Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. Sivala

Course / Group : I sem BZC

Paper : I – Biology of Non chordates

Name of the Topic : Principles of Taxonomy

Hours required : 1 hr

Learning Objectives : ✓ To know taxonomical principals
✓ To understand the levels of Organization

Previous knowledge to be reminded : ✓ To classify the Organisms based on characters
✓ To Apply the Taxonomical knowledge

(Continue on the reverse side if needed)

Topic Synopsis :
* Characteristic features of life
① Growth
② Cellular Organization
③ Reproduction
④ Homeostasis
⑤ Organic evolution
⑥ Irritability

* Taxonomic principals
① Identification
② characterisation
③ Nomenclature
④ classification

Examples/Illustrations : Systemic levels of classification
Taxa to Species

Additional inputs : Scientific names of the Organisms

Teaching Aids used : charts - Hierarchical position

References cited : Invertebrates – Jordan & Verma
– Hyman

Student Activity Planned after the teaching : Students divided into groups as per taxonomical orders

Activity planned outside the Class Room. if any : Collect the Organism identification characters resides surroundings.

Any other activity :

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Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. Sivala

Course / Group : I BSC

Paper : I - Biology of Non Chordates

Name of the Topic : Binomial Nomenclature – Rules of Nomenclature

Hours required : 1 hr

Learning Objectives :
- ✓ To know the Linnaeus classification
- ✓ To understand the genus and species
- ✓ To classify the organism
- ✓ To apply the knowledge Hierarchical position of the organism

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :

Levels and hierarchy of classification
1) Kingdom
2) phylum
3) class — Binomial Nomenclature
4) Order — Binomial Nomenclature
5) Family
6) Genus
7) Species/Subspecies

Examples/Illustrations :
- Naja naja
- Homo sapiens

Additional inputs :
- * Tautozygous

Teaching Aids used :
- * phylogenetic ~~nomenclature~~ classification

References cited :
- Invertebrates – Jordan & Verma
- Invertebrates classification – L.H. Hyman

Student Activity Planned after the teaching : Divide the genus and species (Binomens) given organism scientific name.

Activity planned outside the Class Room. if any : observe surrounding organisms and write down the characters and classify based on identification

Any other activity :

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HUMAN TAXONOMY

Kingdom – Animalia
phyllum – Chordates
Class – Mammalia
Order – Primates
Family – Hominidae
Genus – Homo
Species – Sapiens

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. Sivala

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : ~~General characters of protozoa~~ Whittakers 5 kingdom classification.

Hours required : 1 hr

Learning Objectives :
- ✓ TO know the unicellular organisms
- ✓ TO understand the protozoan metabolisms
- ✓ TO diversifying the organism on primitive characters

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :

All living organisms
(R. Whittaker-1969)
- ① protista - Unicellular, Eukaryotic
- ② Bacteria - without nucleus, unicelled (prokaryotic)
- ③ Fungi - Moulds, Mushroom & yeasts
- ④ plantae - Eukaryotes with chloroplasts
- ⑤ Animalia - Multi cellular Eukaryotes, which are heterotrophs

Examples/Illustrations :

Additional inputs : 5 kingdom classification's prokaryotes & Eukaryotes

Teaching Aids used : chart showing whittakers classification

References cited : Invertebrates - Jordan & Verma

Student Activity Planned after the teaching : Students were divided in to 5 groups and each group speak on characters of each kingdom

Activity planned outside the Class Room. if any : ~~Observe~~ Surrounding living Creatures & carry to and classify them ~~into~~ accord to 5 kingdom classification

Any other activity :

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Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. Sivala

Course / Group : I sem - BZC

Paper : I - Biology of Non Chordates

Name of the Topic : General Characters of protozoa

Hours required : 1 hr

Learning Objectives :
✓ To know the primitive organisms cellular structure
✓ To understand the metabolisms in protozoa

Previous knowledge to be reminded : 5 Kingdom classification - Animalia

(Continue on the reverse side if needed)

Topic Synopsis :
* Protozoa - proto = primitive, ~~Zoa - Animals~~
* ~~first~~ observed - Antony Von Leuwenhoek
* Simplest, unicellular, Microscopic, Most primitive
* Body - Single cell - protoplasmic level
* Nucleus - one or Many
* Common Storage food material - glycogen
* Sexual / ASexual Reproduction

Examples/Illustrations : ~~Amoeba~~
Paramoecium, Vorticella.

Additional inputs : Charts diseases causative protozoans

Teaching Aids used : Chart showing protozoan animals

References cited : The Invertebrates - L.H. Hyman
Invertebrate Zoology - Jordan & Verma

Student Activity Planned after the teaching : each student - each character

Activity planned outside the Class Room. if any : Collect the protozoan organisms names

Any other activity : Draw the protozoan organisms at home.

