

<b>Phylum</b>	<b>Basis of classification</b>
1. Protozoa	Locomotary organ
2. Porifera	Spicules (Endoskeleton)
3. Coelentrata	Dominance of zoids/ Polymorphism
4. Annelida	Locomotary organ
5. Arthropoda	Body appendages and no. of legs.
6. Chordata	Notochord, cranium, jaw.

Compd of xe	Shape
XeF <sub>2</sub>	Linear
XeF <sub>4</sub>	Square planar
XeF <sub>6</sub>	Distorted pentagonal bipyramidal
XeOF <sub>2</sub>	T - shaped
XeOF <sub>4</sub>	Square pyramidal
XeO <sub>3</sub>	Pyramidal (sp <sup>3</sup> hybridization)

Charles Darwin and Wallace jointly published the book "Theory of Natural Selection" in 1858.

Name of Books	Author
1. Historia Animalia	Aristotle
2. Origin of species	Charles Darwin
3. Systema Naturae	C. Linnaeus
4. Species plantarum	C. Linnaeus
5. Micrographia	Robert Hooke
6. Theory of population	Malthus

Bacteria was discovered by Leewenhoek.

- **Robert Koch** "father of Bacteriology."
- **Robert Hooke** "father of cell biology."
- **Edward Jenner** "father of Immunology."
- **Thomos Addision** "father of endocrinology."
- **Empedocles** "father of concept of evolution"
- **Iwanoswoky** "father of virology." But stanley crystallised virus at first.
- **Alexender flemming** - discovered penicillin.

<b>Compound</b>	<b>Oxidation state</b>
1. Dinitrogen Pentoxide ( $\text{N}_2\text{O}_5$ )	+5
2. Nitrogen dioxide ( $\text{NO}_2$ )	+4
3. Dinitrogen trioxide ( $\text{N}_2\text{O}_3$ )	+3
4. Nitric oxide ( $\text{NO}$ )	+2
5. Dinitrogen oxide ( $\text{N}_2\text{O}$ )	+1
6. Dinitrogen ( $\text{N}_2$ )	0
7. Hydroxylamine ( $\text{NH}_2\text{OH}$ )	-1
8. Hydrazine ( $\text{N}_2\text{H}_4$ )	-2
9. Ammonia ( $\text{NH}_3$ )	-3

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- Islet of langerhans in Pancreas contains.
  - $\alpha$  - cell - Secrete glucagon ( $\uparrow$  glucose level)
  - $\beta$  - cell - secrete insulin ( $\downarrow$  glucose level)
  - $\delta$  - cell - Secrete somatostatin

- Order of ionizing power  
 $\alpha$ - (Alpha) rays >  $\beta$  (Beta) rays >  
 $\gamma$  (Gamma) rays.
- Order of penetration  
 $\gamma$  (gamma rays) >  $\beta$  (Beta rays) >  $\alpha$  (alpha) rays.
- $\alpha$ - rays- Doubly charged helium nuclei.
- $\beta$  - rays- A stream of electron.
- Cathode rays- A stream of  $\beta$  - particle
- $\gamma$  (Gamma) rays- Electromagnetic radiation.

# Caryopsis is the fruit of family Graminae.

Family	Fruit
Cruciferae	Siliqua or silicula
Solanaceae	Berry or capsule
Malvaceae	capsule or schizo carpic
compositae/Asteraceae	cypsela
Leguminseae	legume or pod
Gramineae/poaceae	Cryopsis
Liliaceae	Berry

Plants type	Absorption through
• Marchantia	unicellular rhizoids
• Mosses	Multicellular rhizoids
• Lichen	Rhizines
• Sporophyte of fern	Adventitious root.
• Pinus	Micorrhizal roots
• Higher plants	Root hairs
• Algae and fungi	General body surface
• Parasitic plant (Cuscuta)	Haustorial root

