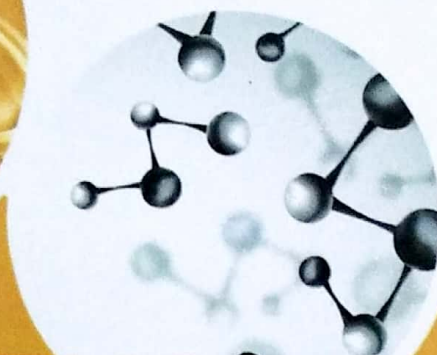


Sri Sathya Sai College For Women, Bhopal

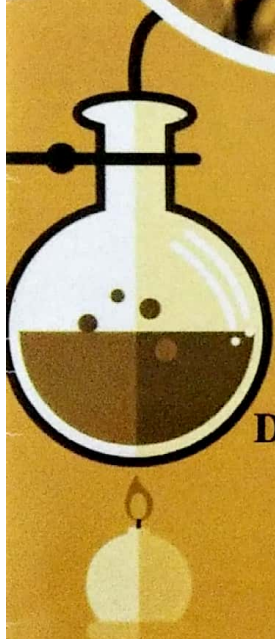


OCTOBER, 2019
Chemistry Newsletter



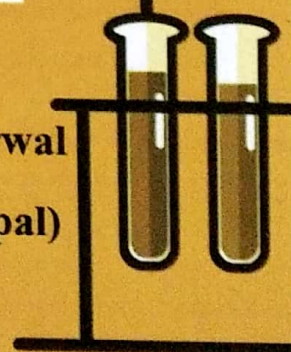
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CHEMSPARK



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Periodic Table of the Elements

The periodic table is organized into groups (vertical columns) and periods (horizontal rows). The elements are color-coded into several categories:

- Alkali metals:** Group 1 (yellow)
- Alkaline earth metals:** Group 2 (grey)
- Lanthanides:** Elements 57-71 (blue)
- Actinides:** Elements 89-103 (red)
- Transition metals:** Groups 3-10 (green)
- Unknown properties:** Elements 104-118 (white)
- Post-transition metals:** Groups 11-16 (light green)
- Metalloids:** Elements 17-18 (purple)
- Other nonmetals:** Elements 19-20 (light blue)
- Halogens:** Group 17 (orange)
- Noble gases:** Group 18 (dark orange)

The table includes the following elements:

- Group 1:** H, Li, Na, K, Rb, Cs, Fr
- Group 2:** Be, Mg, Ca, Sr, Ba, Ra
- Group 3:** Sc, Y, La, Ac
- Group 4:** Ti, Zr, Hf, Ta, Nb, Mo, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Rn
- Group 5:** V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 6:** Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 7:** Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 8:** Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 9:** Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 10:** Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 11:** Cu, Zn, Ga, Ge, As, Se, Br, Kr
- Group 12:** Zn, Ga, Ge, As, Se, Br, Kr
- Group 13:** Al, Ga, In, Tl, Sn, Pb, Bi, Po, At, Rn
- Group 14:** Si, Ge, Sn, Pb, Bi, Po, At, Rn
- Group 15:** P, As, Sb, Bi, Po, At, Rn
- Group 16:** S, Se, Te, Po, At, Rn
- Group 17:** F, Cl, Br, I, At, Rn
- Group 18:** He, Ne, Ar, Kr, Xe, Rn

The table also includes the following elements:

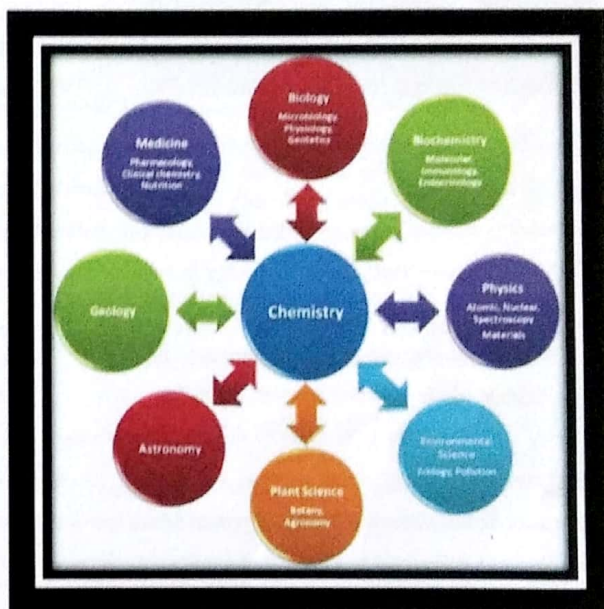
- Group 19:** H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Rn, Fr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr

The table is a comprehensive reference for the periodic table of elements, showing the relationships between different groups and periods.

