

Vitamin D

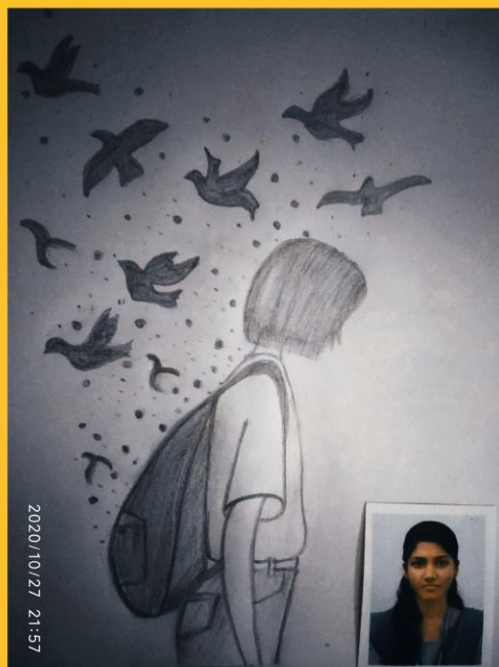
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S. A. Benila Rani, 408 III B.Sc.

IS VITAMIN-D THE NEW ELIXIR?

Vitamin D carries a cholesterol backbone and has steroid-like effects. Two sources of vitamin D are: food (eggs, butter, liver, fatty fish) and synthesis in the skin on exposure to ultraviolet rays (290-320 nm) from the sun. Vitamin D deficiency is associated with infection, HIV, type 1 and 2 diabetes, arthritis, heart disease, osteoporosis, multiple sclerosis, depression, IBD, asthma and multiple cancers. Vitamin D's biologically active form (1,25(OH)₂D₃) has shown neuroprotective effects including the clearance of amyloid plaques, a hallmark of Alzheimer's disease. Vitamin D plays an essential role in brain health, muscle contraction, nerve conduction, it is neuro-steroid with various actions in the brain. Serum 25-hydroxyvitamin D (25(OH)D) concentrations, either in utero or early life, may reduce the risk of autism. It is emerging that rickets is only the tip of the iceberg of vitamin D deficiency.

Vitamin D acts by performing multiple functions, and controlling hundreds of genes and its action binds to 2776 different points of DNA, exerting a modifying role on more than, 200 genes and thus modulating the immune system. It is now firmly established that Vit D₃ is metabolised first in the liver to 25-OH-D or calcidiol and subsequently in the kidneys to 1,25-(OH)₂D to produce a biologically active hormone. Free hormone crosses the plasma membrane and interacts with a specific nuclear receptor known as the vitamin D receptor (VDR) located in the nucleus of target cells, a DNA-binding, zinc-finger protein. This ligand-receptor complex enhances transcription of mRNAs which code for calcium-transporting proteins, bone matrix proteins, or cell cycle-regulating proteins. As a result, restoring blood levels of calcium and phosphate to normal when concentrations of the two ions are low.

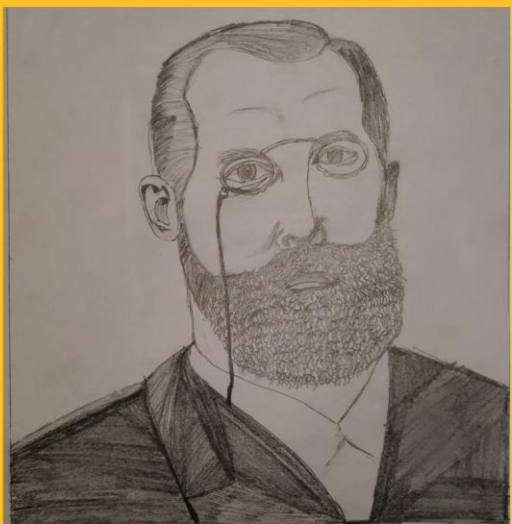
Vitamin D also possesses immuno-modulatory properties that may alter responses to infections *in vivo*. In northern latitudes, higher level of cholesterol are seen in winter than in summer, possibly because of the cholesterol lowering effect of the vitamin D we receive from sunshine during the summer. Vitamin D also shows blood pressure lowering effects similar to ACE inhibitors.

Can you imagine what would happen if a drug company came out with a single pill that reduces the risk of cancer, heart attack, stroke, osteoporosis, PMS, SAD and various autoimmune disorders? There would be a media frenzy the likes of which has never been seen before! Well, guess what? Such a drug exists.....it is the sun.