Hybridization of C-C bond in benzene is  $sp^2$

- $sp^3$  has tetrahedral geometry
- $sp^2$  has planar (zig-zag) geometry
- $sp$  has linear geometry
- energy  $sp^3 > sp^2 > sp$
- Electronegativity  $sp^3 < sp^2 < sp$
- $dSp^2$  square planar
- $Sp^3d$  - square pyramidal
- $Sp^3d^2$  - octahedral
- Unhybrid orbital lies perpendicular to hybrid orbitals
- Hybrid orbitals form  $\sigma$  bond.
- Unhybrid orbitals form  $\pi$  bond.
- Bond length of C-C is  $1.54 \text{ \AA}^\circ$ , C = C is  $1.34\text{-}\text{\AA}^\circ$  and that of C ≡ C is  $1.2 \text{ \AA}^\circ$

Common name	Zoological name	Phylum
Cuttle fish	Sepia	Mollusca
Silver fish	Lepisma	Arthropoda (Insecta)
Flying fish	Exoectus	Pisces
Star fish	Asterias	Echinodermata
Devil fish	Octopus	Mollusca
Hag fish	Myxine	Chordata
Cray fish	Astacus	Arthropoda
Jelly fish	aurelia	Coelenterata

Cranial bones	Facial bones	Ossicles
Parietal, temporal, frontal, occipital, sphenoid,	Zygomatic, lacrimal, nasal, inferior concha, maxilla, palatine, vomer mandible	3 - ossicles, malleus, incus and stapes in each ear

The important ores of diff. metal are :

<b>Mercury</b>	- Cinnabar	- HgS
<b>Aluminium</b>	- Bauxite	- $Al_2O_3 \cdot 2H_2O$
	- Corundum	- $Al_2O_3$
	- Cryolite	- $Na_3AlF_6$
<b>Calcium</b>	- Gypsum	- $CaSO_4 \cdot 2H_2O$
	- Fluorspar	- $CaF_2$
	- Limestone (Chalk)	- $CaCO_3$
<b>Copper</b>	- Copper pyrite, (Chalcopyrite) $CuFeS_2$	
	- Copper glance - $Cu_2S$	
	- Malachite(green) - $CuCO_3 \cdot Cu(OH)_2$	
	- Azurite(blue) - $2CuCO_3 \cdot Cu(OH)_2$	
<b>Iron</b>	- Haematite	- $Fe_2O_3$
	- Iron Pyrite	- Fe S <sub>2</sub>
	- Magnetite	- $Fe_3O_4$
	- Siderite	- $FeCO_3$
<b>Lead</b>	- Galena	- PbS
<b>Magnesium-</b> Carnalite		- $KCl \cdot MgCl_2 \cdot 6H_2O$
	- Dolomite	- $MgCO_3 \cdot CaCO_3$
	- Epsom salt	- $MgSO_4 \cdot 7H_2O$
	- Magnesite	- $MgCO_3$
<b>Silver</b>	- Silver glance (Argentite)	- $Ag_2S$
	- Horn Silver	- AgCl
<b>Zinc</b>	- Calamine	- $ZnCO_3$
	- Zinc blonde	- ZnS
	- Zincite	- ZnO
<b>Radium</b>	- Pitch blonde	- $U_3O_8$

Vitamin B <sub>1</sub>	→	Thiamine
Vitamin B <sub>2</sub>	→	Riboflavin
Vitamin B <sub>6</sub>	→	Pyridoxine
Vitamin B <sub>12</sub>	→	Cyanocobalamin
Vitamin A	→	Axerophthol or Retinol
Vitamin D	→	Calciferol
Vitamin E	→	Tocopherol
Vitamin C	→	Ascorbic Acid
Vitamin K	→	Phylloquinone

Name of Larvae	Animal
Amphiblastula	Sycon (Porifera)
Bipinnaria	Asterias (Echinodermata)
Bladderworm	Taenia solium (Platyhelminthes)
Caterpillar	Butterfly (Insecta)
Cercaria	Fasciola hepatica (Platyhelminthes)
Parenchymula	Leucosolenia (Porifera)
Planula	Obelia (coelentrata)
Veliger	Pila
Rhabditiform	Ascaries (Nematoda)
Tadpole	Rana (Amphibia)
Glochidium	Unio (mollusca)