Chemistry-the central science

Chemistry is often called **the central science** because of its role in connecting the physical sciences, which include chemistry, with the life sciences and applied sciences such as medicine and engineering. The nature of this relationship is one of the main topics in the philosophy of chemistry and in scientometrics. The phrase was popularized by its use in a textbook by Theodore L. Brown and H. Eugene LeMay, titled *Chemistry: The Central Science*, which was first published in 1977, with a thirteenth edition published in 2014.

The central role of chemistry can be seen in the systematic and hierarchical classification of the sciences by Auguste Comte in which each discipline provides a more general framework for the area it precedes (mathematics → astronomy → physics → chemistry → physiology and medicine → social sciences). Balaban and Klein have more recently proposed a diagram showing partial ordering of sciences in which chemistry may be argued is “the central science” since it provides a significant degree of branching. In forming these connections the lower field cannot be fully reduced to the higher ones. It is recognized that the lower fields possess emergent ideas and concepts that do not exist in the higher fields of science.



Thus chemistry is built on an understanding of laws of physics that govern particles such as atoms, protons, neutrons, electrons, thermodynamics, etc. although it has been shown that it has not been “fully ‘reduced’ to quantum mechanics”. Concepts such as the periodicity of the elements and chemical bonds in chemistry are emergent in that they are more than the underlying forces that are defined by physics.

In the same way, biology cannot be fully reduced to chemistry despite the fact that the machinery that is responsible for life is composed of molecules. For instance, the machinery of evolution may be described in terms of chemistry by the understanding that it is a mutation in the order of genetic base pairs in the DNA of an organism. However, chemistry cannot fully describe the process since it does not contain concepts such as natural selection that are responsible for driving evolution. Chemistry is fundamental to biology since it provides a methodology for studying and understanding the molecules that compose cells.

Latest News And Discoveries

1. Nobel Prize in Chemistry 2019: Lithium-ion batteries

Date: October 9, 2019

Source: Nobel Foundation

Summary: The Nobel Prize in Chemistry 2019 is being awarded to John B. Goodenough, M. Stanley Whittingham, and Akira Yoshino "for the development of lithium-ion batteries."



The Nobel Prize in Chemistry 2019 rewards the development of the lithium-ion battery. This lightweight, rechargeable and powerful battery is now used in everything from mobile phones to laptops and electric vehicles. It can also store significant amounts of energy from solar and wind power, making possible a fossil fuel-free society.

2. Eco-friendly electrochemical catalysts using solar cells to harvest energy from the sun

Date: October 3, 2019

Source: Tokyo Institute of Technology

Summary: A research team from Tokyo Institute of Technology (Tokyo Tech) and Kanazawa University develops an eco-friendly device that uses solar energy to catalyze an electrochemical oxidation reaction with high efficiency.

3. Mosquito eye inspires artificial compound lens

Date: September 25, 2019

Source: American Chemical Society

Anyone who's tried to swat a pesky mosquito knows how quickly the insects can evade a hand or fly swatter. The pests' compound eyes, which provide a wide field of view, are largely responsible for these lightning-fast actions. Now, researchers reporting in *ACS Applied Materials & Interfaces* have developed compound lenses inspired by the mosquito eye that could someday find applications in autonomous vehicles, robots or medical devices.

4. Reactor turns greenhouse gas into pure liquid fuel

Lab's 'green' invention reduces carbon dioxide into valuable fuels

Date: September 3, 2019

Source: Rice University

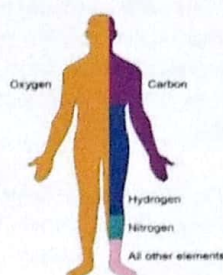
Summary: An electrocatalysis reactor built at Rice University recycles carbon dioxide to produce pure liquid fuel solutions using electricity. The scientists behind the invention hope it will become an efficient and profitable way to reuse the greenhouse gas and keep it out of the atmosphere.



A common greenhouse gas could be repurposed in an efficient and environmentally friendly way with an electrolyzer that uses renewable electricity to produce pure liquid fuels.

