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NMCC Chemletter

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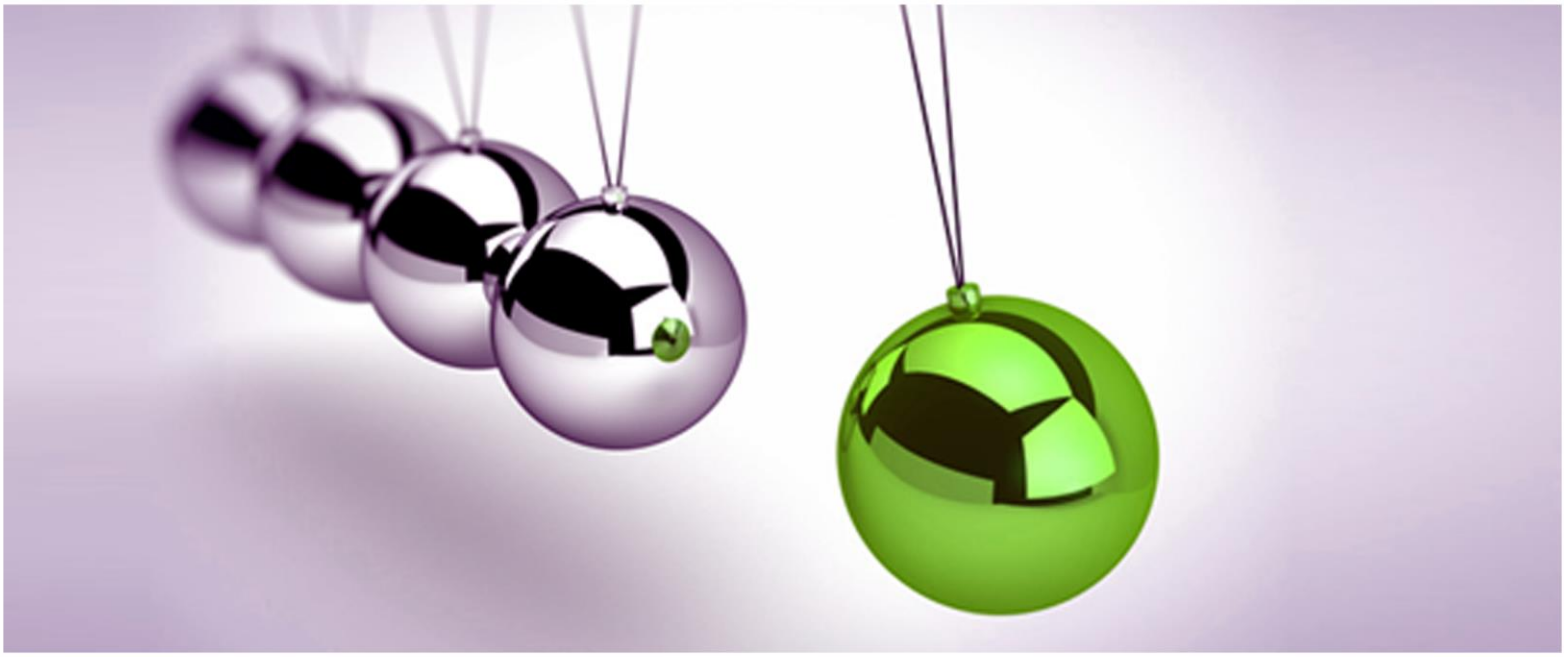

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Class Representatives

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Newton – A Prophet

The equations proposed by Newton were first mathematical expressions of mechanics. Mechanics is the study of bodies in motion. The limitation of Newtonian equations is that they change their forms in various coordinate systems. They are suitable only for Cartesian coordinate system in which a point in space is defined by three distances in three mutually perpendicular axes from the origin. F=ma is the mathematical expression of Newton's second law of motion, where 'a' is acceleration or displacement doubly differentiated with respect to time. To solve the differential equation, it has to be integrated twice, which generates two arbitrary constants say C1 and C2. The prophetic utterance of Newton is that the exact future motion of any object can be predicted with utmost accuracy if the two constants are known.