Dr. Michael Hollick, Physician, Researcher, Vitamin D Expert, Boston University, USA

Dr. S. Ginil Mon
Assistant Professor of Chemistry

Predict these Scientist



MCQs

- The turbidity of a polymer solution measures
 - Light absorbed by solution
 - Light transmitted by the solution
 - Light scattered by the solution
 - None of these
- Chile saltpetre is the ore of

a) Ca	b) Na	c) Mg	d) S
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- What is the value of effective nuclear charge for 4s electron of Zinc atom?

a) 2.365	b) 21.15	c) 4.35	d) 8.85
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- Mercury sticks to the surface of the glass when it comes in contact with

a) Hg_2O	b) HNO_3	c) O_3	d) HCl
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- Milk turns sour at 40°C three times as faster as at 0°C . The energy of activation for souring of milk is

a) 4.694 kcal	b) 2.605 kcal	c) 6.623 kcal	d) 7.673 kcal
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- Two elements whose electronegativities are 1.2 and 3.0, the bond formed between them would be

a) Ionic	b) coordinate	c) covalent	d) Hydrogen
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- White lung cancer is caused by

a) plastics	b) asbestos	c) paper	d) silica
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- Teflon, Styron and neoprene are all

a) co-polymers	b) condensation polymer
c) homopolymers	d) monomers
- Among CaH_2 , NH_3 , NaH and B_2H_6 which are covalent hydrides?

a) NH_3 and B_2H_6	b) NaH and NH_3
c) NaH and CaH_2	d) CaH_2 and B_2H_6
- Anti-Markovnikov's addition of HBr is not allowed in

a) propene	b) 1-butene	c) but-2-ene	d) pent-2-ene
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- For a second order reaction in which both the reactants have equal initial concentration, the time taken for 20% completion of reaction is 500 seconds. What will be the time taken for 60% completion of the reaction?

a) 300 sec	b) 2000 sec	c) 3000 sec	d) 1500 sec
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- The order of the packing efficiency in different types of unit cell is

a) $\text{fcc} < \text{bcc} < \text{simple cubic}$	b) $\text{fcc} > \text{bcc} > \text{simple cubic}$
c) $\text{fcc} < \text{bcc} > \text{simple cubic}$	d) $\text{bcc} < \text{fcc} > \text{simple cubic}$
- A cylinder contains nitrogen gas and a small amount of liquid water at a temperature 22°C . (The vapour pressure of water is 23.8 mm Hg). The total pressure is 600 mm Hg. A piston is pushed into the cylinder until the volume is halved. What is the final total pressure?

a) 1076.2 atm	b) 1.55 atm	c) 1100 atm	d) 1.98 atm
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- The solubility order for alkali metal fluoride in water is

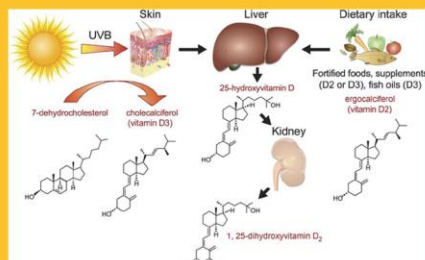
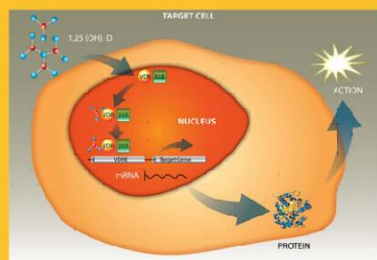
a) $\text{LiF} < \text{RbF} < \text{KF} < \text{NaF}$
b) $\text{RbF} < \text{KF} < \text{NaF} < \text{LiF}$
c) $\text{LiF} > \text{NaF} > \text{KF} > \text{RbF}$
d) $\text{LiF} < \text{NaF} < \text{KF} < \text{RbF}$