- Transpiration occurs from – stomata, lenticel, and cuticle of epidermis of stem and leaf.  
Light reaction – occurs in grana lamellae  
Dark reaction – stroma region of chloroplast.
- Site of respiration – Mitochondria
- Glycolysis occurs in cytoplasm
- Site of Krebs cycle – Matrix of mitochondria
- PSI ( $P_{700}$ ) is located at both stroma and grana lamellae
- PSII ( $P_{680}$ ) is located at grana lamellae.

**Q. earthworm away from the light source  
is known as ?**

**96. (b) Negative phototaxis**

- Phototaxis – Response to light
- Positive phototaxis – organism moves towards light eg. Euglena swims towards water.
- Negative phototaxis – organism moves away from light eg. Earthworm and cockroach move away from light.
- Chemotaxis – Response to chemicals.
- Aerotaxis : Response to air.
- Rheotaxis – Response to stimulus of flowing water or resistance
- Thermotaxis – Response to temperature eg. Planaria shows movement to temperature.
- Thigmotaxis – Response to touch.
- Sociotaxis – Response to a family or group.
- Galvanotaxis – Response to electric stimulus.
- Tropism – Turning movement by which whole body or a major part of the body become oriented.

Endocrine gland	Excess	Deficiency
1. Pituitary Growth hormone)	- gigantism in adults - Acromegaly in children	Dwarfism
2. Glucocorticoids	Cushing's syndrome	Addison's disease
3. Mineralocorticoids	Conn's syndrome	Hypoaldosteronism
4. Parathormone	Hyperparathyroidism Osteoporosis	Hypoparathyroidism Tetany
5. $T_3$ & $T_4$	Hyperthyroidism Thyrotoxicosis Graves disease	- Children cretinism - myxoedema in adults

### 95. (b) Elastic

Cartilage	Anatomical Location
1) Hyaline Cartilage	<ul style="list-style-type: none"> <li>● Embryonic Cartilage</li> <li>● articular cartilage</li> <li>● Costal/articular cartilage</li> <li>● Tracheal and bronchial cartilage</li> <li>● Most of the cartilages of nose and Larynx</li> </ul>
2) Fibrocartilage	<ul style="list-style-type: none"> <li>● intervertebral disc</li> <li>● intra articular disc</li> <li>● Menisci and labra</li> </ul>
3) Elastic Cartilage	<ul style="list-style-type: none"> <li>● External ear</li> <li>● auditory tube</li> <li>● small cartilage of inlet of larynx.</li> </ul>

Duodenum (25 cm) Has	Jejunum (2 m) Has	Ileum (3 m) Has
Brunner glands secrete mucus	Most prominent villi	Payer's patch
Crypts of Leiberkuhn secrete intestinal juice	Plica circularis	Localised aggregation of lymphoid tissue
Ampulla of Vater—hepatopancreatic duct open	Circular muscle	

- Glycolysis (EMP – Pathway) – common metabolic pathway for both aerobic and anaerobic respiration.
- Net gain of ATP =  $(4 - 2) = 2$  ATP.  
Net gain of  $\text{NADH}_2 = 2 = 2 \times 3 = 6$  ATP
- Total ATP production in the glycolysis of Aerobic respiration is =  $2 + 6 = 8$ .
- In glycoysis one molecule of glucose breaks into 2 molecule of 3'C' containing pyruvic acid.

