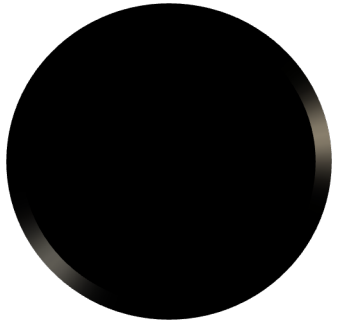
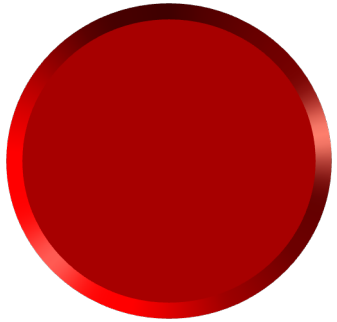
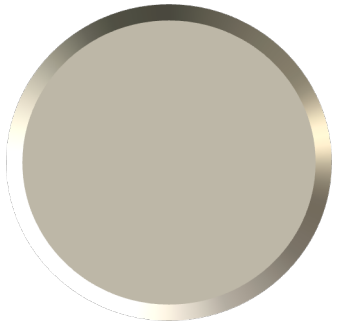
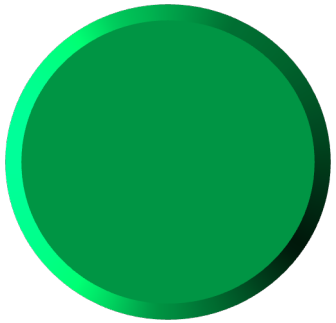
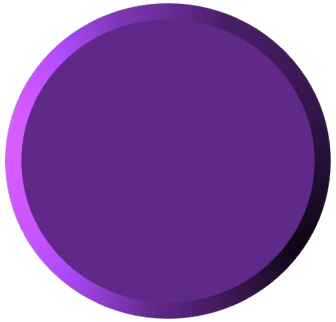
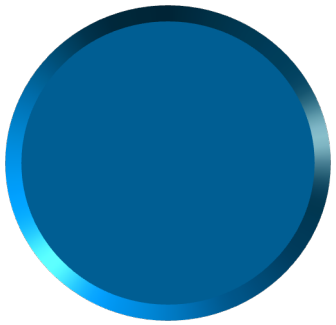
Atom Guide

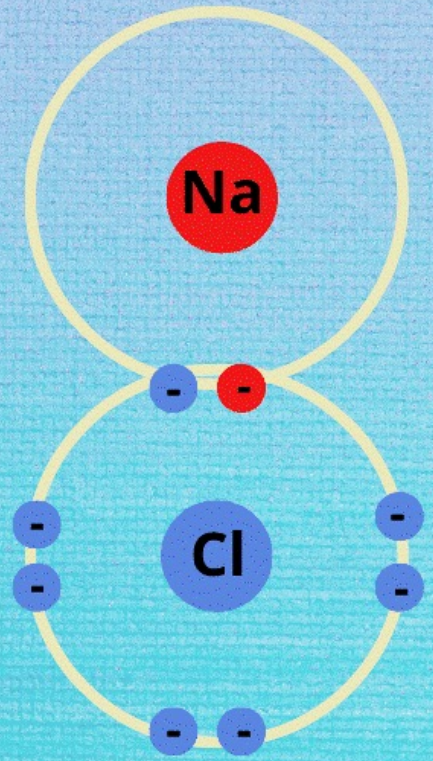
	Carbon
	Oxygen
	Hydrogen

	Chlorine
	Sodium
	Nitrogen

Types of Chemical Bonds

Ionic Bond

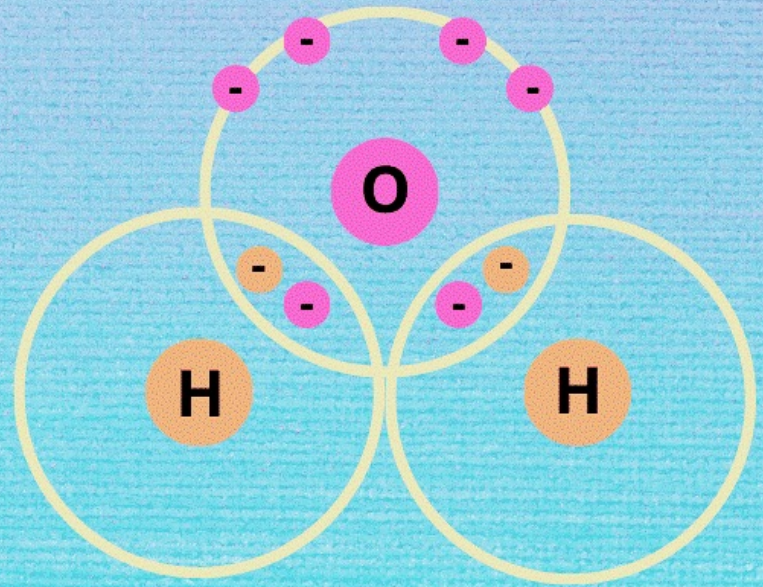
Metal atom donates electron to nonmetal atom.



NaCl

Covalent Bond

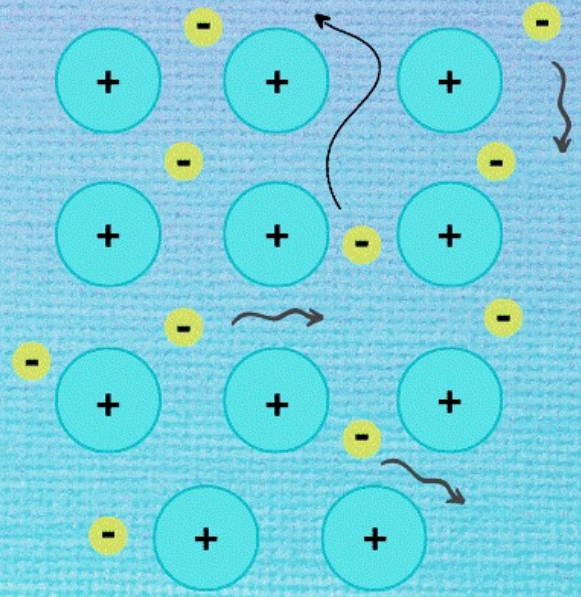
Two nonmetal atoms share electrons.