The word state in classical mechanics is a specification of the position and velocity of each particle of the system at some instant of time, plus specification of forces acting on the particles. According to Newton's second law, if the state of the system is well known at any instant of time, its future state and future motions can be exactly determined. As the size of the particle goes on decreasing the definitive solution becomes probabilistic solution. The impressive success of Newton's law in explaining planetary motions led many philosophers to use his law as an argument for philosophical determinism. The mathematician and astronomer Laplace assumed that the universe consisted of nothing but particles that obeyed Newton's laws. Even we are particles in this universe. If we could compare our mass and volume with the total mass and volume of the universe, there comes the realization that we are all minute particles sticking on the surface of a little bigger particle called earth. If we can know exactly our position that we occupy at present and our intension that drives us in the current situation, we can easily determine our position in future. Our eternal destination is determined by our own understanding about our present and discernment and judgment that we have on it. Open minded self awareness is all that is needed to have a peaceful and blissful final destination.

Dr. S. Ginil Mon

Assistant Professor of Chemistry, NMCC

International Science Day - 10th Nov

International Student's Day - 17th Nov

Alumni's Space

I am proud to be Nesamony Memorial Christian College Chemistry Alumnus and Bishop Ghanadhasan Gold medalist in the year 1987-1990 of BSc Chemistry Batch. Presently, Founder Director of a Organic Agritech firm named M/s. Green Care Biosciences in Hyderabad manufacturing Organic fertilisers, Aqua feed supplements and Ayurvedic health care products. Recently We, Green Care Biosciences got an appreciation award for the best top 10 Agritech start-ups 2020 companies in India by a leading business magazine, named CEO Insights.

In this moment I thank Almighty Lord for this opportunity and all my faculties & classmates who all guided me; without them this success will not be possible.

I remember in my college days, I always dwelt inside the box and never came out of it. In the later days the world showed me that if you are within the box you will be within the system. But to make a change we need to come out of the box. Then only we can understand the subject, knowledge and change the life of people. So my dear friends, I encourage everyone to learn with understandings with outmost thinking to achieve and serve for the mankind.

Dr. C. J. BENSON
Director-Operations
Green Care Biosciences,
Hyderabad.
(www.greencarebiosciences.com)

Staff Corner

GUILIO NATTA

The stereo regularity of the macromolecules have been synthesised in the presence of a catalyst after his name. Guilio Natta was born in the old city of Imperia (Italy), on 26th February 1903. He was graduated in Chemical Engineering at the Polytechnic of Milan in 1924 and passed the examinations for teaching career in 1927. He was appointed as the Professor in the Institute of General Chemistry of the same University and later he became the Director of that Institute.

Prof. Natta started his career with a study of solids by X-Rays and Electron Diffraction. He tried the same instrumentation for the study of Catalysis, Kinetics and the Structure of Organic polymers.

In 1953 he extended the results of Zeigler on Organometallic catalysts to the synthesis of stereospecific polymers. When Natta explained his work to his wife Rosita, expert in languages used greek roots in coin the words to describe stereochemistry of polymers as isotactic, atactic and syndiotactic.

Continued in Page 4 .....

MCQs

1. One mole of any gas at N.T.P. Volumes 22.4 L. This is based on
   a) Laws of constant proportions b) Avogadro's hypothesis
   c) Dalton's atomic theory d) law of gaseous volumes

2. The number of formula units in unit cells of Pt (fcc), ZnS (Zinc blende) and MgO (rock salt) respectively are
   a) 4,4,4 b) 2,3,4 c) 3,4,4 d) 4,1,3

3. Cyanohydrin of which among the following substance gives lactic acid?
   a) CH_3COCH_3 b) CH_3CH_2CHO c) HCHO d) CH_3CHO

4. The common minerals of phosphorous are
   a) colemanite and hydroxyapatite b) borax and fluorapatite
   c) colemanite abd fluorapatite d) hydroxyapatite and fluorapatite

5. Which among the following molecules has the largest dipole moment value?
   a) SO_3 b) HI c) H_2O d) NH_3

6. The number of tertiary, secondary and primary carbons in 3,4-dimethylheptane are respectively
   a) 2,3 and 4 b) 4,3 and 2 c) 3,2 and 4 d) 2,4 and 3

7. During the process of decompositioin of hydrogen peroxide to give oxygen, 48 grams of O_2 is former per minute at a certain point of time. The rate of formation of water at this point is
   a) 0.85 mol min^{-1} b) 1.6 mol min^{-1}
   c) 3.0 mol min^{-1} d) 4.25 mol min^{-1}

8. Cementite is
   a) an ore of iron
   b) interstitial compound of iron and carbon
   c) an alloy of Fe and Cr d) a compound resembling cement

9. Which among the following is an achiral amino acid?
   a) 2-hydroxy methylserine b) tryptophan
   c) 2-methylglycine d) 2-ethylalanine