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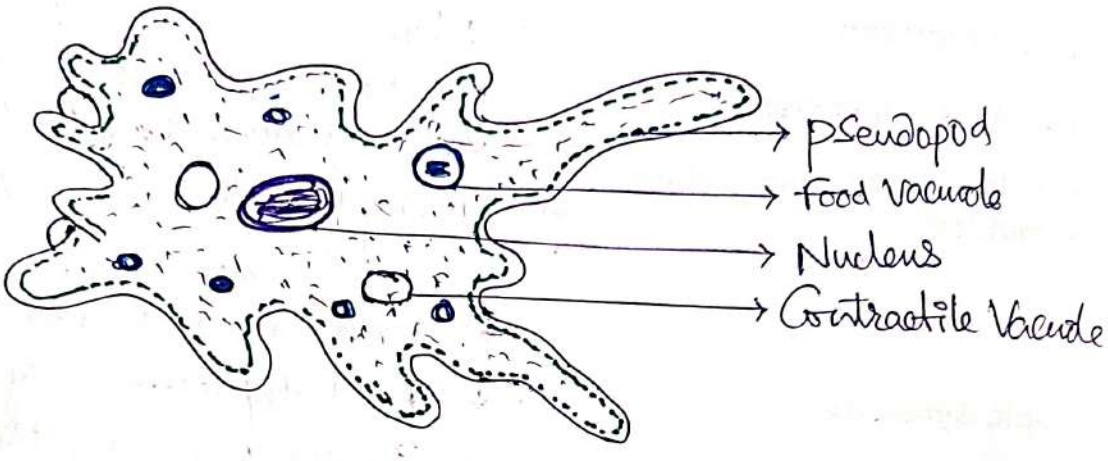
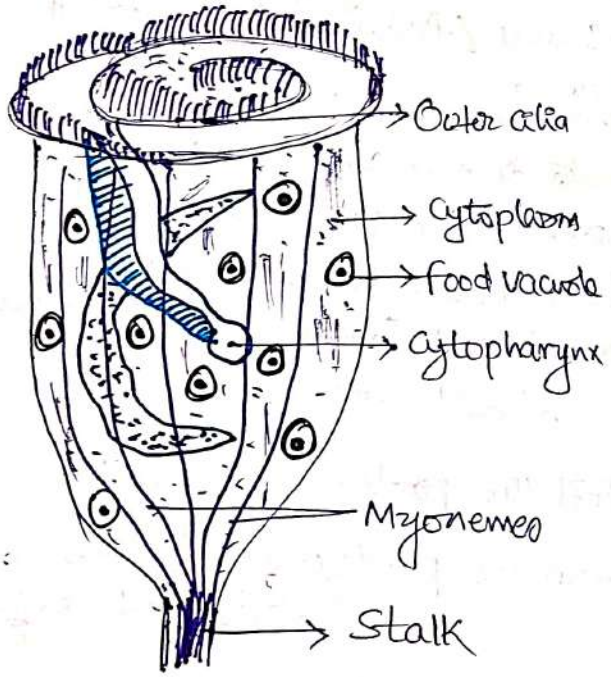
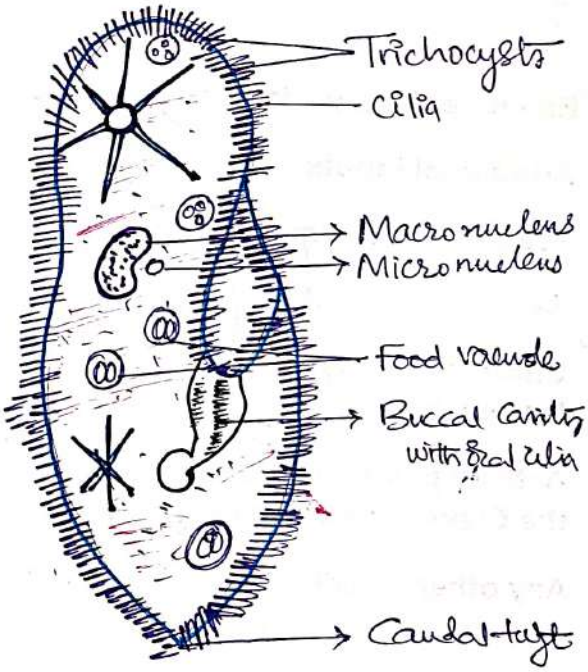
Amoeba



Vorticella



Paramecium



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : classification of protozoa

Hours required : 1 hr

Learning Objectives : ✓ To know the classification of protozoa
✓ To understand the evolutionary position

Previous knowledge to be reminded : ✓ To apply the classification rules accord to characters

(Continue on the reverse side if needed)

Topic Synopsis : according to L.H. Hyman

protozoa classified 2 sub phylums

① plasmodroma → Sarcodina, Mastigophora, Opalinata, Sporozoa

② Ciliophora – Ciliata

Examples/Illustrations : Amoeba
Entamoeba
Plasmodium

Additional inputs : ① Amoebic dysentery – E. Histolitica
② Malaria fever – plasmodium vivax

Teaching Aids used : Chart & Visual images showing classification of protozoa

References cited :

Student Activity Planned after the teaching : Students divided in to 4 groups and speak out the characters & examples

Activity planned outside the Class Room: if any : prepare a chart showing protozoan classification.

