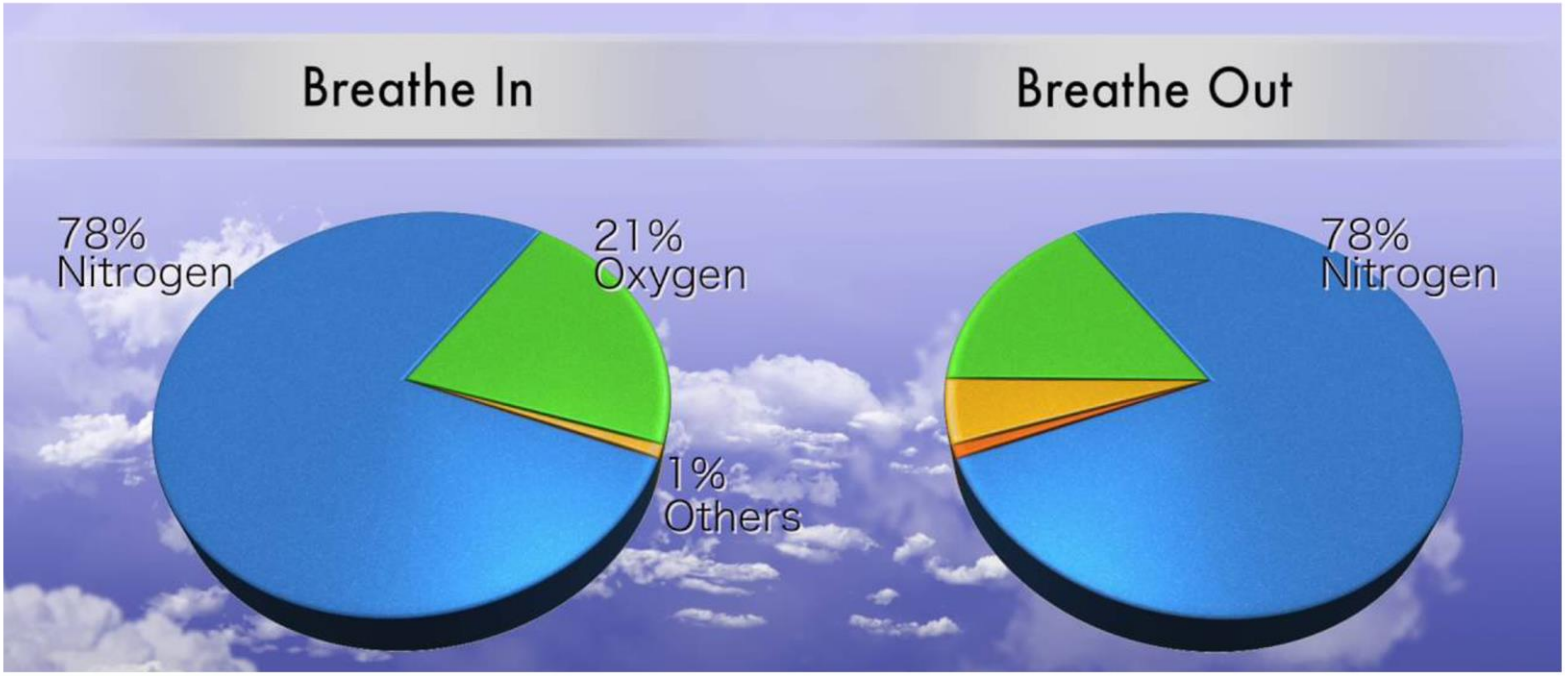
March 2021

Map's

nmcc Chemletter

Department of Chemistry & Research, Nesamony Memorial Christian College
Marthandam, Kanniyakumari District, Tamilnadu, India

Volume 02 • Issue 03 • Pages 4



Inside This Issue

Campus News

Valedictory meeting of Chemistry Association on 31.03.2021

Electrum - Green Gold

Electrum is a naturally occurring alloy of Gold and Silver with a small amount of other metals. The man-made alloy of Gold and Silver is similar to that of Electrum and is called Green Gold.

History of Electrum:

As a natural metal, electrum was obtained and used by early man. Electrum was used to make the earliest metal coins. Egyptians used the metal to coat important structures. Ancient drinking vessels are made from electrum. The Modern Nobel Prize Medal consists of Green Gold (synthesized electrum) plated with Gold.

Appearance & Composition:

The word Electrum has also been applied to the alloy called German Silver although this is an alloy that is Silver in colour and not composition. Modern Green Gold consisting of gold and silver actually appear Yellowish Green. Alloying with Copper deepens the colour of the metal. German Silver typically consists of 60% Copper, 20% Nickel and 20% Zinc. Natural Electrum ranges in colour from Pale gold to Bright gold depending on the amount of the element of Gold present in the Alloy. Brassy coloured electrum contains a higher amount of Copper.