10. The water soluble vitamin is
    a) Vitamin K b) Vitamin E c) Vitamin C d) Vitamin D

11. Alkyl fluorides are coveniently prepared by
    a) Sandmayer's reaction b) Finkalstein reaction
    c) Swart's reaction d) Free radical fluorination

12. Which is used in the manufacture of lacquers and paints?
    a) Polyethylene b) PVC c) Bakelite d) Glyptal

13. Which element has the highest boiling temperature?
    a) Ne b) He c) Xe d) Kr

14. The higher order reactions (usually >3) are very rare, because
    a) loss of active species on collision
    b) low probability of simultaneous collision of all the reacting species
    c) increase in entropy and activation energy as more molecules are involved
    d) shifting of equilibrium towards reactants due to elastic collisions

15. Two Faradays of electricity are passed through a solution of copper sulphate ($CuSO_4$). The amount of copper deposited at the cathode is (Cu = 63.5 amu)
a) 63.5 g b) 35.6 g c) 56.3 g d) 36.5 g

16. The deep purple colour of $KMnO_4$ is due to
a) $\pi \rightarrow \pi^*$ transition b) M → L charge transfer
c) d → d transition d) L → M charge transfer

17. If N_2 gains an electron, where this electron goes?
a) π - antibonding M.O b) π - bonding M.O
c) sigma bonding M.O d) sigma antibonding M.O

18. Ortho and para - hydrogens differ in
a) atomic number b) spin of protons
c) number of electrons d) atomic mass

19. A catalyst lowers the activation energy of the forward reaction by 20 kJ mol^{-1}. What effect does it have on the activation energy of the backward reaction?
a) Increases by 20 kJ mol^{-1}. b) Decreases by 20 kJ mol^{-1}.
c) remains unaffected d) cannot be predicted

20. Which of the following is false about alkali metals?
a) alkali metals give blue colour in liquid ammonia
b) Li^+ ion is very small
c) oxides of sodium metal are amphoteric
d) lithium is the strongest reducing agent

21. The estimation of reducing substances by the use of standard iodine solution is called
a) permanganometry b) iodimetry
c) iodometry d) both iodimetry and iodometry

22. The substance which contains stereogenic centre is
a) 3-Bromopentane b) 3,2-Dibromopentane
c) 3-Cyclopenten-1-ol d) 2-cyclopenten-1-ol

23. Magnetic, azimuthal and principal quantum numbers are respectively related to
a) orientation, size and shape b) orientation, shape and size
c) shape, orientation and size c) none of these

24. The most stable free radical is
a) tert-butyl radical b) 2,4,6-tri-tert-butylphenoxyradical
c) trityl radical d) diphenylmethyl radical

25. In the Michael reaction, addition to the α,β-unsaturated carbonyl compound occurs in a
a) 1,2-fashion b) 1,5-fashion c) 1,4-fashion d) 1,3-fashion

Student's Corner

2020 - Emmanuelle Charpentier and Jennifer A. Doudna "for the development of a method for genome editing"

2019 - John B. Goodenough, M. Stanley Whittingham and Akira Yoshino "for the development of lithium-ion batteries"

2018 - Frances H. Arnold "for the directed evolution of enzymes", George P. Smith and Sir Gregory P. Winter "for the phage display of peptides and antibodies"

2017 - Jacques Dubochet, Joachim Frank and Richard Henderson "for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution"

2016 - Jean-Pierre Sauvage, Sir J. Fraser Stoddart and Bernard L. Feringa "for the design and synthesis of molecular machines"

2015 - Tomas Lindahl, Paul Modrich and Aziz Sancar "for mechanistic studies of DNA repair"

Student's Corner

Continuation....

2014 - Eric Betzig, Stefan W. Hell and William E. Moerner "for the development of super-resolved fluorescence microscopy"

2013 - Martin Karplus, Michael Levitt and Arieh Warshel "for the development of multiscale models for complex chemical systems"

2012 - Robert J. Lefkowitz and Brian K. Kobilka "for studies of G-protein-coupled receptors"

2011 - Dan Shechtman "for the discovery of quasicrystals"

2010 - Richard F. Heck, Ei-ichi Negishi and Akira Suzuki "for palladium-catalyzed cross couplings in organic synthesis"

2009 - Venkatraman Ramakrishnan, Thomas A. Steitz and Ada E. Yonath "for studies of the structure and function of the ribosome"

2008 - Osamu Shimomura, Martin Chalfie and Roger Y. Tsien "for the discovery and development of the green fluorescent protein, GFP"

2007 - Gerhard Ertl "for his studies of chemical processes on solid surfaces"