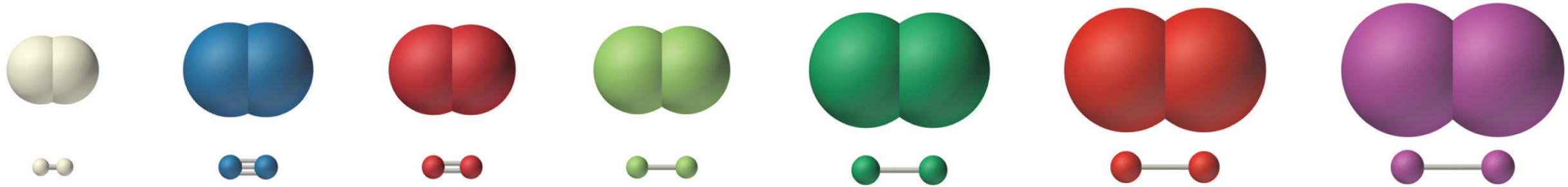
H_2O

Metallic Bond

Electrons move freely between metal atoms.

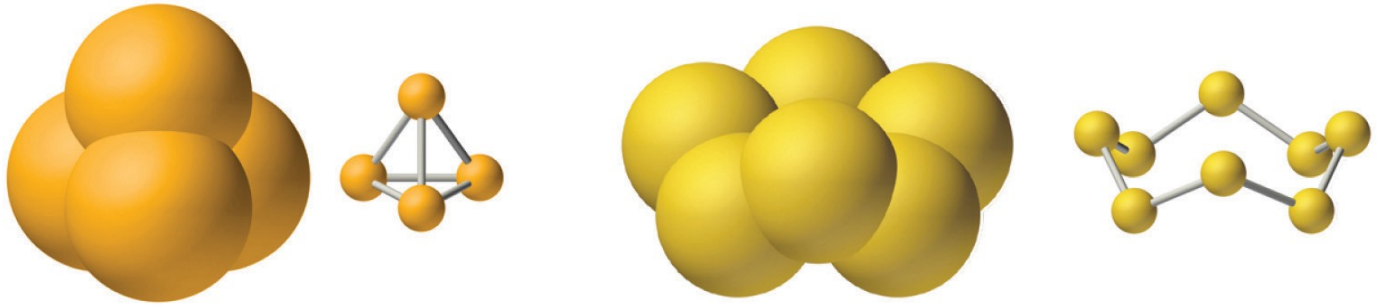


Fe



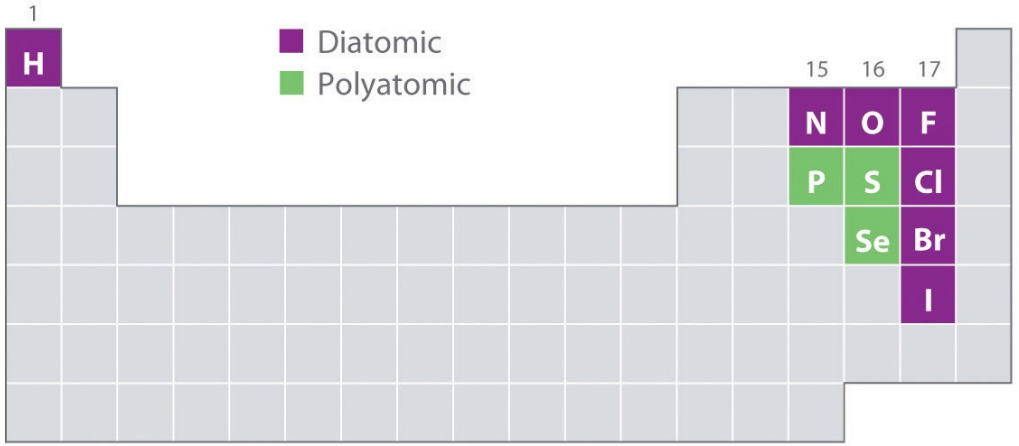
Hydrogen (H_2) | Nitrogen (N_2) | Oxygen (O_2) | Fluorine (F_2) | Chlorine (Cl_2) | Bromine (Br_2) | Iodine (I_2)

(a) Elements that exist as diatomic molecules



Phosphorus (P_4) | Sulfur (S_8)

