. hydrogen

Composition of Dry Air

Gas	% by vol	Gas	% by vol
Nitrogen	78.084	Krypton	0.0001
Oxygen	20.948	Carbon monoxide	0.00001
Argon	0.934	Xenon	0.000008
Carbon dioxide	0.031	Ozone	0.000002
Neon	0.00182	Ammonia	0.000001
Hydrogen	0.0010	Nitrogen dioxide	0.0000001
Helium	0.00052	Sulfur dioxide	0.00000002
Methane	0.0002		

Is Air a solution?

- A. You are kidding, right?
- B. NO. All solutions must be liquid.
- C. No, it is a heterogeneous mixture.
- D. Yes, it is a homogeneous mixture, which is what essentially defines a solution.

Solution: a homogeneous mixture of two or more substances.

Solvent: The component of a solution that is present in the greatest amount.

Solute: the component(s) of a solution that is present in the smaller amount.

Examples of solution:

Solution	Solvent	Solute
Saline solution		
Beer		
Air		
18K gold		

What's in a Breath?

Gas	Inhaled air (%) [*]
Nitrogen	78.0
Oxygen	21.0
Argon	0.9
Carbon dioxide	0.04

* Percent by volume

Compared to inhaled air, the exhaled air contains ____ oxygen (O_2).

- A. More
- B. less but still some
- C. less and almost none
- D. About the same

Compared to inhaled air, the exhaled air contains ____ carbon dioxide (CO_2).

- A. less
- B. more and almost 100%
- C. more but much less than 100%
- D. about the same

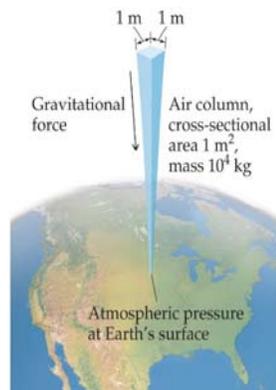
What's in a Breath?

Gas	Inhaled air (%) [*]	Exhaled air (%) [*]
Nitrogen	78.0	78.0
Oxygen	21.0	16.0
Argon	0.9	0.9
Carbon dioxide	0.04	4.0

^{*} Percent by volume

Atmospheric Pressure

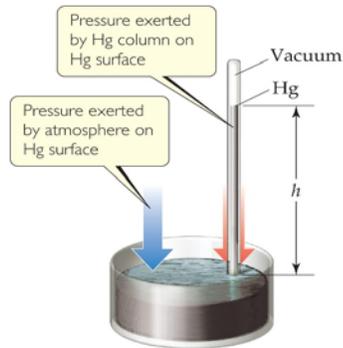
- ❖ Earth has an atmosphere of air and air has mass.
- ❖ **Atmospheric pressure** is caused by the air in the atmosphere bearing down on the earth's surface and on us.



- ❖ The atmospheric pressure at sea level is referred to as the **standard pressure**.

standard pressure = 1 atm = 760 mmHg

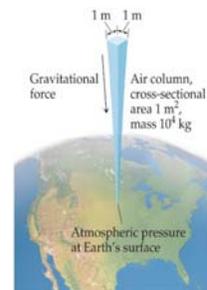
standard pressure = 760 mmHg



Evangelista Torricelli's device for measuring the atmospheric pressure.

In Greeley, the atmospheric pressure is typically _____.

- A. greater than 760 mmHg
- B. lower than 760 mmHg
- C. equal to 760 mmHg



In what direction does the atmosphere apply its pressure?

- A. downward only
- B. upward only
- C. downward and upward only
- D. In all directions

**A balloon expands as it rises up the sky.
Why?**

- A. The pressure inside the balloon increases as the balloon rises and causes the balloon to expand.
- B. The atmospheric pressure is lower at higher elevation. The pressure inside the balloon is higher than the atmospheric pressure and causes the balloon to expand.
- C. The balloon probably gets warmer as it got higher and closer to the sun. The heat from the sun must have cause the gas inside the balloon to expand.