Properties & Uses:

The properties of Electrum depends on the metals in the alloy and their percentage. Generally, Electrum has a high reflectivity and is an excellent conductor of Heat and electricity. It is malleable, ductile and corrosion resistant. Electrum has been used as currency to make Jewelry and ornaments, for drinking vessels, exterior coating for pyramids. Electrum is harder and more durable than pure Gold. Thus, Electrum was a popular and valued precious metal.

Stephy John J
PSCH203273, I M.Sc. Chemistry

Alumni's Space

My name is Syama M S. I was a student (PG Chemistry) of the renowned college NMCC Marthandam in the year 2012 to 2014. I also worked as H.Sc. teacher in MMRHS School, Karamana. Talking about my college life, I had enjoyed my college life to the fullest and experienced best college days of my life.

My college life was a masterful mixture of delight, pleasure, increased responsibility and hard work. I was lucky to get an opportunity to study in this college especially in the Chemistry department. Well and systematically planned curriculum helped us to study well, a dedicated and diligent panel of mentors taught us very well followed by an integrative learning methods. They were very friendly and could seek any help related to academics any time. In the practical sessions also I learned new things and developed new skills, it helped me in my professional life. I could proudly say that, I was one of the students in the Chemistry department. With immense pleasure I would like to give bunch of thanks to our lovable mentors Niveditha madam, Ginil sir, Selvin sir, Femitha madam, Bella madam and Jeba Jeevitha madam.

Mrs. Syama M. S.
M.Sc. Food Science and Biotechnology with Advanced Practice.
School of Health and Life Science.
Teesside University, Middlesbrough,
United Kingdom.

HIDEKI SHIRAKAWA1936-1999

MCQs

1. The total number of electrons present in 18 mL of water (density of water is 1 gmL^{-1}) is
   a) $2.023x10^{23}$ b) $2.023x10^{24}$ c) $2.023x10^{25}$ d) $2.023x10^{26}$

2. A bubble of gas released at the bottom of a lake increases to eight times, its original volume when it reaches the surface. Assuming that atmospheric pressure is equivalent to the pressure exerted by a column of water 10 m high, what is the depth of the lake?
   a) 90 m b) 10 m c) 70 m d) 80 m

3. Many elements have non-integral atomic masses because
   a) Their isotopes have same number of neutrons
   b) Their isotopes have non-integral masses
   c) They exists as isotopes
   d) Their constituent neutrons, protons and electrons combine to give fractional masses.

4. The d-orbital involved in sp^3d hybridisation is
   a) dxy b) dzx c) dz_2 d) $dx_2 - y_2$

5. When same amount of zinc is treated separately with excess of sulphuric acid and excess of sodium hydroxide the ratio of volumes of hydrogen evolved is
   a) 1:1 b) 1:2 c) 2:1 d) 9:4

6. An ideal gas expands in volume from $10^{-3}m^3$ to 10^{-2} m^3 at 300 K against a constant pressure of 105 Nm^{-2}. The work done is
   a) 900 kJ b) -900 kJ c) 270 kJ d) -900 J

7. 2.1 g of Fe combine with S evolving 3.77 kJ. The heat of formation of FeS in kJ/mol is
   a) -1.79 b) 100.5 c) -3.77 d) None of these

8. Sea water is found to contain 5.85% NaCl and 9.5% $MgCl_2$ by weight of solution. Calculate its normal boiling point assuming 70% ionization for NaCl and 50% ionization of $MgCl_2$ [Kb (H_2O) = 0.51 kg mol-1 K]
   a) 101.4°C b) 102.29°C c) 103.27°C d) 99.46°C

9. The pK_w of a neutral solution in 50°C is 13.36, what would be the pH of the solution at this temperature?
   a) 7.63 b) 7.00 c) 6.68 d) 7.96

10. The pH of a 10^{-9} M solution of HCl in water is
    a) 8 b) -8 c) between 7 & 8 d) between 6 & 7

11. In ideal gas heat engine operates in Carnot cycle between 227°C and 127°C. it absorbs 6 x 10^4 cal of heat at high temperature. Amount of heat converted to work is
    a) 1.2 x 10^4 cal b) 4.8 x 10^4 cal
    c) 6 x 10^4 cal d) 2.4 x 10^4 cal

12. The equivalent weight of $KMnO_4$ in an acidic, a neutral and an alkaline medium respectively are (molecular weight of $KMnO_4$ = 158)
    a) 31.60, 79, 158 b) 31.60, 52.67, 79
    c) 31.60, 52.67, 158 d) 52.67, 158, 31.60