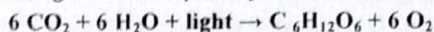
Chemistry in Everyday Life

1. Body Composition Your body is a fascinating place. Carbon and oxygen are the two most essential elements of the body. The other elements which are present in your body are nitrogen, phosphorous, hydrogen, oxygen, calcium, potassium, sulfur, magnesium, etc.



2. Chemistry of Emotions Whenever you are feeling happy, sad, ecstatic, relaxed, or stressed, there are many chemical reactions taking place in your body. It is because of the chemical messengers called neurotransmitters released in the brain that we feel all sorts of emotions.

3. Chemistry in Food Production Plants produce food for themselves through photosynthesis; which is a complex chemical reaction in itself. The chemical reaction that takes place in photosynthesis is the most common and vital chemical reaction. Animals also release energy for carrying out daily activities through similar respiratory chemical reactions.



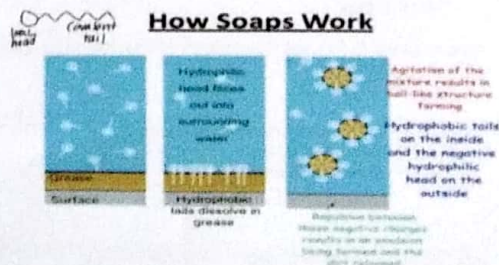
4. Chemistry in Hygiene Right before you consume your food, you make it a point to wash your hands with soap. Isn't it? The cleaning action of soap is based on its ability to act as an emulsifying agent. Soaps are fatty acids salts of sodium or potassium; produced by a chemical reaction called saponification. Soaps interact with the grease or oil molecule, which, in turn, results in a cleaner surface.

5. The Chemistry of an Onion Ever wondered why you shed tears while chopping an onion? This also happens because of the underlying chemistry concepts. As soon as you slice an onion, sulfenic acid is formed from amino acid sulfoxides. Sulfenic acid is responsible for the volatile gas, propanethiol S-oxide, that stimulates the production of tears in the eyes.

6. Chemistry in Baking Who does not like to eat fluffy freshly baked bread? Baking soda is an efficient leavening agent. The addition of baking soda to food items before cooking leads to the production of carbon dioxide (CO_2); which causes the foods to rise. This whole process of rising of baked good is called chemical leavening.

7. Chemistry in Food Preservatives The chemical food preservatives not only prohibit the growth of bacteria, virus, fungi but also hinder the oxidation of fats, which is responsible for making the foods rancid. The most common chemical food preservatives are sodium benzoate, sorbic acid, potassium sorbate, calcium sorbate, sodium sorbate, propionic acid, and the salts of nitrous acid.

8. Chemistry in Digestion The moment you put food in your mouth, a number of different chemical reactions start in your digestive tract. Saliva contains the enzyme amylase, which is responsible for breaking down carbohydrates, the stomach starts producing hydrochloric acid, the liver releases bile and the list of compounds released during digestion goes on.



Facts and Trivia

1. Helium Is 14.5 Times Lighter Than Air. Hence, the reason why helium balloons float.

2. The Average Human Being Is Made up of 60% Water. Newborn babies are actually made up of even more water, about 80%. However, this quickly stabilizes to just over 60% after the first year or so.

3. A Lightning Strike Can Get as Hot as 54,000°F. So think again before you carry a lightning rod around in a thunderstorm.

4. Diamonds Are Called Ice for a Reason. At a chemical level, diamonds are made-up of a unique three dimensional weaved lattice structure that easily transports heat, leaving the surface of the treasured gem feeling cold to the touch.

5. 1 Inch of Water Is Equal to 10 Inches of Water At 30°F. This fact is especially interesting because most materials tend to compress and get smaller in the cold. Water

has so much energy to spare that it does the opposite and expands.

6. Sound Travels 4.3 Times Faster Through Water Than Through Air. Water particles are much closer together than oxygen particles, which means it's much easier for sound to bounce from one particle to the next in water and thus travel faster.

7. Copper Is Naturally Antibacterial. It is an essential nutrient for both humans and bacteria at low doses, but at high doses it kills off bacteria. It is the only element known to behave this way.