Process	Catalyst
1. Haber's process for $\text{NH}_3$	Fe, (Promoter) Mo
2. Contact process for $\text{H}_2\text{SO}_4$	$\text{Pt}, \text{V}_2\text{O}_5$
3. Ostwald process for $\text{HNO}_3$	Pt guaze
4. Bosch process for $\text{H}_2$	$\text{Fe}_2\text{O}_3 + \text{Cr}_2\text{O}_3$
5. Deacon's process for $\text{Cl}_2$	$\text{Cu}_2\text{Cl}_2$
6. Manufacture of vegetable ghee	Ni
7. $\text{O}_2$ preparation from $\text{KClO}_3$	$\text{MnO}_2$
8. Methanol from $\text{H}_2$ and $\text{CO}$	$\text{ZnO} & \text{Cr}_2\text{O}_3$

- A. Acidic oxides – oxides of non metals which dissolve in water to form acid.  
eg.  $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{NO}_2$ ,  $\text{N}_2\text{O}_5$ ,  $\text{P}_4\text{O}_{10}$ ,  $\text{SO}_3$ .
- B. Basic oxides – metal oxides except metallic oxides high oxidation states eg.  $\text{CrO}_3$ ,  $\text{V}_2\text{O}_5$ ,  $\text{Mn}_2\text{O}_7$ ,  $\text{CaO}$ ,  $\text{NaO}$ .
- C. Neutral oxide – oxides which neither reacts with acid nor with base eg.  $\text{NO}$ ,  $\text{CO}$ ,  $\text{H}_2\text{O}$ ,  $\text{N}_2\text{O}$ .
- D. Amphoteric oxides – oxides which reacts with acids as well as base. eg.  $\text{Al}_2\text{O}_3$ ,  $\text{ZnO}$ ,  $\text{SnO}$ ,  $\text{SnO}_2$ ,  $\text{BeO}$ ,  $\text{PbO}$ ,  $\text{PbO}_2$ ,  $\text{SbO}$ .

### Peroxides:

- oxide containing group ( $\text{O}_2^{2-}$ )
- where O.N of oxygen is  $-1$   
eg.  $\text{BaO}_2$ ,  $\text{Na}_2\text{O}_2$ ,  $\text{H}_2\text{O}_2$

### Superoxides

- Oxides containing superoxide ion ( $\text{O}_2^-$ ) where O N of oxygen is  $-\frac{1}{2}$ .  
eg  $\text{KO}_2$ ,  $\text{RbO}_2$ .

#### (d) electron pair acceptor

##### Lewis acid

- Can accept a pair of electrons  
eg.
  - All cations  $\text{Fe}^{+2}$ ,  $\text{Al}^{+3}$ ,  $\text{H}^+$ ,  $\text{Na}^+$
  - Compounds with incomplete octet  
eg.  $\text{AlCl}_3$ ,  $\text{BF}_3$ ,  $\text{FeCl}_3$ .
  - Metals in carboxyl complexes eg. Ni in  $\text{Ni}(\text{CO})_4$
  - Molecules having central atom with d-orbitals which can acquire more than 8 – electrons eg.  $\text{SiCl}_4$ ,  $\text{SnCl}_2$ ,  $\text{SnCl}_4$
  - Molecules with multiple bonded atoms with different electronegativity eg.  $\text{CO}_2$ ,  $\text{SO}_2$ .

##### Lewis base

- Electron pair donor
- Nucleophile.
- All anions  $\text{Cl}^-$ ,  $\text{F}^-$ ,  $\text{CN}^-$
- Molecules with lone pair of electrons eg.  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{ROH}$ .

