

# GENERAL CHEMISTRY 101

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**HOWDY!**

**Dr. Ahmed A. Mohamed**  
**Department of Chemistry**  
**Texas A&M University**

## Contact information

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[amohamed@mail.chem.tamu.edu](mailto:amohamed@mail.chem.tamu.edu)

# CHAPTER 1

## The Foundations of Chemistry

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The rose on the right is in an atmosphere of sulfur dioxide,  $\text{SO}_2$ . Gaseous  $\text{SO}_2$  and aqueous solutions of  $\text{HSO}_3^-$  and  $\text{SO}_3^{2-}$  ions are used as bleaching agents. A similar process is used to bleach wood pulp before it is converted to paper.



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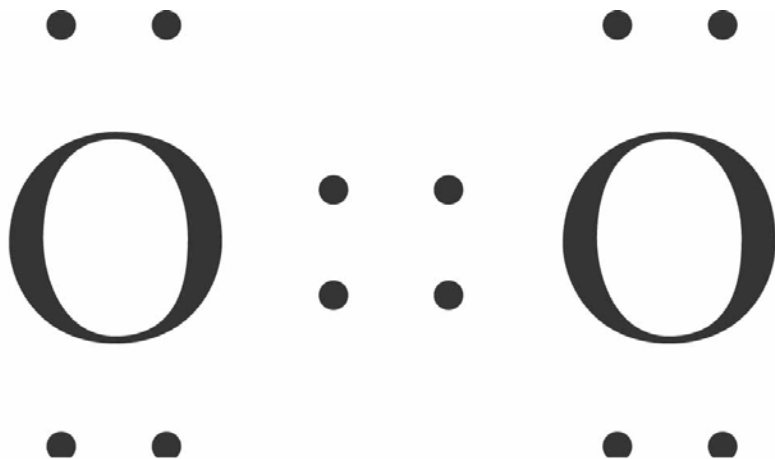
# Why is lemon often added to seafood?

The odor that we associate with fish is due to the presence of amines. That is one reason why lemon is often added to seafood. The citric acid (a weak acid) neutralizes the odor of the amines.

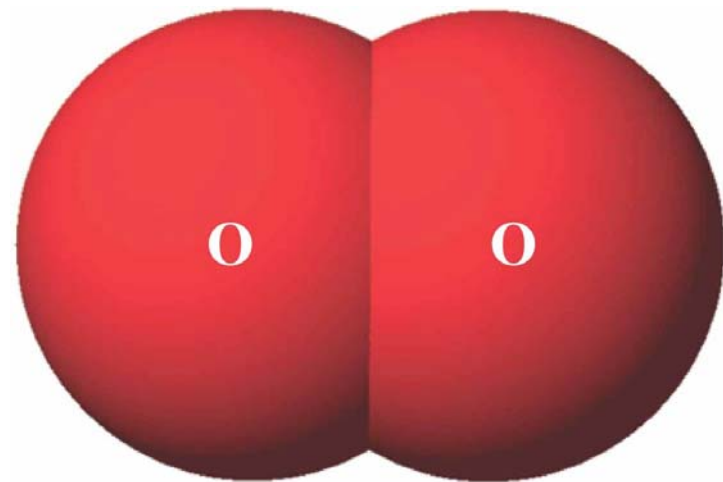


# How do atoms form molecules?

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An O<sub>2</sub> molecule.

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# Fundamental particles of matter

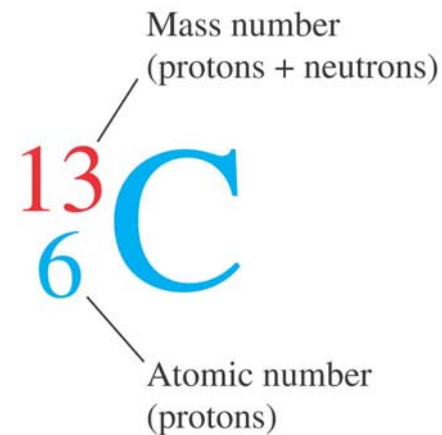
Particle	Mass	Charge (relative scale)
electron ( $e^-$ )	0.00054858 amu	1-
proton ( $p$ or $p^+$ )	1.0073 amu	1+
neutron ( $n$ or $n^0$ )	1.0087 amu	none



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← atomic number

← symbol

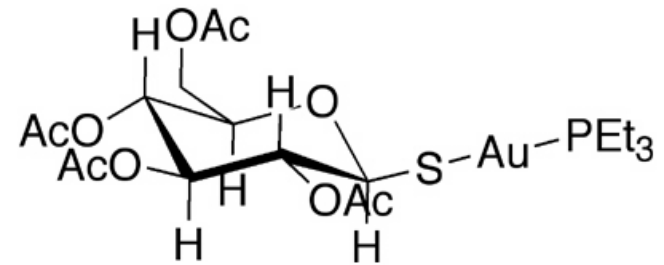


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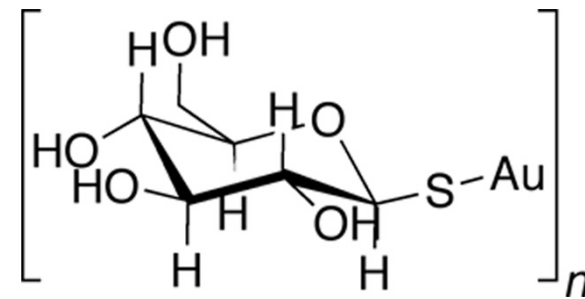
# Treatment of Rheumatoid Arthritis