Any other activity : Assignment

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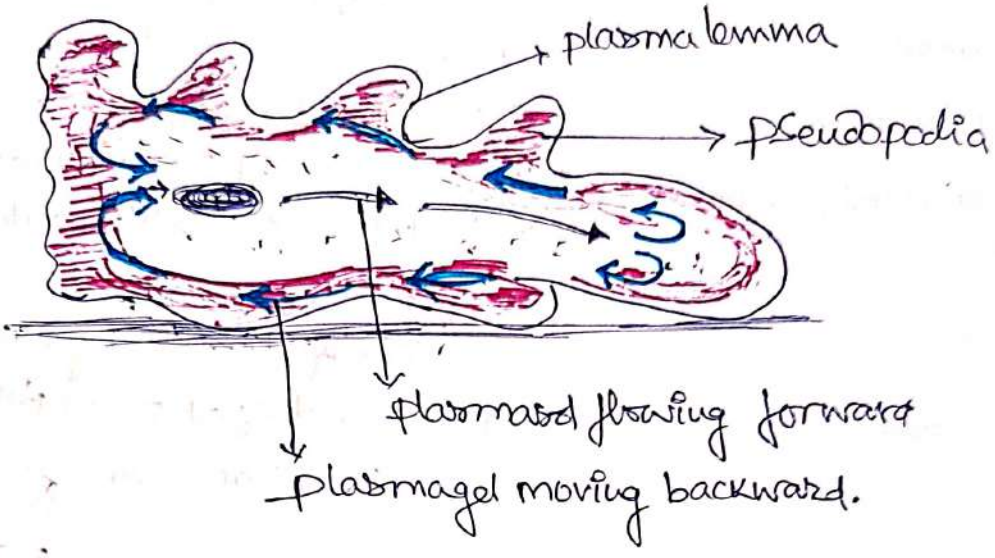
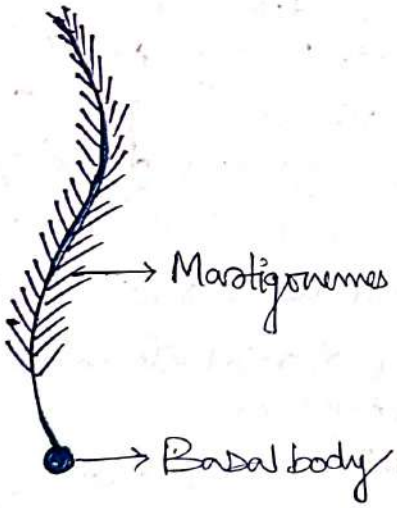
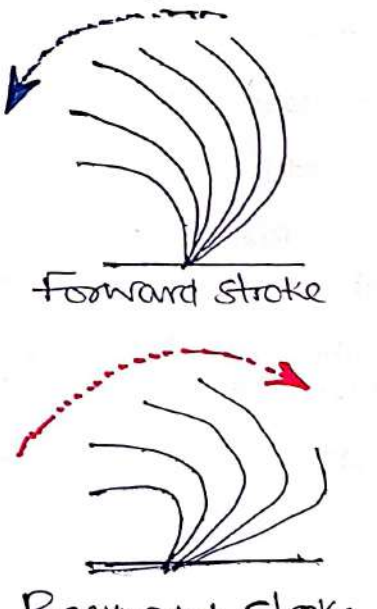
Movement of Amoeba



Pantonematic flagella



Ciliary movement



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Locomotion in protozoa

Hours required : 1 hr

Learning Objectives :
- ✓ To know the different locomotion organs in protozoa
- ✓ To understand the mechanism of locomotion
- ✓ To understand protozoan organisms food collection by locomotory organs.

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

* protozoan classification
* Locomotion.

Topic Synopsis :

Locomotion - movement — food, shelter & Reproduction

Types ← Amoeboid, Flagellar, Ciliary, Wriggling/gliding

① Amoeboid — Sol-gel theory
② Types of flagella ← stiff, pliable, Acro, Anematic
③ Ciliary ← Synchronous, Metachronous

Examples/Illustrations :

Additional inputs : Reticulopodia - Locomotion & food collection

Teaching Aids used : Locomotion - chart - with examples

References cited :
1. Invertebrata — Jordan & Verma
2. The invertebrates — L.H. Hyman

Student Activity Planned after the teaching : Act play by the students — by the action Students shows the different locomotion by

Activity planned outside the Class Room. if any : Make a chart having all types of locomotion Pictures with examples

Any other activity : Draw the diagrams of locomotion

Signature of the Lecturer

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Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu.S
Course / Group	:	I sem - BZC
Paper	:	I - Biology of Non chordates
Name of the Topic	:	Nutrition in protozoa
Hours required	:	1 hr
Learning Objectives	:	✓ To know the nutrition process ✓ To understand the different types of nutritions
Previous knowledge to be reminded	:	Types of Nutritions

(Continue on the reverse side if needed)

Topic Synopsis :