S.No.	System	Axes	Angle	Examples
1.	Cubic or regular	$a = b = c$	$\alpha = \beta = \gamma = 90^\circ$	NaCl, KCl, Zns, diamond, alums, pd
2.	orthorhombic (Rhombic)	$a \neq b \neq c$	$\alpha = \beta = \gamma = 90^\circ$	KNO <sub>3</sub> , BaSO <sub>4</sub> , PbCO <sub>3</sub> Rhombic sulphur
3.	Tetragonal	$a = b \neq c$	$\alpha = \beta = \gamma = 90^\circ$	SnO <sub>2</sub> , Zno, TiO <sub>2</sub> , NiSO <sub>4</sub> , white Sn
4.	Monoclinic	$a \neq b \neq c$	$\alpha = \gamma = 90^\circ$ $\beta = 90^\circ$	CaSO <sub>4</sub> , 2H <sub>2</sub> O monoclinic sulphur
5.	Triclinic	$a \neq b \neq c$	$\alpha \neq \beta \neq \gamma = 90^\circ$	CaSO <sub>4</sub> , 5H <sub>2</sub> O K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>
6.	Hexagonal	$a = b \neq c$	$\alpha = \beta = 90^\circ$ $\gamma = 120^\circ$	Zno, cds, Hgs, graphite
7.	Rhombohedral or Trigonal	$a = b = c$	$\alpha = \beta = \gamma \neq 90^\circ$	NaNO <sub>3</sub> , CaCO <sub>3</sub> quarts, As, sb, B

found in separate bundles alternating with each other in different radii.

Dicot stem - conjoint collateral and open

Monocot stem - conjoint collateral and closed

Bicollateral (cambium and phloem occurs twice) - stem of cucurbitaceae family (cucurbita cucumbers)

9:3:3:1

Genotypic ratio in F<sub>2</sub> generation of

Monohybrid cross - 1:2:1

Phenotypic ratio in F<sub>2</sub> generation of monohybrid cross - 3:1

Dihybrid cross

Phenotypic ratio - 9:3:3:1

Number of phenotypes - 4

Genotypic ratio - 1:2:2:4:1:2:1:2:1

No of genotypes = 9

Incomplete dominance

Phenotypic ratio = 1:2:1

genotypic ratio = 1:2:1

No of genotypes = 3

Genotypic ratio and phenotypic ratio are same in incomplete dominance.

10. (b)

11. (c)

Turgor pressure - it is the pressure, which develops inside the cell and exerted on cell wall, maintains the turgidity of cell.

During endosmosis, water enters inside the cell and the turgor pressure increases gradually.

Wall pressure (WP) - inward pressure exerted on the cell content by stretched cell wall.

In normal cell

$$DPD = OP - TP \quad (TP = WP)$$

In fully plasmolysed cell

$$TP = WP = 0$$

$$SO, DPD = OP$$

In fully turgid cell

$$DPD = O, SO, TP = OP$$

Cell in hypotonic solution - endosmosis cell become turgid

Cell in hypertonic solution - exosmosis, cell become flaccid

## 12. (b) Photosynthesis

- $6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$
- Photosynthesis is an anabolic process
- Oxidation of H<sub>2</sub>O into O<sub>2</sub>
- Source of 'H' in glucose is H<sub>2</sub>O
- Source of 'O<sub>2</sub>' is H<sub>2</sub>O
- Reduction of CO<sub>2</sub> in glucose
- Primary photosynthetic pigment is - chl.a
- Carotenoids protects plants from the photodynamic damage of chloroplast
- Light reaction occurs in grana lamellae and dark reaction in stroma regions of chloroplast.
- 1<sup>st</sup> step of photosynthesis is the activation of molecules with the help of sunlight.
- Respiration is a catabolic process in which there is oxidation of substrates to release energy.

## 13. (c) Ribosome

- Mitochondria - site of respiration
- RER - (ER + Ribosome) - helps in protein synthesis.
- SER - helps in fats and lipids synthesis
- Ribosome - Protein factory of cell incorporates with mRNA for protein synthesis

## Golgi Body

- Helps in cell plate (Phragmoplast) formation during cytokinesis
- Nissl's granules are rich in Ribosome/RER (mainly ribosome)
- Forms Nissl's granules in cyton of nerve cell

- **Ecology** - interrelationship between living organisms and non-living environment
- **Entomology** - study of insects
- **Trophology** - Food and nutrition
- **Taxonomy** - Classification, arrangement and identification of organisms

20. (d)

[Also refer to IOM 2009 Q. 25]