13. How many faradays are required to reduce 1 mol of BrO^{3-} to Br^- ?
    a) 3 b) 5 c) 6 d) 4

14. Half-life of a hypothetical reaction is found to be inversely proportional to the cube of initial concentration. The order of reaction is
a) 4 b) 3 c) 5 d) 2

15. Soaking of water by a sponge is an example of
a) simple adsorption b) physical adsorption
c) chemisorption d) absorption

16. The spontaneous outcome of internal liquid from gels is called
a) synersis b) thixotrophy c) swelling d) None of these

17. The highest electrical conductivity from the following aqueous solution is of
a) 0.1 M difluoroacetic acid b) 0.1 M fluoroacetic acid
c) 0.1 M chloroacetic acid d) 0.1 M acetic acid

18. Which pair of elements has same chemical properties?
a) 13, 22 b) 3, 11 c) 4, 22 d) 2, 4

19. Which of the following fluxes is used to remove acidic impurities in metallurgical process?
a) Silica b) Lime stone
c) Sodium chloride d) Sodium carbonate

20. The ionization of hydrogen atom gives
a) hydride ion b) hydronium ion c) proton d) hydroxyl ion

21. When CO is passed over solid NaOH heated to 200°C, it forms
a) Na_2CO_3 b) H_2CO_3 c) HCOONa d) all of these

22. Identify the oxide which is amphoteric in nature.
a) CO_2 b) SiO_2 c) SnO_2 d) CaO

23. Which of the following compounds is not coloured?
a) Na_2CuCl_4 b) Na_2CdCl_4 c) $FeSO_4$ d) VI_3

24. IUPAC name of $[Pt(NH_3)_2Cl(NO_2)]$ is
a) platinum diamminechloronitrite
b) chloronitrito-N-ammineplatinum(II)
c) diamminechloridonitrito-N-platinum(II)
d) diamminechloronitrito-N-platinate(II)

25. Which is the poorest reducing agent?
a) atomic hydrogen b) Nascent hydrogen
c) Dihydrogen d) all have same strength

Student's Corner

Osmosis: Osmosis is the movement of solvent particles across a semipermeable membrane from a dilute solution into a concentrated solution. The solvent moves to dilute the concentrated solution and equalize the concentration on both sides of the membrane.

Examples include red blood cells swelling up when exposed to freshwater and plant root hairs taking up water. To see an easy demonstration of osmosis, soak gummy candies in water. The gel of the candies acts as a semipermeable membrane.

Diffusion: Diffusion is the movement of particles from an area of higher concentration to lower concentration. The overall effect is to equalize concentration throughout the medium

Examples of diffusion include the scent of perfume filling a whole room and the movement of small molecules across a cell membrane. One of the simplest demonstrations of diffusion is adding a drop of food coloring to water. Although other transport processes do occur, diffusion is the key player.

contd.....

Scientist & Discovery

HIDEKI SHIRAKAWA1936-1999

He was pioneering the conducting polymers while polymers are believed to be inert material.

He was born in August 1936 in Tokyo . His father Hatsutavou was a medical doctor . During his school education he was interested in insects, plants and making radio. Later he became a polymer scientist. He joined Tokyo Institute of Technology in 1957 and received the degree of Doctor of Engineering in 1966. The discovery of doping effect of bromine on polyacetylene , resulted in 10 million times higher conductivity than poly acetylene. He continued his work on polyacetylene films, which lead to share nobel prize in 1966. He was the professor of material science 1982 at the Tokyo institute of technology. He received many awards such as society of polymer science in 1982, award of advancement in polymer science in 1999 and award of person of cultural merit in 2000.

Dr. N. T. Niveditha
Head & Assoc. Professor of Chemistry, NMCC

..... contd

Similarities:

Both osmosis and diffusion equalize the concentration of two solutions.

Both diffusion and osmosis are passive transport processes, which means they do not require any input of extra energy to occur. In both diffusion and osmosis, particles move from an area of higher concentration to one of lower concentration.

Dissimilarities:

Diffusion can occur in any mixture, including one that includes a semipermeable membrane, while osmosis always occurs across a semipermeable membrane.

When people discuss osmosis in biology, it always refers to the movement of water. In chemistry, it's possible for other solvents to be involved. In biology, this is a difference between the two processes.

One big difference between osmosis and diffusion is that both solvent and solute particles are free to move in diffusion, but in osmosis, only the solvent molecules (water molecules) cross the membrane.