15. 2.0 g of oxygen contains number of atoms equal to
 - a) 4.0 g of sulphur
 - b) 7.0 g of Nitrogen
 - c) 0.5 g of hydrogen
 - d) 2.3 g of sodium
16. The isoelectric point of a colloiddally dispersed material is the pH value of which
 - a) The dispersed phase migrate in an electric field
 - b) The dispersed phase does not migrate in an electric field
 - c) The dispersed phase has pH equal to 7.
 - d) The dispersed phase has pH equal to zero.
17. Copper is extracted from copper pyrites ore by heating in a blast furnace The method is based on the principle that
 - a) Copper has more affinity for oxygen than sulphur at high temperature
 - b) Iron has less affinity for oxygen than sulphur at high temperature
 - c) Sulphur has less affinity for oxygen at high temperature
 - d) Copper has less affinity for oxygen for oxygen than at high temperature.
18. What is the maximum wavelength of light that would excite an electron from the $n=1$ to the $n=3$ level of atomic hydrogen?
 - a) 1 nm
 - b) 10^{-7} nm
 - c) 103 nm
 - d) 487 nm
19. When 50 cc of 0.2 N H_2SO_4 is mixed with 50 cc of 1 N KOH the heat liberated is
 - a) 11.46 J
 - b) 57.3 kJ
 - c) 573 kJ
 - d) 0.573 kJ
20. Which of the following amino acids contains sulphur and is an essential amino acid?
 - a) Isoleucine
 - b) Methionine
 - c) Proline
 - d) Glutamine
21. Which has maximum number of oxo groups?
 - a) H_2SO_4
 - b) H_2SO_3
 - c) H_3PO_3
 - d) H_3PO_4
22. Which of the following statements is false?
 - a) The main reason for river water pollution is industrial and domestic sewage discharge
 - b) Surface water contains a lot of organic matters, mineral nutrients and radioactive materials.
 - c) Oil spill in sea water causes heavy damage to fishery
 - d) Oil slick in sea water increases D.O value.
23. Ionic radii are
 - a) Directly proportional to square of effective nuclear charge
 - b) Inversely proportional to effective nuclear charge
 - c) Inversely proportional to square of effective nuclear charge
 - d) Directly proportional to effective nuclear charge.
24. Which of the following is/are paramagnetic?
 - a) $[V(CO)_6]$
 - b) $[Cr(CO)_6]$
 - c) $[Co_2(CO)_8]$
 - d) $[Fe(CO)_5]$
25. Which of the following species is not expected to be a ligand?
 - a) NO
 - b) NH_4^+
 - c) $NH_2CH_2CH_2NH_2$
 - d) CO

Student's Corner

Common Name – Chemical Name

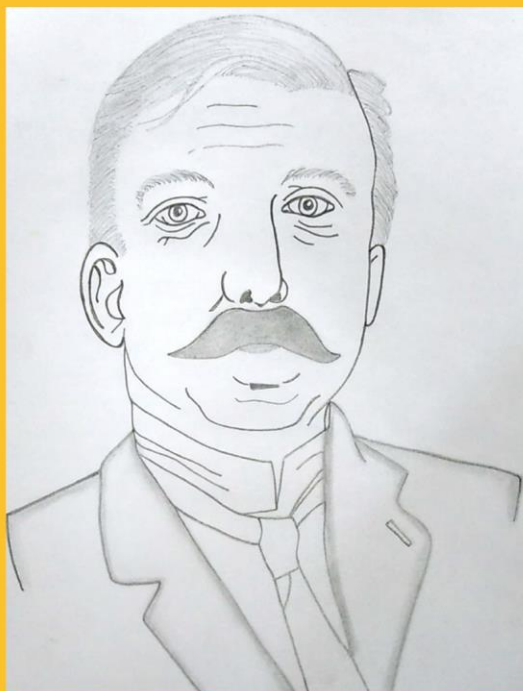
Blue Vitriol	–	Copper sulphate
Smelling Salt	–	Ammonium carbonate
Washing Soda	–	Sodium carbonate
Caustic Soda	–	Sodium hydroxide
Calomel	–	Mercurous chloride
White Vitriol	–	Zinc sulphate
Pearl Ash	–	Potassium carbonate
Quartz	–	Silicon dioxide
Saltpeter	–	Potassium nitrate
Lunar Caustic	–	Silver nitrate
Slacked Lime	–	Calcium hydroxide
Quick Lime	–	Calcium oxide
Carborundum	–	Silicon carbide
Niter	–	Potassium nitrate
Red Lead	–	Triplumbic tetroxide
Hypo	–	Sodium thiosulphate
Rust	–	Hydrated Iron sulphate
Green Vitriol	–	Ferrous sulphate
Glauber's Salt	–	Sodium sulphate
Caustic Potash	–	Potassium hydroxide
Chloroform	–	Trichloromethane
Litharge	–	Lead oxide
Chalk, Marble	–	Calcium Carbonate
Spirit	–	Ethyl alcohol
Soda Water	–	Carbonic Acid
Limestone	–	Calcium Carbonate
Bleaching Powder	–	Calcium hypochlorite
Plaster of Paris	–	Calcium sulphate hemihydrate
Wood Alcohol	–	Methyl alcohol
Iron Pyrite	–	Iron disulphide
Milk of Magnesia	–	Magnesium hydroxide
Chile Saltpeter	–	Sodium nitrate
DDT	–	Dichloro-diphenyl-trichloroethane
Milk of Lime	–	Calcium hydroxide
Sand	–	Silicon dioxide
TNT	–	Trinitrotoluene
Vinegar	–	Acetic acid
Aspirin	–	Acetyl salicylic acid



P. Arul Pravisha
II M.Sc. Chemistry

Answers - November 2020 Issue

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



Campus News

NMCC Chemistry Alumni Meeting - Google Meet
- 15th January 2021 at 7.00 PM



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The Editorial Board

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