(b) Elements that exist as polyatomic molecules



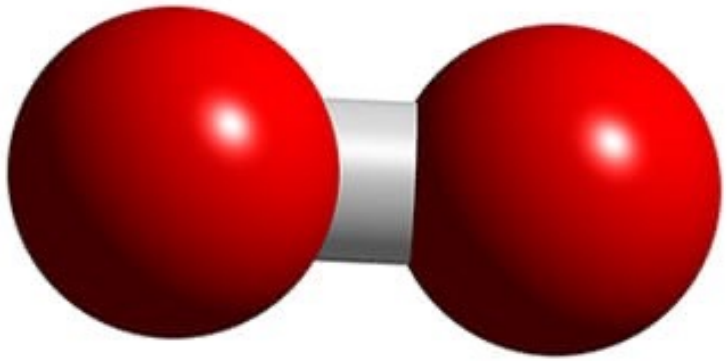
Oxygen

Chemical formula: O_2

Properties: Odourless, colourless gas

Source: During photosynthesis by plants and microbes

Use: Life support, manufacture of stone, glass, steel and metal products



Two oxygen atoms bonded

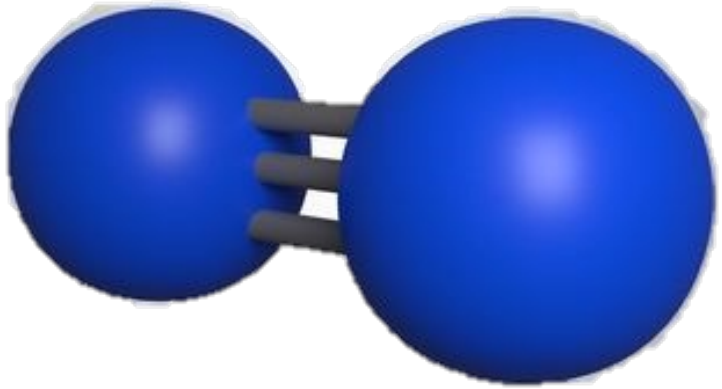
Nitrogen

Chemical formula: N_2

Properties: Odourless, colourless gas and liquid

Source: Combustion of fossil fuels such as coal and oil

Use:
Make fertilisers, nitric acid, nylon, dyes and explosives



Two nitrogen atoms bonded

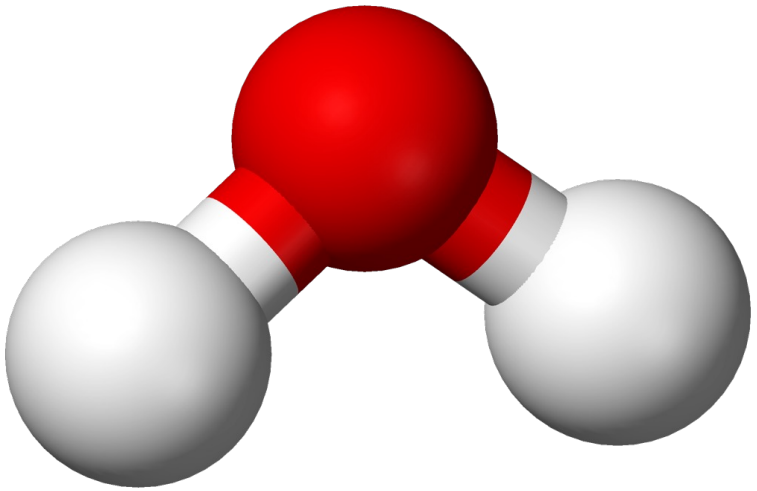
Water

Chemical formula: H_2O

Properties: Odourless, colourless gas

Source: Bodies of water (rivers, lakes, and ocean)

Use:
Bathing, drinking, and cooking



One oxygen atom bonded to two hydrogen atoms

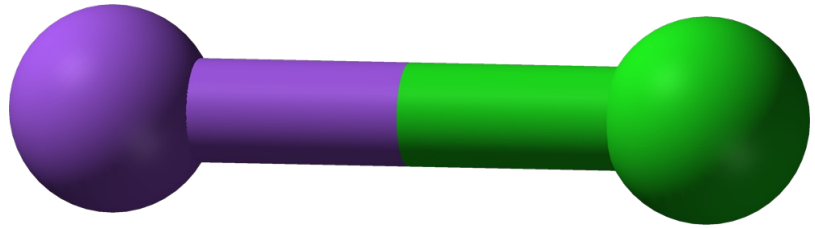
Sodium chloride / Salt

Chemical formula: NaCl

Properties: White, odourless, salty crystals

Source: Seawater

Use: Food preservative and seasoning to enhance flavor.



One sodium atom bonded to one chlorine atom

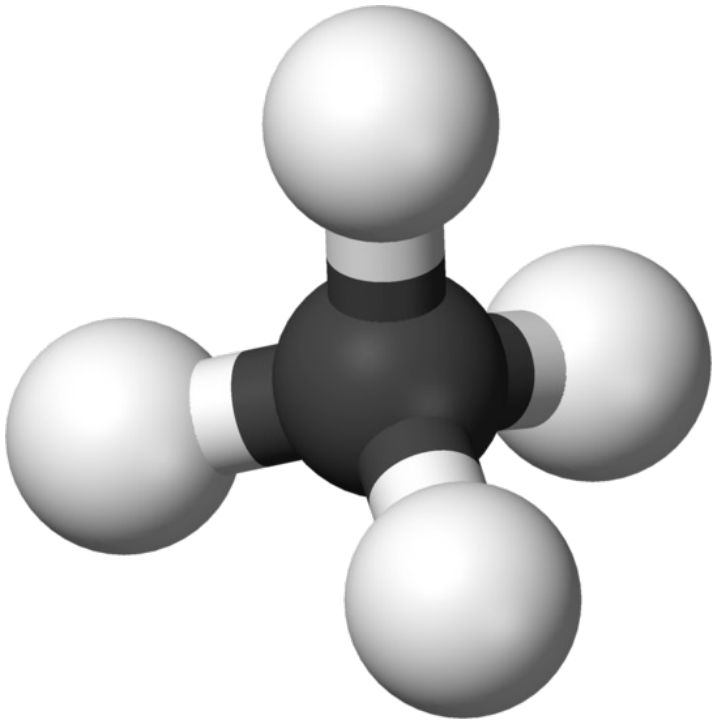
Methane

Chemical formula: CH_4

Properties: Odourless, colourless, flammable gas

Source: Production of coal, natural gas, and oil / Agricultural practices, land use, and decay of organic waste