Angelin Jacinth.N
PSCH203255, I M.Sc. Chemistry

Answers - February 2021 Issue

1) c	2) c	3) a	4) d	5) a
6) b	7) d	8) c	9) c	10) a
11) b	12) d	13) a	14) d	15) b
16) c	17) a	18) c	19) d	20) b
21) a	22) d	23) c	24) c	25) d

Staff Corner

Have A Deep Breathe

The air we breathe is a mixture of many different substances, in which nitrogen and oxygen are dominate. Every breathe we inhale consists of about 21% oxygen (O_2) and 78% nitrogen (N_2). Both of them are diatomic molecules, similar in size but very different behaviour and uses in the living system. Hemoglobin, a large iron-containing red molecule in our blood, captures oxygen from the air we inhale and transports it to all the cells, where it reacts in the highly controlled oxidative processes of metabolism. The iron ion in haemoglobin binds oxygen and ignores nitrogen, Nitrogen is not reactive in our bodies. Nitrogen is the bulk of what we inhale, and it is exhaled unchanged. If carbon monoxide (CO), which is very similar in the size of O_2 and N_2, is present in the air we breathe at a level of about 1.2%, it can cause immediate unconsciousness and death in 1 to 3 minutes. Nitric oxide (NO) is another molecule similar in size to O_2, N_2 and CO. It has both beneficial and lethal effects on the body. Small quantities of nitric oxide that are essential for life are produced in the body in a highly controlled series of reactions. If we inhale nitric oxide, it is extremely dangerous to life.

Dr. S. Ginil Mon
Assistant Professor of Chemistry, NMCC

To submit this quiz online
Scan the QR Code
Or
Use the Link Below

https://forms.gle/91s2jE1TzvT85GhHA

The Publishers

All issues regarding the newsletter, copyright and publication of similar editions in any subject/region can be entertained through:

The Editor - Newsletters
Mizpah Academic Publications
MAP International
mapmizpub@gmail.com

Student's Corner

Computer Aided Drug Design (CADD)

The most fundamental goal in drug design is to predict whether a given molecule will bind to a target and if so how strongly. Molecular mechanics or molecular dynamics is most often used to estimate the strength of the intermolecular interaction between the small molecule and its biological target. These methods are also used to predict the conformation of the conformation of the small molecule and to model conformational changes in the target that may occur when the small molecule binds to it.

Molecular mechanics methods may also be used to provide semi-quantitative prediction of the binding affinity. Also, knowledge-based scoring function may be used to provide binding affinity estimates. These methods use linear regression, machine learning, or other statistical techniques to derive predictive binding affinity equations by fitting experimental affinities to computationally derived interaction energies between the small molecule and the target. Drug design with the help of computers may be used at any of the following stages of drug discovery-

- Hit identification using virtual screening .
- Hit to lead optimization of affinity and selectivity.
- Lead optimization of other pharmaceutical properties while maintaining affinity.

In order, to overcome the insufficient prediction of binding affinity calculated by scoring functions, the protein-ligand interaction and compound 3D structure cent information are used for analysis. Drug designing is the creative research process of finding novel medications based on the knowledge of the biological target such as Protein, DNA, RNA metabolites etc. Primarily, there are seven classes of therapeutic targets namely normal receptors, nuclear receptor, ion channels, enzymes, hormones, cofactors and nucleic acids. The drug is most usually an organic small molecule fulfilling all the pharmacophore requirements, which activates or inhibits the function of a biomolecule such as a protein accountable for the disease which in turn results in therapeutic benefit of a patient.

There are two types of drug design-

1. Structure Based Drug Design: Structure-based drug design relies on knowledge of the 3D structure of the biological target obtained though methods such as X-ray crystallography or NMR spectroscopy. If an experimental structure of a target is not available it may be possible to create a homology Hebel of the target based on the experimental structure of a related protein. Using the Structure of the biological target, candidate drugs that are predicted to bind with high affinity and selectivity to the target may be designed using interactive graphics and the intuition of a medicinal chemist.

2. Ligand Based Drug Design: Ligand-based drug design or indirect drug design relies on knowledge of other molecules that bind to the biological target of interest. The other molecules may be used to derive a pharmacophore model that defines the minimum necessary structural characteristics that a In other words, a model of the molecule must possess in order to bind to the target. biological target may be built based on the knowledge of what binds to it and this model in turn may be used to design new molecular entities that interact with the target. Alternatively, a Quantitative Structure Activity Relationship (QSAR) in which a correlation between calculated properties of molecules and their experimentally determined biological activity, may be derived. These QSAR relationships in turn used to predict the activity of new analogs.

Ardra Augustine
II M.Sc. Chemistry

Instructions

Kindly use the link given to submit this quiz online on or before 30th of May, 2021

Regular participants can enter the yearly quiz fest which will have participants from all regions. Winners will move forward to compete for Universal Trophies organized by the MAP International.

The Publisher's decision will be final.

The Editorial Board

The Editorial Board

All issues regarding the contents of this newsletter can be entertained through: The Department of Chemistry & Research, Nesamony Memorial Christian College, Marthandam - 629 165, Kanniyakumari District, Tamilnadu, India

Dr. S. Ginil Mon (therocksgm@yahoo.com)