2006 - Roger D. Kornberg "for his studies of the molecular basis of eukaryotic transcription"

2005 - Yves Chauvin, Robert H. Grubbs and Richard R. Schrock "for the development of the metathesis method in organic synthesis"

2004 - Aaron Ciechanover, Avram Hershko and Irwin Rose "for the discovery of ubiquitin-mediated protein degradation"

2003 - "for discoveries concerning channels in cell membranes"

Peter Agre "for the discovery of water channels", and Roderick MacKinnon "for structural and mechanistic studies of ion channels"

2002 - "for the development of methods for identification and structure analyses of biological macromolecules"

John B. Fenn and Koichi Tanaka "for their development of soft desorption ionisation methods for mass spectrometric analyses of biological macromolecules".

Kurt Wüthrich "for his development of nuclear magnetic resonance spectroscopy for determining the three-dimensional structure of biological macromolecules in solution"

2001 - William S. Knowles and Ryoji Noyori "for their work on chirally catalysed hydrogenation reactions" K. Barry Sharpless "for his work on chirally catalysed oxidation reactions"

2000 - Alan J. Heeger, Alan G. MacDiarmid and Hideki Shirakawa "for the discovery and development of conductive polymers"

Anchu A S

No. 253, II M.Sc. Chemistry

Answers - October 2020 Issue

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

Staff Corner

Page 2 Continuation ...

These studies lead the invention of helical structure of DNA. The world's first Industrial production of the Isotactic Polypropylene was carried out using $TiCl_3$ and $Al(C_2H_5)_3$ in the Montecatini's laboratories. The product was marketed as a plastic material named Moplen, a synthetic fibre named Meraklon and a packing film named Moplefan.

He was honoured with International gold medal of the Rubber Industry in 1961, Perrin medal and Perkin medal in 1963. He was awarded Nobel Prize of the year 1963 in Chemistry for his work in catalysis of polymers. Guilio Natta died on 2nd May 1979.

Macromolecules are the essence of life and technological age too.

Dr. N. T. Nevaditha
Head & Professor
Dept. of Chemistry

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Use the Link Below

https://forms.gle/aRKKCUgp1AFgMtCU7

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Student's Corner

Seven wonderful facts of Chemistry!

There is an inherant love to Chemistry that stems from truth.

Here are some interesting Chemistry facts that will spark and renew our interest in the noble field of science.....!

1. Do you know that our car airbags are packed with salt Sodium Azide which is very toxic?

When a collision occurs the car's sensors trigger an electrical impulse which in fraction of seconds raises the temperature of the salts. These then decompose into harmless nitrogen gas rapidly expanding the air bag

2. We know DNA is the blue print for life containing all biological instructions that make each species unique. The surprising fact is that DNA is a natural flame retardant and suppressant. The property is due to DNA's chemical structure. When heated, the phosphate containing backbone produces phosphoric acid which chemically removes water, leaving behind a flame resistant carbon rich residue.

Other bases such as nitrogen react to produce ammonia which inhibits combustion. Now researchers are planning to coat fabric with DNA to make it inflammable coating.

3. Do you ever wonder why Mars appears as bright red star?

Earth gets its blue colour by the presence of oceans all around. Same way Mars is covered with a lot of Iron oxide - the same compound that gives color to blood and rust. Hence it gets the name after the Greek God of War.

4. You may have noticed a characteristic smell after a long thunderstorm. The lightning cracks the oxygen Molecules in atmosphere into radicals which reforms into Ozone. The smell of Ozone is similar to chlorine. This is how the ozone layer of the stratosphere is formed.

5. If you step inside a bathtub, the water obviously go up by Archimede's law but when you add a volume of Sodium Chloride salt to a volume of water, the overall volume actually decreases by upto 2%.This is due to the fact that the solvent Molecules become more ordered in the vicinity of dissolved ions.

6. The rarest naturally occurring element is Astatine. (Greek word astatos=unstable). It is a semi metal produced by decay of Uranium and Thorium. It's most stable form has the half life of only 8.1 hours. The entire crust contains only about 28 g of the element. Only 0.00000005 g of Astatine has been made so far.

7. A remarkable transition occurs in the properties of liquid Helium at the temperature 2.17K (very close to absolute zero) called the lambda point, part of the liquid becomes superfluid which can go against gravity and climb on the walls and move through any pore in the apparatus.

Abisha P M
No. 252, II M.Sc Chemistry

Instructions

Kindly use the link given to submit this quiz online on or before 12th of December, 2020

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