Use: Fuel,
chemical feedstock



One carbon atom bonded to four hydrogen atoms

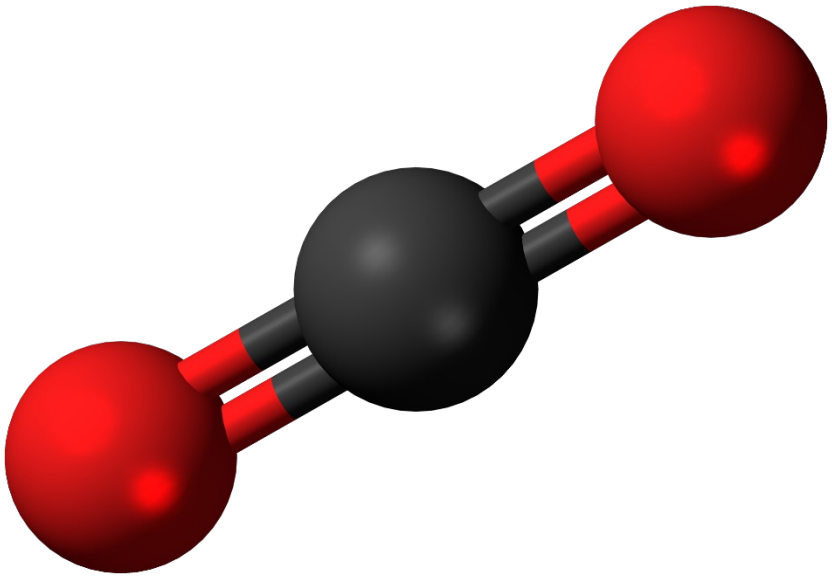
Carbon dioxide

Chemical formula: CO_2

Properties: Odourless, colourless gas

Source: Exhale, burning coal, oil, or natural gas

Use: Fire extinguishers, life jackets



One carbon atom bonded to two oxygen atoms

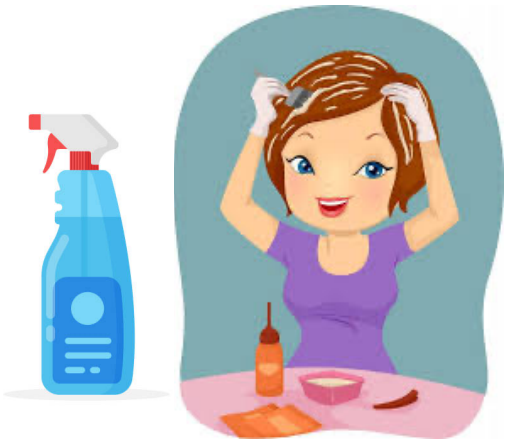
Hydrogen Peroxide

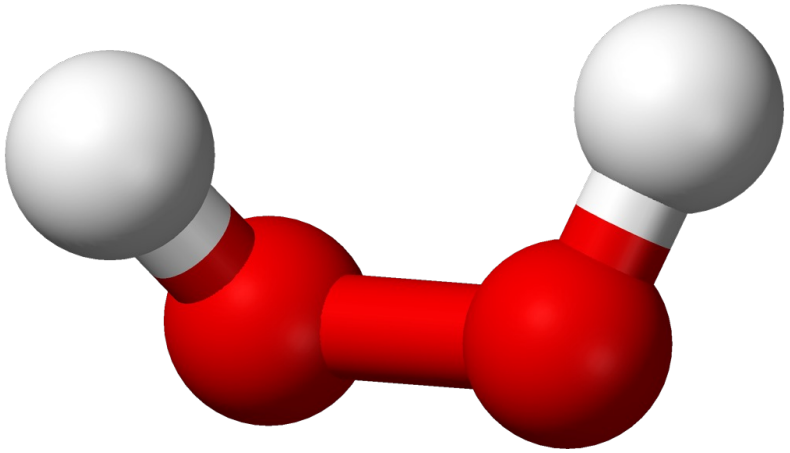
Chemical formula: H_2O_2

Properties: colorless liquid at room temperature with a bitter taste and slightly pungent, irritating odour

Source: Natural, or manufactured

Use: Bleaching agents and disinfectant





Two oxygen atoms bonded with two hydrogen atoms

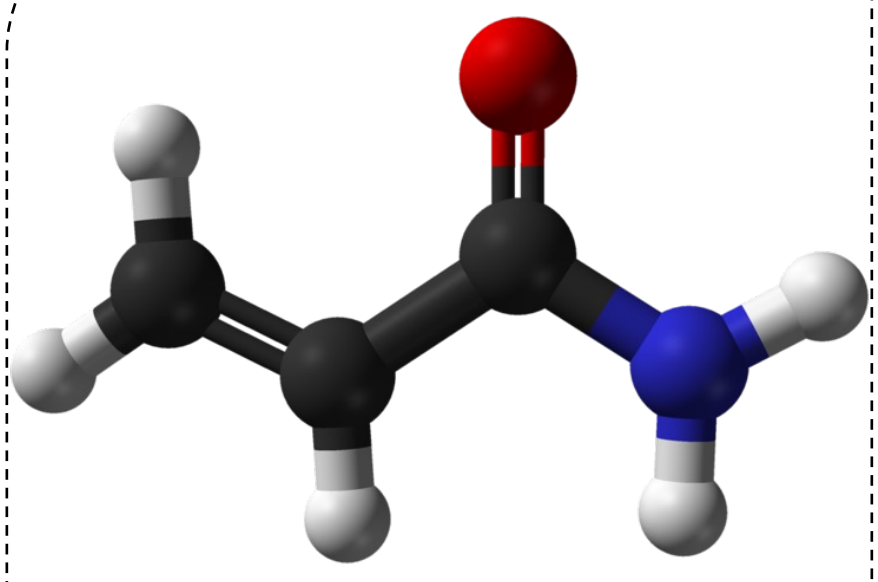
Acrylamide

Chemical formula: C_3H_5NO

Properties: White odorless solid, soluble in water

Source: In foods made from plants, such as potato products, grain products, or coffee.