8. Before There Was Everything Else, There Was Hydrogen. In the earliest days of the universe the only element to exist was hydrogen. Hydrogen atoms would go on to fuse into helium, which would go on to fuse into carbon, and from there continue to create a variety of more complex elements that make up the universe as we know it today.

Competitive Corner

1. Lysergic acid diethylamide (LSD) is a drug used as a :

- a) Steroid
- b) Sedative

- c) Analgesic
- d) Hallucinogen

2. Which of the following substances undergo 'sublimation' on heating

- 1. Iodine 2. Naphthalene 3. Camphor
- a) 1 and 2
- b) 1 and 3

- c) 2 and 3
- d) All of these

3. Amalgam is a term used for an alloy of a metal with :

- a) Copper
- b) Mercury

- c) Lead
- d) Aluminium

4. Gammexone, D.D.T. and Bleaching powder are important compounds of

- a) Chlorine
- b) Nitrogen

- c) Sulphur
- d) Phosphorus

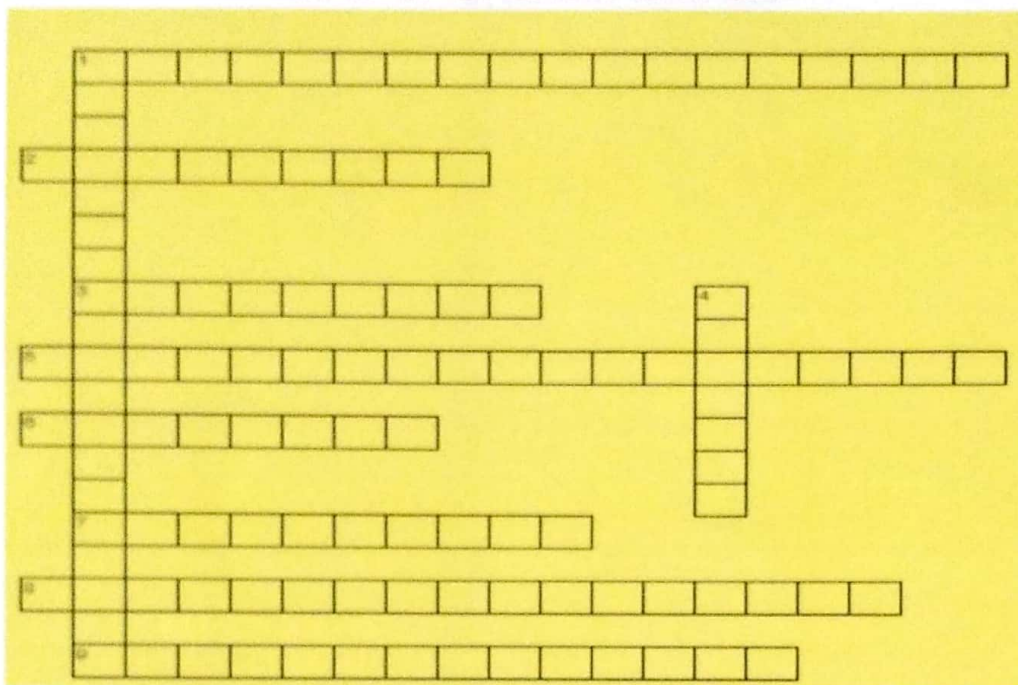
5. L.P.G. is a hydrocarbon consisting of a mixture of:

- a) Methane and Butane
- b) Propane and Butane

- c) Ethane and Propane
- d) Ethane and Butane

ANSWERS: 1. Hallucinogen 2. All of these 3. Mercury 4. Chlorine 5. Propane and Butane

Crossword



Across

- 1 A chemical reaction which gives off heat
- 2 Any process which chemically breaks down or degrades metal
- 3 The chemicals that are there before a chemical reaction
- 5 A chemical reaction in which a compound breaks down into the elements that make it up
- 6 The chemicals that form after a chemical reaction
- 7 A chemical reaction in which a carbon containing compound reacts with oxygen to produce water, carbon dioxide, light, and heat
- 8 a chemical reaction in which 2 or more elements combine to form a compound
- 9 A type of reaction during which an acid and a base produce a salt compound and water

ACROSS:

1.Exothermic

2.Corrosion

3. Reactants

5.Simple Decomposition

6. Products

7. Combustion

8.Simple Composition

9.Neutralization

DOWN: 1. Endothermic 4.Rusting

Down

- 1 A chemical reaction which absorbs heat
- 4 The corrosion of iron