**Myopia** - Short sightedness

- Image is formed in front of retina
- Corrected by concave lens

**Hypermetropia** - Long sightedness

- Image is formed behind retina
- Corrected by convex lens.
- **Astigmatism** - Due to uneven surface of cornea corrected by cylindrical lens
- **Presbyopia** - Due to failure of accommodation
  - Seen in old age > 40 years
  - Corrected by bifocal lens

**Hypothalamus**

- Growth hormone releasing hormone (GHRH)
- Growth hormone inhibiting hormone/ somatostatin.
- Thyrotropin releasing hormone (TRH)
- Corticotropin releasing hormone (CRH)
- Gonadotropin releasing hormone (GnRH)
- Prolactin inhibiting hormone/Dopamine.

**Pituitary**

- Growth hormone (GH)
- Thyroid stimulating hormone (TSH)
- Adrenocorticotropic hormone (ACTH)
- Follicle stimulating hormone (FSH)
- Luteinizing hormone (LH)
- Prolactin
- Oxytocin
- ADH/Vasopressin

**Thyroid**

- Thyroxine/T<sub>4</sub>
- Triiodothyronine /T<sub>3</sub>
- Calcitonin

**Parathyroid**

- Parathyroid hormone (PTH) /  
Parathormone

**Endocrine pancreas**

- Insulin
- Glucagon
- Somatostatin
- Pancreatic polypeptide

**Gonads**

- Testosterone
- Estrogen
- Progesterone

**Kidney**

- Renin
- Erythropoietin
- 1, 25 – (OH)<sub>2</sub> cholecalciferol.

<b>Order of rx<sup>n</sup></b>	<b>Unit of rate constant</b>
Zero	$\text{mol. L}^{-1} \text{ time}^{-1}$
1 <sup>st</sup>	$\text{time}^{-1}$
2 <sup>nd</sup>	$\text{Lmol}^{-1} \text{ time}^{-1}$
3 <sup>rd</sup>	$\text{L}^2 \text{ mol}^{-2} \text{ time}^{-1}$

## • Volant adaptation

- Adaption for flying, Eg. Birds,
- Presence of pneumatic bone, absence of bone marrow in bone, absence of urinary bladder, presence of air sacs, well developed cerebellum to control the muscle, are the adaptation features to reduce the weight of body for flight.
- **Cursorial** → adaptation for running → Eg. Kangaroo, Cockroach.
- **Arboreal** → adaptation for living in trees. Eg. Monkey.
- **Scansorial** → adaptation for climbing on vertical wall. Eg. Lizard
- **Aquatic** → adaptation in water → Eq, fisher (primary), Rhinos (secondary).
- **Fossorial** → adaption for burrowing → Earthworm, Rabbit.

## Homologous organ

Male	Female
Scrotum	Labia majora
Cowpers gland/ Bulbourethral gland	Bartholin gland
Testis	Ovary
Penis	Clitoris
Prostate	Paraurethral gland of skene
Vas deferens	Round ligament
Spongy urethra	Labia minora

<b>Simple fruit</b>	<b>Edible part</b>
• Almond	Seed
• Coconut (Drup)	Endosperm
• Grapes, Brinjal, Tomato	Pericarp and placenta
• Betel nut (Berry)	Seed
• Pomegranate (Balausta)	Juicy testa
• Lemon, orange (Hesperidium)	Juicy placental hair

<b>Aggregate fruit</b>	<b>Edible part</b>
• Custard apple (Etaerio of berries)	Mesocarp
• Strawberry, Lotus (Etaerio of achenes)	Thalamus and seed
• Rusberry (Etaerio of drupes)	Thalamus
<b>Composite fruit</b>	<b>Edible part</b>
• Jackfruit (sorosis)	Fleshy axis, Bracts, perianth and seed.
• Mulberry (sorosis)	Prianth
• Pineapple (sorosis)	Fleshy axis, fused perianth and pericarp
• Fig. (synconus)	Peduncle and seeds