Use: Manufacture various polymers, especially polyacrylamide, as thickener and flocculating agent



Three carbon atoms bonded with five hydrogen atoms, one oxygen atom and one nitrogen atom

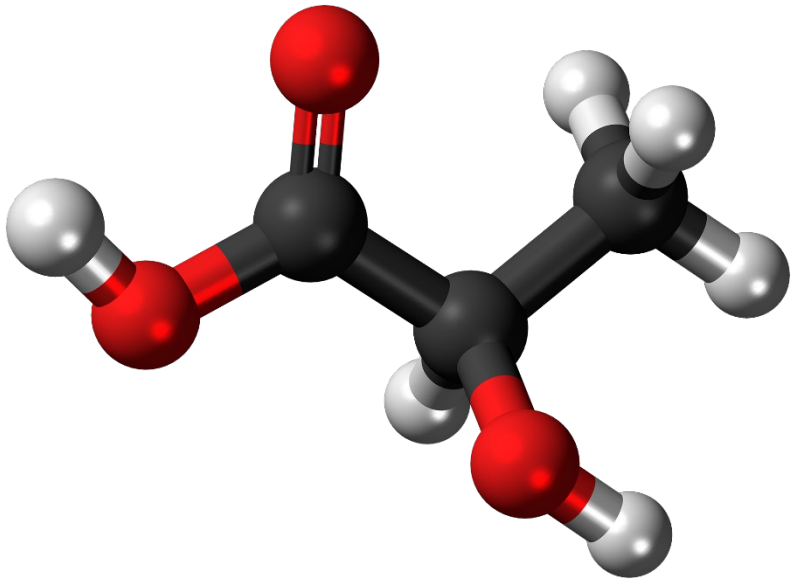
Lactic acid

Chemical formula: $C_3H_6O_3$

Properties: Colorless to yellow odorless syrupy liquid

Source: Fermented food (pickled foods, fermented soy products, salami, yogurt, and more)

Use: Food preservative, curing agent, and flavoring agent



Three carbon atoms bonded with three oxygen atoms and six hydrogen atoms

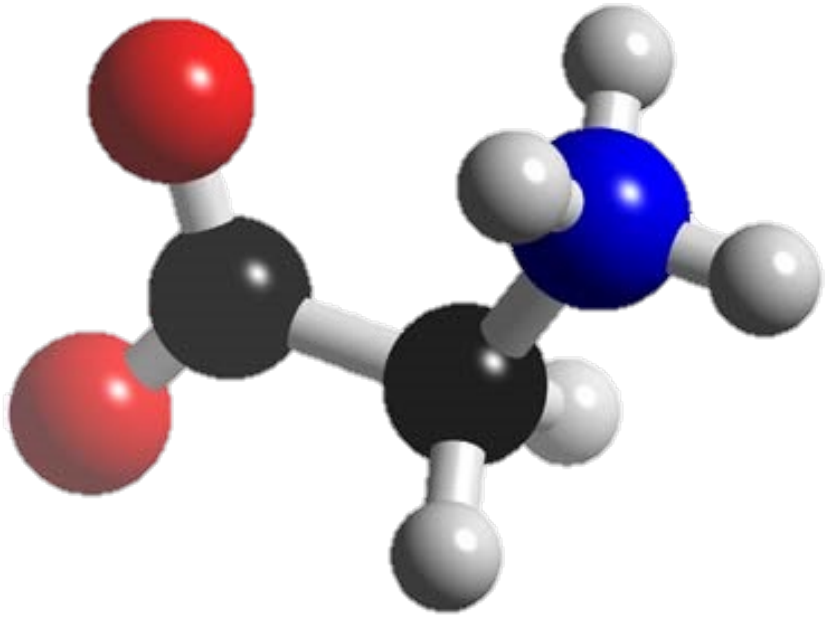
Glycine

Chemical formula: $C_2H_5NO_2$

Properties: Colourless crystalline solid having a sweet taste

Source: Legumes, fish, dairy products, and meat

Use: Transmitting chemical signals in the brain



Two carbon atoms bonded with five hydrogen atoms, one nitrogen atom and two oxygen atoms