**Gold**



**Auranofin**



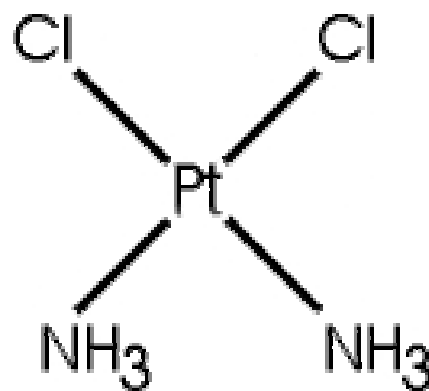
**Solganol**

# Treatment of cancer

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**Platinum**



Cisplatin



# **Chemistry is a new language for you**

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**Chemical vocabulary and understanding can come from many experiences, besides the classroom.**

## *Photosynthesis...Fusion...Heat...Light*

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**“If a student is doing a problem outside on a beautiful day, chemical changes might involve photosynthesis occurring in the plants around her/him providing oxygen for the student to breathe and the fusion reactions in the sun which provide heat and light”**

## *Dissolves...Filtering...Evaporating*

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“A mixture of salt and pepper can be separated by adding water which dissolves only the table salt, sodium chloride, filtering the mixture to collect the pepper, then evaporating the water to recover the salt”

## *Homogenous...Mixture...Compound...Heterogeneous*

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- (a) Gasoline is a homogenous mixture of organic compounds distilled from oil.
- (b) Tap water is a homogeneous liquid mixture, called an aqueous solution, containing water, dissolved salts, and gases such as chlorine and oxygen.
- (c) Calcium carbonate is a compound,  $\text{CaCO}_3$ , consisting of the elements Ca, C and O in the fixed atomic ratio, 1:1:3.
- (d) Toothpaste is a heterogeneous mixture of water, organic and inorganic compounds.

## *Exothermic...Endothermic*

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- (a) Combustion is an exothermic process in which a chemical reaction releases heat.
- (b) The freezing of water is an exothermic process. Heat must be removed from the molecules in the liquid state to cause solidification.
- (c) The melting of ice is an endothermic process. The system requires heat to break the attractive forces that hold solid water together.

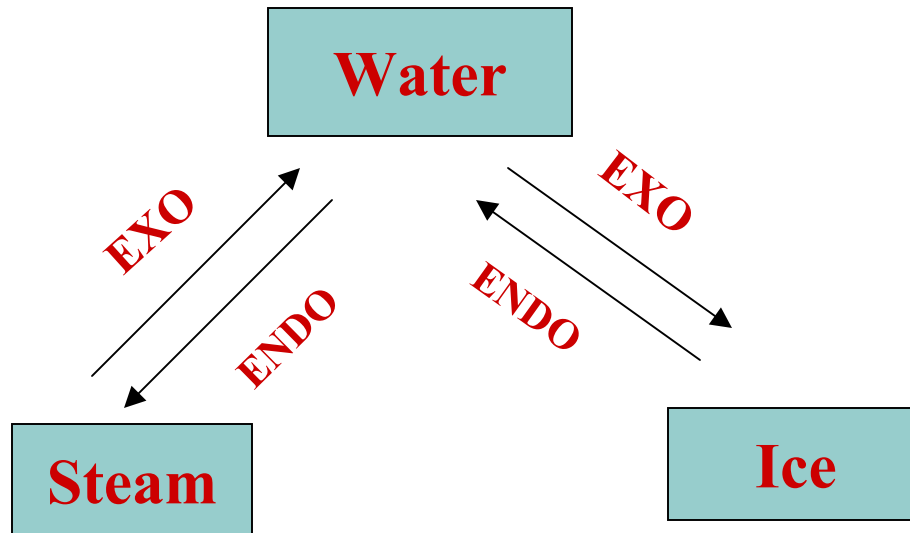
## *Exothermic...Endothermic*

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- (d) The boiling of water is an endothermic process. Molecules of liquid water must absorb energy to break away from the attractive forces that hold liquid water together in order to form gaseous molecules.
- (e) The condensing of steam is an exothermic process. The heat stored in water vapor must be removed for the vapor to liquefy. The condensation process is the opposite of boiling which requires heat.

# In Summary...

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# Take-Home Vocabulary

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- **Chemical change:** A change in which one or more new substances are formed.
- **Physical change:** A change in which a substance changes from one physical state to another, but no substances with different compositions are formed.



# Take-Home Vocabulary

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- **Endothermic:** Describes processes that absorb heat energy.
- **Exothermic:** Describes processes that release heat energy.
- **Energy:** The capacity to do work or transfer heat.

# Take-Home Vocabulary

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**Mixture:** A sample of matter composed of variable amounts of two or more substances, each of which retains its identity and properties.

**Heterogeneous mixture:** A mixture that does not have uniform composition and properties throughout.

**Homogeneous mixture:** A mixture that has uniform composition and properties throughout.

*Chemistry is fun!*