Family	Floral formula
Cruciferae	Ebr $\oplus$ ♂ K <sub>2+2</sub> C <sub>4</sub> A <sub>2+4</sub> G <sub>(2)</sub>
Compositae	Ebr% ♀ K <sub>pappus</sub> C <sub>(5)</sub> A <sub>0</sub> G <sub>(2)</sub> (Ray floret)
	Br $\oplus$ ♂ K <sub>pappus</sub> C <sub>(5)</sub> A <sub>5</sub> G <sub>(2)</sub> disc floret
Solanaceae	Ebr $\oplus$ ♂ K <sub>(5)</sub> C <sub>(5)</sub> A <sub>5</sub> G <sub>(2)</sub>
Gramineae	Brl. Br% ♂ P <sub>2(lodicules)</sub> A <sub>3</sub> G <sub>1</sub>
Leguminosae	Br.% ♂ K <sub>(5)</sub> C <sub>1+2+(2)</sub> A <sub>1+(9)</sub> G <sub>1</sub>
Malvaceae	Br $\oplus$ ♂ Epi <sub>7</sub> K <sub>(5)</sub> C <sub>(5)</sub> A <sub>(∞)</sub> G <sub>(5)</sub>
Liliaceae	Br $\oplus$ ♂ P <sub>(3+3)</sub> A <sub>3+3</sub> G <sub>(3)</sub>

Cell components	Discovered by
Mitochondria	Kolliker
Nucleus	R.Brown
Chloroplast	Sachs
Cell membrane	C.Nageli and C. Crammer
Nucleolus	Fontana
Chromosome	Sutton and Boveri (Boreri)
Golgi complex	Camillo Golgi

Type of vaccines	Name of vaccines
1. Killed vaccines	Typhoid, cholera
2. Toxoid vaccines	Diphtheria, tetanus
3. Attenuated living vaccines	Oral polio vaccines (OPV), Bacille calmette Guerin (BCG), Mumps, Measles, Rubella (MMR)
4. Antibodies as vaccines	Anti-tetanus serum, Antirabies serum
5. Structural vaccines	Hepatitis B vaccines

- **Vitamin C = 1<sup>st</sup> vit. produced through fermentation process.**
- **Fat soluble vit = vit. A, D, E, K**
- Water soluble Vit = Vit. B complex and vit.C.
- **Term Anitibiotis** is coined by **Selman A. Waksman** (discovered streptomycin).
- **Alexender Fleming** extracted penicillin from the fungus *penicillium notatum*.  
Nowadays, penicillin is commercially produced from *penicillium chrysogenum*.
- Penicillin → **1<sup>st</sup> synthesized antibiotic**.
- **Antibiosis** is the property of antibiotic to kill pathogenic microorganism.
- Streptomycin is useful against both **Gram +ve and gram -ve bacteria**.

Monomer	Polymer
1. Ethylene Glycol +di-methyl terep-thalate	Terylene or Dacron (Polyester)
2. Hexamethylene diamine + adipic acid	Nylon - 6,6 (Polyamide)
3. Formaldehyde + phenol	Bakelite
4. Coprolactum	Nylon-6/Perlon
5. Acrylonitrile/vinyl cyanide	Polyacrylonitrile (PAN) or Orlon
6. Styrene and Butadiene	Bunas, SBR
7. $\text{CF}_2 = \text{CF}_2$ (Tetrafluoro ethylene)	Teflon
8. $\alpha$ -Glucose	Starch, Glycogen
9. $\beta$ -Glucose	Cellulose
10. Isoprene	Rubber
11. Chloroprene	Neoprene
12. $\text{CH}_2-\text{CH}_2$ (Ethylene)	Polyethene
13. $\text{C}_6\text{H}_5\text{CH}=\text{CH}_2$ (styrene)	Polystyrene
14. $\text{CH}_2 = \text{CHCH}_3$ (propylene)	Polypropylene