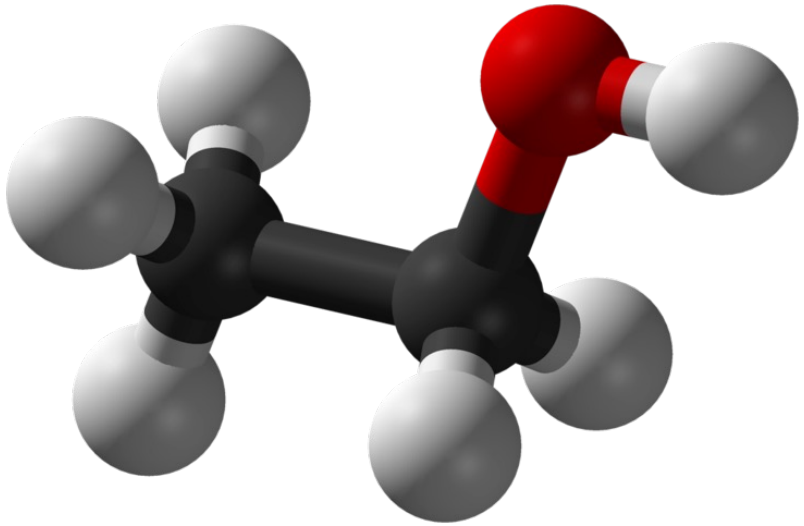
Ethanol

Chemical formula: C_2H_6O

Properties: Clear, colourless liquid with pleasant odour and burning taste

Source: Cellulosic feedstocks, such as corn, crop residues and wood

Use: Solvent, alcoholic drinks, sanitizer



Two carbon atoms bonded with six hydrogen atoms and one oxygen atom

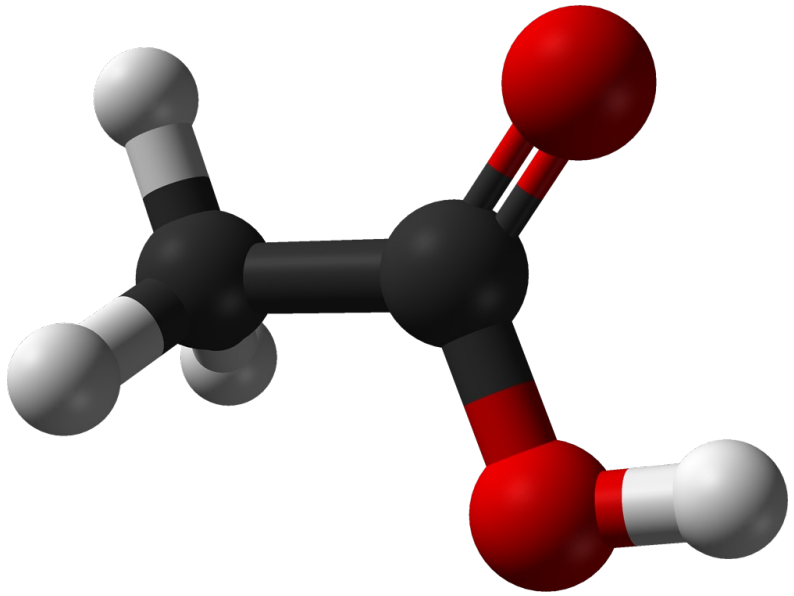
Acetic Acid

Chemical formula: CH_3COOH

Properties: Colorless liquid or crystals with a sour, vinegar-like odor

Source: Vinegar, apples, grapes, pineapple, strawberries, and oranges

Use: Food preservative and food additive, household cleaning products



Two carbon atoms bonded with four hydrogen atoms and two oxygen atoms

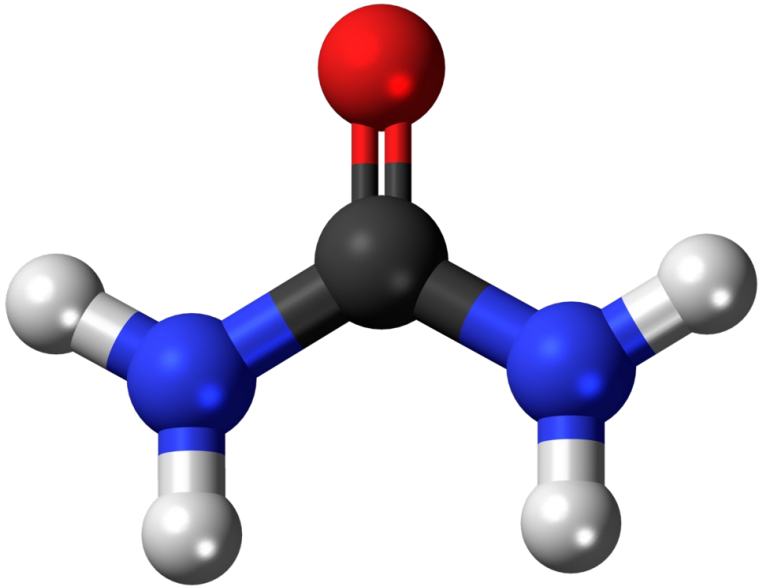
Urea

Chemical formula: CH_4N_2O

Properties: White, almost odourless solid with saline taste

Source: Protein metabolism a mammalian urine

Use: Fertilizer, resins, emollient



One carbon atom bonded with four hydrogen atoms, two nitrogen atoms and one oxygen atom

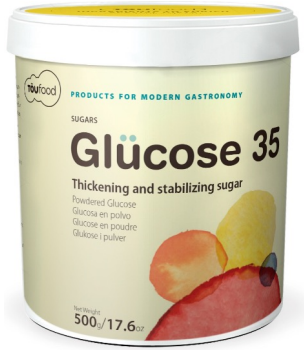
Glucose

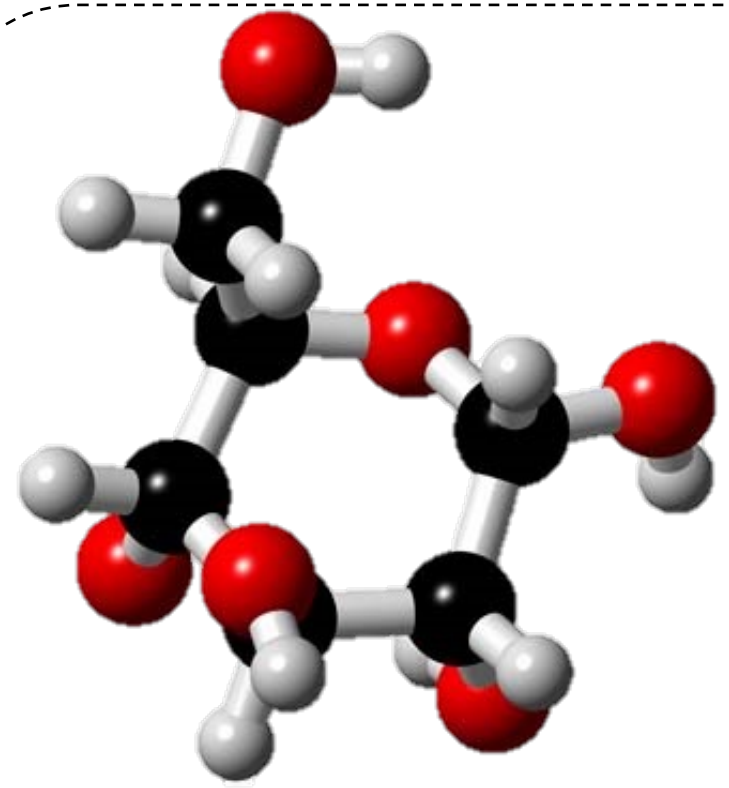
Chemical formula: $C_6H_{12}O_6$

Properties: White crystalline powder, odorless, sweet

Source: Carbohydrates, like bread, potatoes, and fruit.