1. Holozoic / Zoo trophic nutrition
2. Pinocytosis
3. Autotrophic / holophytic nutrition
4. Saprozoic nutrition
5. parasitic nutrition
6. Coprozoic nutrition
7. Mixotrophic nutrition

Examples/Illustrations	:	Omnivores Carnivores
Additional inputs	:	parasitic - protozoan parasites - diseases
Teaching Aids used	:	chart showing All types of nutrition with examples.
References cited	:	1) The invertebrates - Kotpal
Student Activity Planned after the teaching	:	Group activity - Student wise nutrition types with examples
Activity planned outside the Class Room. if any	:	Draw a chart showing different nutrition mode
Any other activity	:	—

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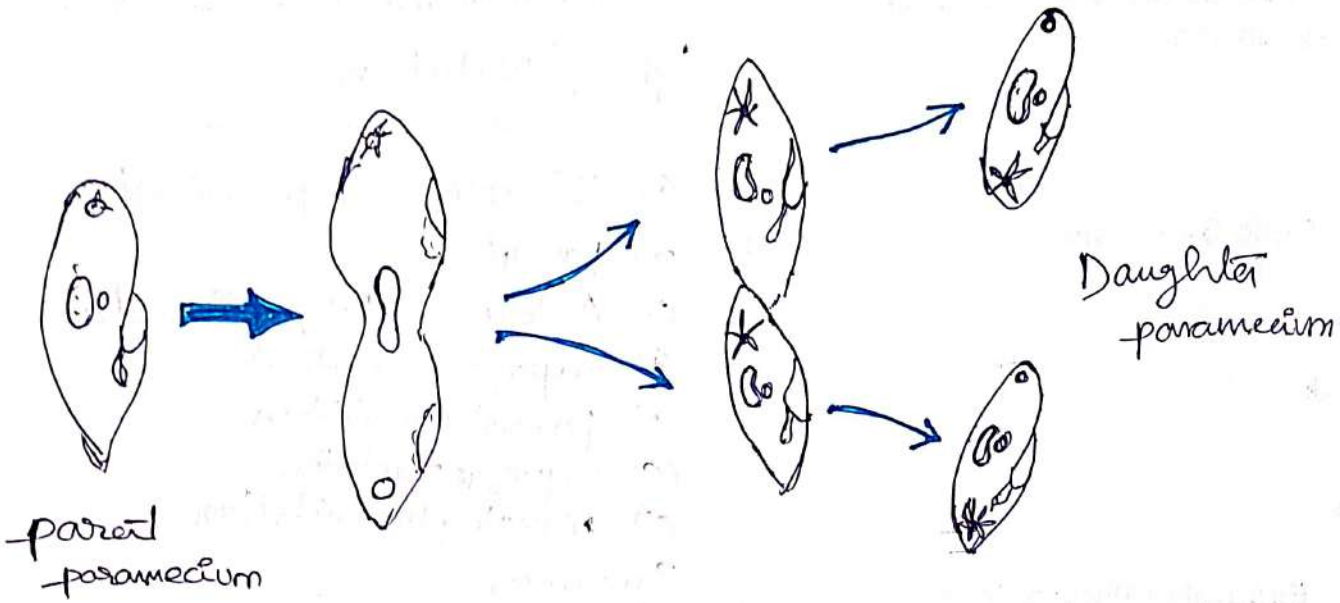
Transverse Binary fission of paramecium



Name of the Department / Subject: Ravi Babu. S
Name of the Lecturer : Zoology
Course / Group : I sem – BSc
Paper : I – Biology of Non Chordates
Name of the Topic : Reproduction in protozoa
Hours required : 1 hr
Learning Objectives :
- ✓ To know the importance of reproduction
- ✓ To understand the types of reproduction types
- ✓ To understand the reproduction process

Previous knowledge to be reminded : Asexual & Sexual Reproduction

(Continue on the reverse side if needed)

Topic Synopsis :

* it provides. Continuous existance of life
  - Transverse
  - Longitudi

Reproduction in Protozoa
- Asexual
  - Binary fission
  - Multiple fission
  - plasmotomy
  - Budding
  - Cyst formation
- Sexual
  - Syngamy
  - Conjugation
  - parthenogenesis
  - Regeneration

Examples/Illustrations : Euglena
paramoecium

Additional inputs : Varicella Reproduction
paramoecium – Syngamy & Autogamy

Teaching Aids used : Chart – paramoecium
Euglena – fission

References cited : The Invertebrates – Jordan & Verma

Student Activity Planned after the teaching : Draw the diagrams of reproduction

Activity planned outside the Class Room. if any : Assignment

Any other activity : –

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Name of the Department / Subject: Department of Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem BZC

Paper : I – Biology of Non chordates

Name of the Topic : Elphedium Structure – Life cycle

Hours required : 1 Hr

Learning Objectives :
- ✓ To understand the elphedium life cycle
- ✓ To differentiate Microsporic & Macrosporic in forams in life cyc

Previous knowledge to be reminded : Aquatic protozoans

(Continue on the reverse side if needed)