## Plank's constant

$$= \frac{E}{f} = \frac{[ML^2T^{-1}]}{[T^{-1}]} = [ML^2T^{-1}]$$

Angular momentum =  $mvr = [ML^2T^{-1}]$

- Linear momentum and impulse  
 $\rightarrow [MLT^{-1}]$
- Work, energy, torque, couple, moment, internal energy, heat, work function.  
 $\rightarrow [ML^2T^{-2}]$
- Universal gas constant and molar specific heat capacity  
 $\rightarrow [ML^2T^{-2}K^{-1} mol^{-1}]$
- Rydberg's constant and wave number  
 $\rightarrow [M^0L^{-1}T^0]$
- Electric potential, EMF, electric potential difference  
 $\rightarrow [ML^2T^{-3}A^{-1}]$
- Specific heat capacity and principle gas constant  
 $\rightarrow [M^0L^2T^{-2}K^{-1}]$
- Magnetizing force and intensity of magnetization  
 $\rightarrow [M^0L^{-1}T^0A]$
- Thermal capacity, Boltzmann's constant and entropy  
 $\rightarrow [ML^2T^{-2}K^{-1}]$
- Intensity of radiation, solar constant  
 $\rightarrow [ML^0T^{-3}]$
- If C, R and L are capacitance, resistance and inductance, then  $[CR]$ ,  $[L/R]$ ,  $[\sqrt{LC}]$  have dimension of time  $[T]$

S.N.	Phylum	Classification based on
1.	Protozoa	Locomotory organ [IOM]
2.	Porifera	Spicules
3.	Coelentrata	Dominance of polyp/ medusa
4.	Platyhelminthes	Nature of mode of life.
5.	Nemahelminthis	Presence or absence of phasmids.
6.	Annelida	Locomotory organ [MOE]
7.	Mollusca	Shell/ foot
8.	Enchinodermata	Position of madreporite & larval forms

Laws of stoichoimetry	Given by
1. Conservation of mass	Lavoisier
2. Definite proportion	Proust
3. Multiple proportion	Dalton
4. <u>Reciprocals/</u> proportions	<u>equivalent</u> <u>Ritchcer</u>
5. Gaseous volume	Gay Lussac

- **Bacteriophage** : ds DNA
- **Cyanophage** : ds DNA
- **Mycophage** : ds DNA
- **Plant ds DNA virus**
  - ◆ Cauliflower Mosaic Virus
  - ◆ Mirabilis Mosaic Virus
  - ◆ Dahila Mosaic Virus
- **Animal ss RNA virus**

Influenza, AIDS virus, Measles, Rhinovirus (common cold), Mumps, poliomyelitis virus, yellow fever, Dengue fever, all Hepatitis except Hepatitis B, Japanese encephalitis virus etc.
- **ss DNA**

Coliphage S<sub>13</sub>, Parvovirus, φ× 174 bacteriophage, etc..
- **ds RNA**

Mycophage , Reo sarcoma virus, wound tumour virus, Rice dwarf virus, Rota virus, etc.
- **ds DNA animal virus**

Small pox (Variola), Herpes simplex Virus, Chicken pox, Hepatitis B, Adeno virus, Coliphage T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>6</sub>, T<sub>7</sub>, Human papilloma virus (HPV) etc.
- **Virus contain either DNA or RNA**
- **Tobacco mosaic** was the first disease recognized to be caused by a virus.
- In latin the word "virus" means "poison".

Order of $r^{xn}$	Half life $t_{1/2}$	$t_{1/2} \propto \frac{1}{a^{n-1}}$
Zero.	$t_{1/2} = \frac{a}{2k}$	$t_{1/2} \propto a$
1 <sup>st</sup>	$t_{1/2} = \frac{0.693}{k}$	$t_{1/2} \propto \frac{1}{a^0}$
2 <sup>nd</sup>	$t_{1/2} = \frac{1}{ak}$	$t_{1/2} \propto \frac{1}{a}$
3 <sup>rd</sup>	$t_{1/2} = \frac{3}{2ka^2}$	$t_{1/2} \propto a^{-2}$