Use: Respiration (aerobic and anaerobic). It is also converted into starch so that it can be stored for future energy needs.





Six carbon atoms bonded with twelve hydrogen atoms and six oxygen atoms

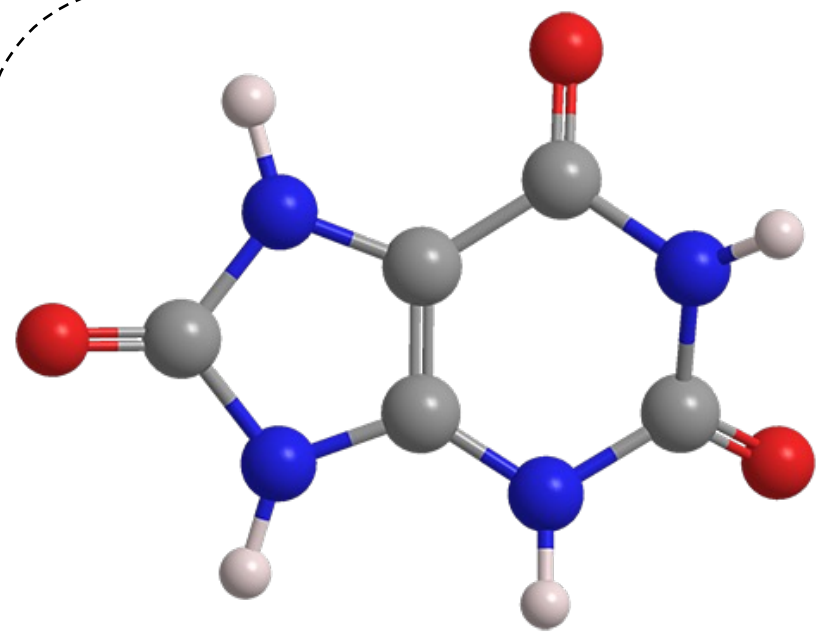
Uric acid

Chemical formula: $C_5H_4N_4O_3$

Properties: White, odourless solid

Source: Normal body waste product, liver, shellfish, alcohol

Use: Pesticide products, skin conditioner



Five carbon atoms bonded with four hydrogen atoms, four nitrogen atoms and three oxygen atoms