Topic Synopsis :
- * Dimorphic phoraminiferan (pore bearers / polystomella)
- * Unicellular, Microscopic protozoan
- * 1st formed chamber – prolaculum
- * Body ← Shell
  - Cytoplasm ← Endo, Ecto
  - Pseudopodea – Reticulopodea
- Reproduction ← Asexual, Sexual

Examples/Illustrations : Microsporic, Megalosporic

Additional inputs : Shells of the protozoans – foraminiferan Ooze

Teaching Aids used : Elphedium – Model, life history – chart

References cited : The invertebrates – Jordan & Verma

Student Activity Planned after the teaching : Students are arranged Spirally like elphedium shells and middle like prolaculum and tell the parts of elphedium

Activity planned outside the Class Room. if any :

Any other activity : Draw the diagram of elphedium

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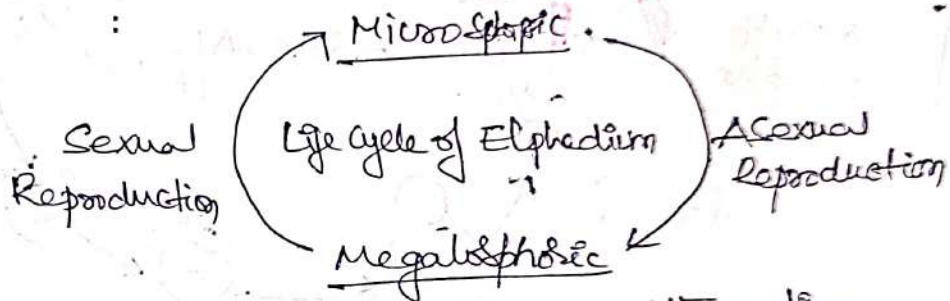
Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu. S
Course / Group	:	I sem - BZC
Paper	:	I - Biology of Non Chordates
Name of the Topic	:	Elphedium - Metagenesis
Hours required	:	1 hr
Learning Objectives	:	✓ To know the importance of metagenesis ✓ To understand the alteration of generation
Previous knowledge to be reminded	:	✓ To Analyse the Microsphoic and Megalosphoic structu

(Continue on the reverse side if needed)

Elphedium Structure

Topic Synopsis :



Examples/Illustrations	:	Micro & Megalosphoic - Alternative alteration of generation - Metagenesis
Additional inputs	:	Visual images of Microsphoic & Megalosphoic
Teaching Aids used	:	Life Cycle of elphedium - chart
References cited	:	The invertebrates - Jordan & Varma
Student Activity Planned after the teaching	:	Students divided - 2 groups each group - Speak out - characters of both Microsphoic & Megalosphoic
Activity planned outside the Class Room. if any	:	Draw the life cycle of elphedium
Any other activity	:	Assignment

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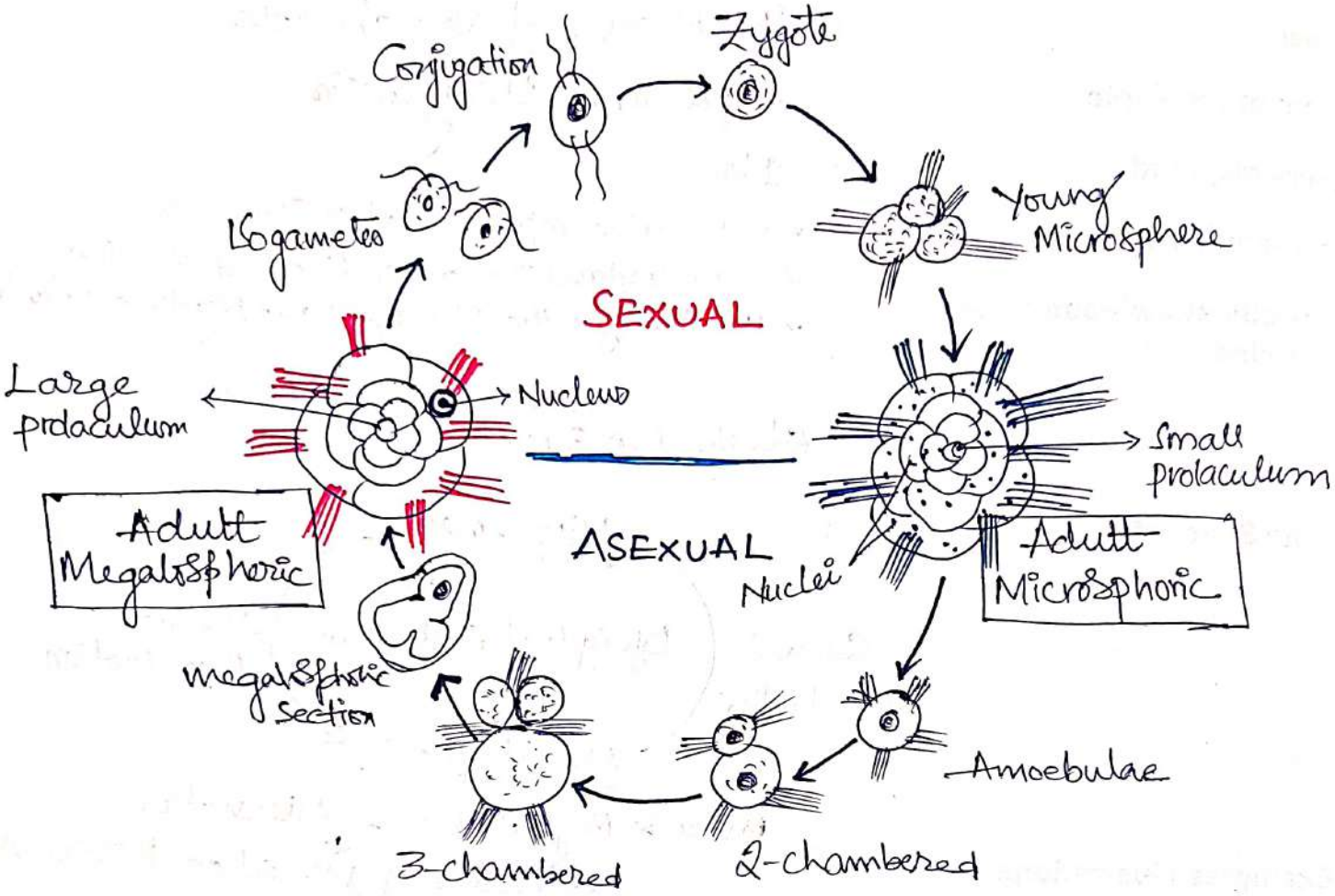
Elphedium- Reproduction and life cycle



Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu. S
Course / Group	:	I sem BZC
Paper	:	I - Biology of Non chordates
Name of the Topic	:	Porifera General characters
Hours required	:	1 Hr
Learning Objectives	:	✓ To Know the porifera organism Habit & habitat ✓ To understand the complexity of organism
Previous knowledge to be reminded	:	Protozoa Sponges (protozoa → porifera) *(Continue on the reverse side if needed)*
Topic Synopsis	:	* Aquatic organism - solitary & colonial * Body perforated numerous pores - Ostia * Diploblastic animals * Interior space - Spongocoel - covered - choanocytes * Nutrition - holozoic - intracellular digestion * High power of regeneration * Holoblastic cleavage
Examples/Illustrations	:	Sponges - Fresh water Sponge Euplectella - Venus flower basket
Additional inputs	:	Sponges Examples - Common names
Teaching Aids used	:	Visual images of Sponges
References cited	:	The 'invertebrates - R.L. Kotpal
Student Activity Planned after the teaching	:	each Student Speak on all general character " One Student - One General character"
Activity planned outside the Class Room. if any	:	Collect the porifera organisms and its important through internet
Any other activity	:	Assignment

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Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Classification of porifera

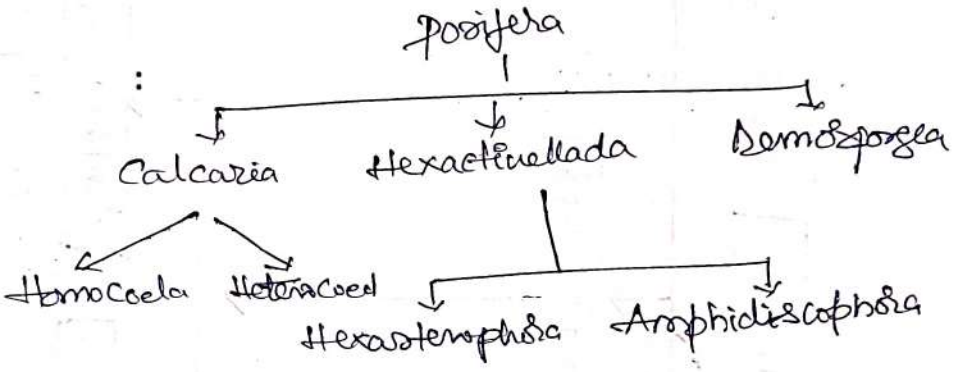
Hours required : 1 hr

Learning Objectives : ✓ To know the porifera classification
✓ To understand the taxonomical position of porifera

Previous knowledge to be reminded : porifera General Characters

(Continue on the reverse side if needed)

Topic Synopsis :



Examples/Illustrations : Fresh water sponges

Additional inputs : water canal System
Economic importance of porifera

Teaching Aids used : Chart showing porifera classification

References cited : The invertebrates - R L Kotpal

Student Activity Planned after the teaching : Total class divided by groups as per classification - Speak out examples

Activity planned outside the Class Room. if any : Assignment

Any other activity : Collect the economic importance porifera information through net

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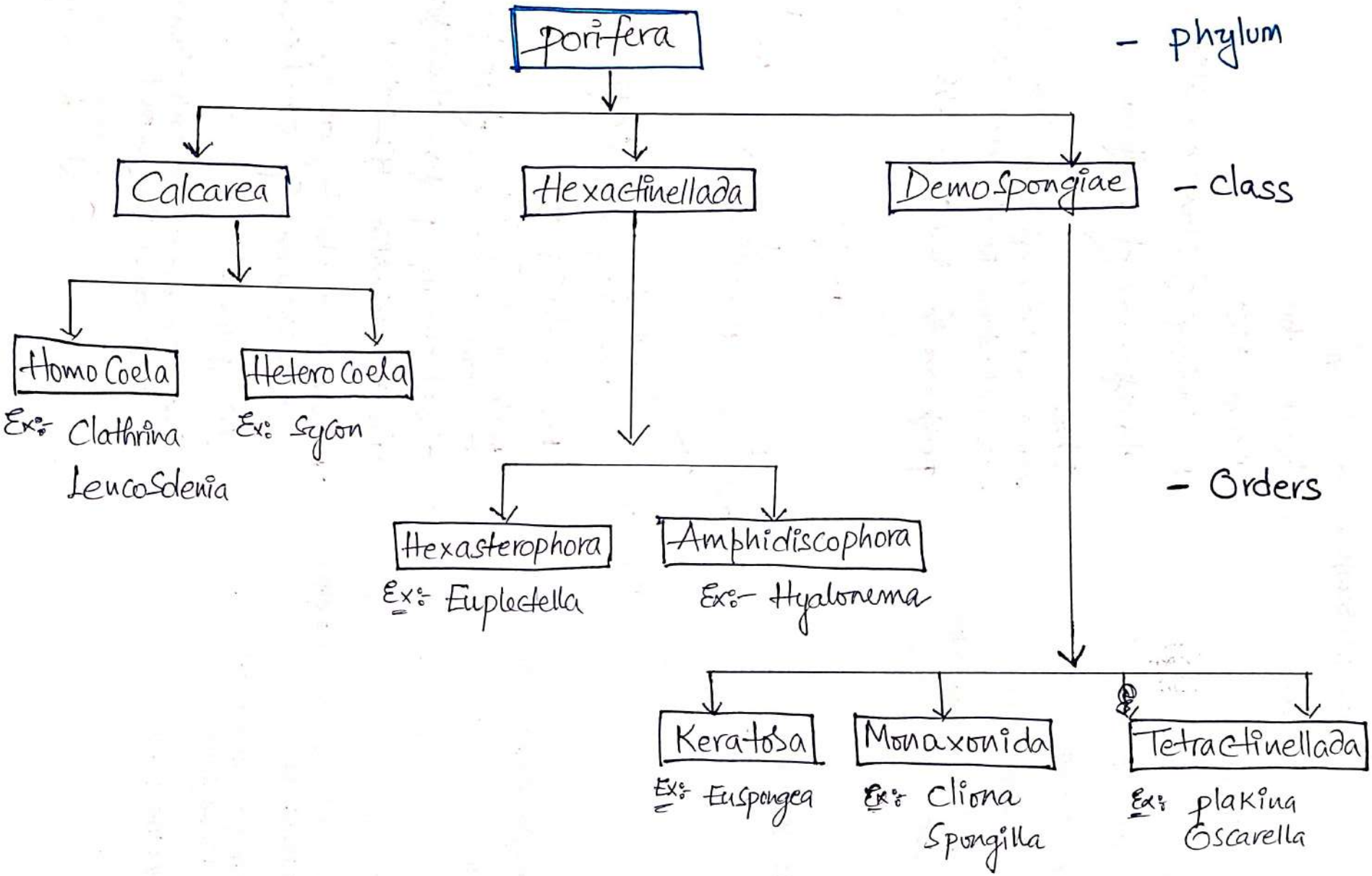
Porifera
- phylum
Calcarea
Hexactinellada
Demospongiae
- class
Homo Coela
Hetero Coela
Ex: Clathrina
Leucosdenia
Ex: Sycon
- Orders
Hexasterophora
Amphidiscophora
Ex: Euplectella
Ex: Hyalonema
Keratosa
Monaxonida
Tetractinellada
Ex: Euspongea
Ex: Cliona
Spongilla
Ex: plakina
Oscarella

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Skeleton in Sponges

Hours required : 1 hr

Learning Objectives : ✓ To know the types of Spicules in Skeletal system
✓ To understand how protects the porifarans Canal

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :

Development of Spicules
- Monaxon Spicules
- Triaxon Spicules
- Other spicules

classification
- Monaxons ← Styles, Tylostyles
- Triaxons
- Tetraxons
- polyaxons

Desma Spiers

Examples/Illustrations : Clacarous Spicules & Sponge Spicules

Additional inputs : Canal system & protection of Spicules

Teaching Aids used : Models of the different types of Spicules

References cited : The invertebrates - Jordan & verma

Student Activity Planned after the teaching : "each one - prepare one" - Spicules model by using thermocole

Activity planned outside the Class Room. If any : Draw the chart showing all type skeletal sys in porifarans.