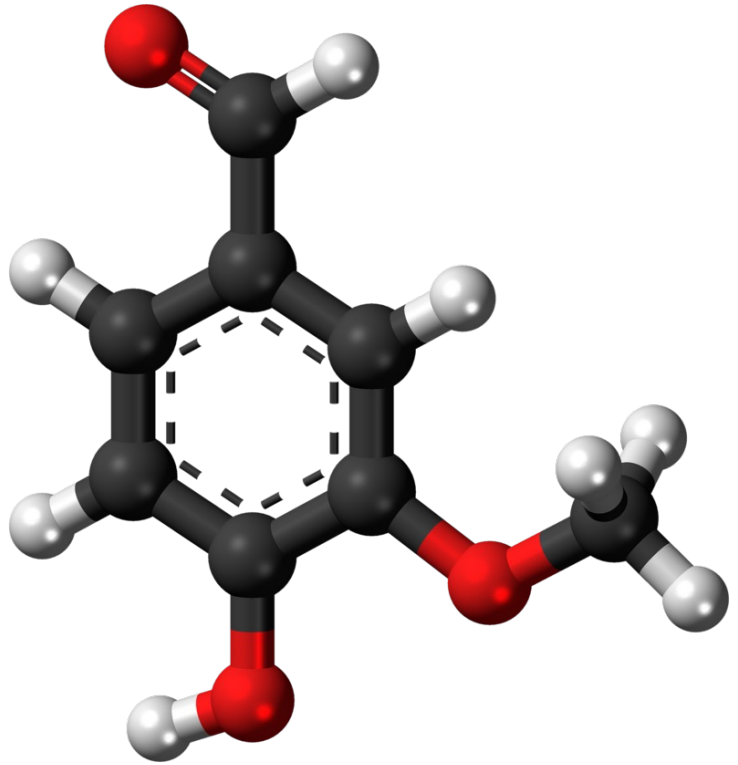
Vanillin

Chemical formula: $C_8H_8O_3$

Properties: White or off-white solid with sweet vanilla odour

Source: Vanilla bean

Use: Flavoring agent and fragrance



Eight carbon atoms bonded with eight hydrogen atoms and three oxygen atoms

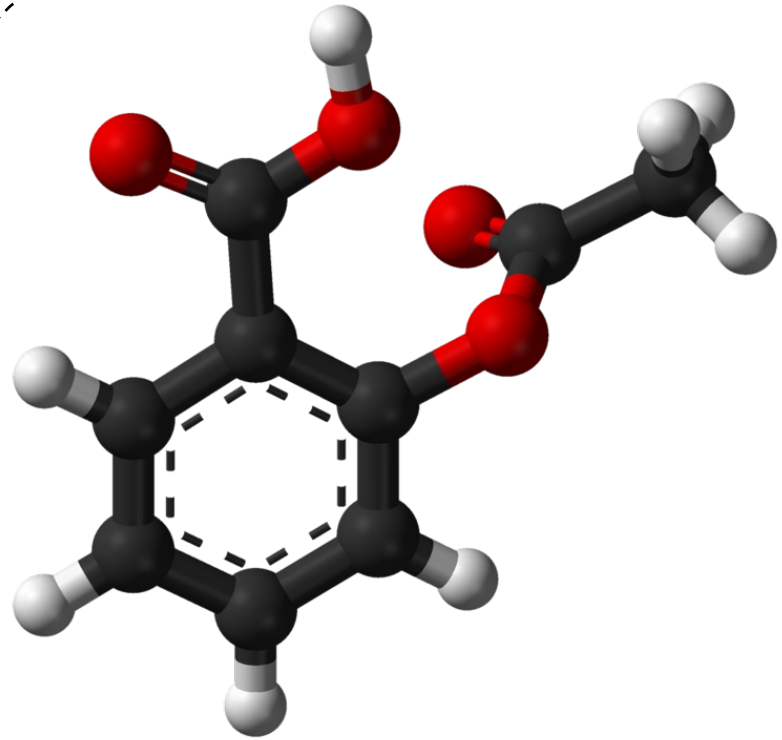
Aspirin

Chemical formula: $C_9H_8O_4$

Properties: Odourless, white powder with slightly bitter taste

Source: Synthetic derivative of the natural substance, salicylic acid

Use: Anti inflammatory, anti-pyretic



Nine carbon atoms bonded with eight hydrogen atoms and four oxygen atoms

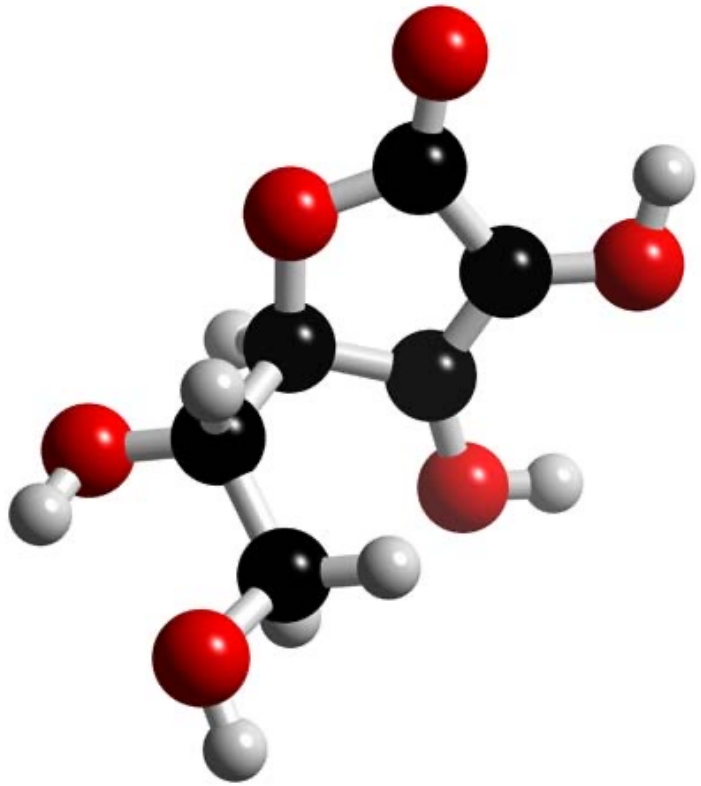
Vitamin C

Chemical formula: $C_6H_8O_6$

Properties: White to very pale yellow powder with sharp acidic taste

Source: Citrus fruits, guava, broccoli, tomato, potato

Use: Dietary supplement, skin lightening agent, antioxidants



Six carbon atoms bonded with eight hydrogen atoms and six oxygen atoms

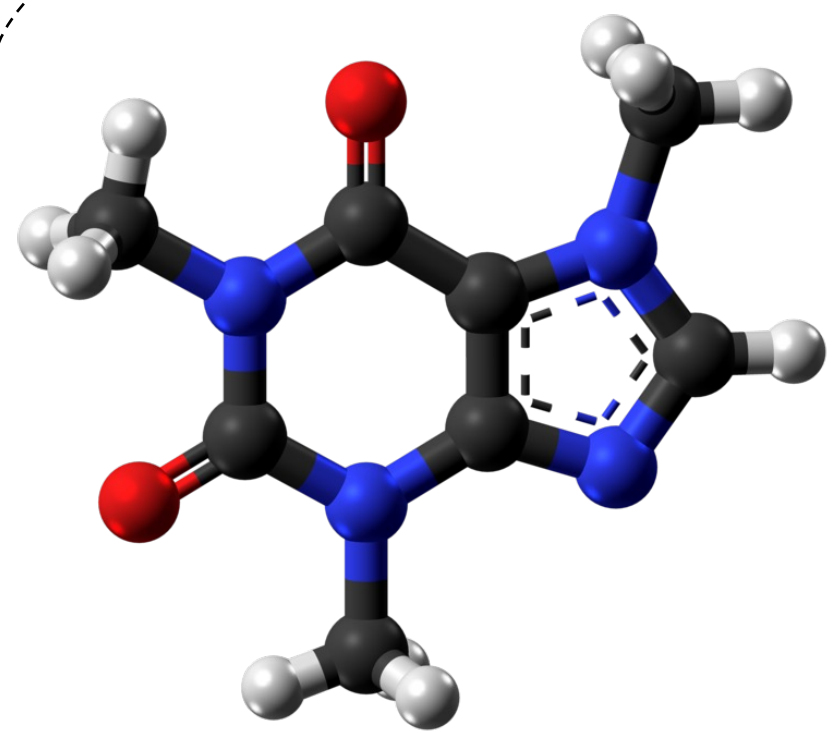
Caffeine

Chemical formula: $C_8H_{10}N_4O_2$

Properties: White odourless powder with bitter taste

Source: Coffee bean, tea leaves, cacao beans

Use: Flavoring, fragrance, cardiac and respiratory stimulants



Eight carbon atoms bonded with ten hydrogen atoms, four nitrogen atoms and two oxygen atoms