Any other activity :

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Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - Zoology - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Canal System in Sponges

Hours required : 1 hr

Learning Objectives :
- ✓ To know the various types of canal systems in sponges
- ✓ To understand the water passage in canal systems
- ✓ To appreciate evolutionary relationship of canal system

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :

① Asconoid Type:
Exterior → incurrent pores → Spongocoel → Osculum → water out

② Syconoid type :-
incurrent canals → prosopyles → radial canals → internal ostia → Spongocoel → Osculum → out

③ Leuconoid - choanocytes - flagellated chambers

④ Rhagon type

Examples/Illustrations : Apodal — Geodia, Stellata
Diploda type — Spongilla

Additional inputs :

Teaching Aids used : Chart showing all types of canal system

References cited : The invertebrates — R.L. Kotpal

Student Activity Planned after the teaching : Students were divided into 4 groups - different canal systems like and speak out one by one passage of water sequentially.

Activity planned outside the Class Room. If any : Make a model showing water canal system

Any other activity : Assignment

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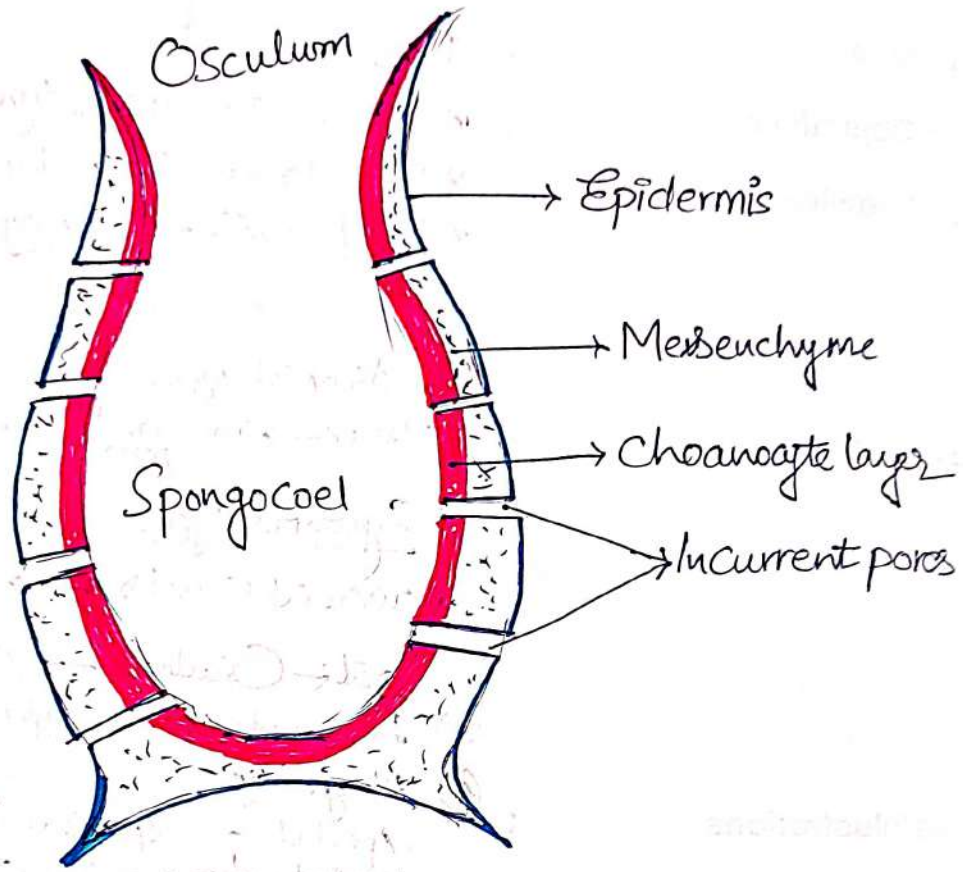
Asconoid type of Canal System



Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu.S
Course / Group	:	I sem – BZC
Paper	:	I – Biology of Non chordates
Name of the Topic	:	General characteristic features of Coelentarata
Hours required	:	1 Hr
Learning Objectives	:	✓ To know the Coelentarata general characters ✓ To understand the Complexity of Organisms
Previous knowledge to be reminded	:	✓ To differentiate various Zoo ids

(Continue on the reverse side if needed)

Topic Synopsis	:	* All Cnidarians are aquatic – Mostly Marine few fresh water. * Exhibit tissue level Organisation * Radial / Bi radial Symmetry * Body Cavity – Coelenteron (Gastro vascular Cavity) * Stinging cells – Cnidocytes / Cnidoblasts * primitive nervous like nervous System * Reproduction is both – Asexual & Sexual
Examples/Illustrations	:	Hydra & obelia
Additional inputs	:	Symmetry Complexity of body Organisation
Teaching Aids used	:	Visual images of phylum Coelentarata
References cited	:	The Invertebrates – R.L. Kotpal
Student Activity Planned after the teaching	:	Draw the Coelentarate Organisms
Activity planned outside the Class Room. if any	:	Collect additional information through internet about Cnidaria Organisms
Any other activity	:	Assignment

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Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of chordates

Name of the Topic : classification of Coelenterata

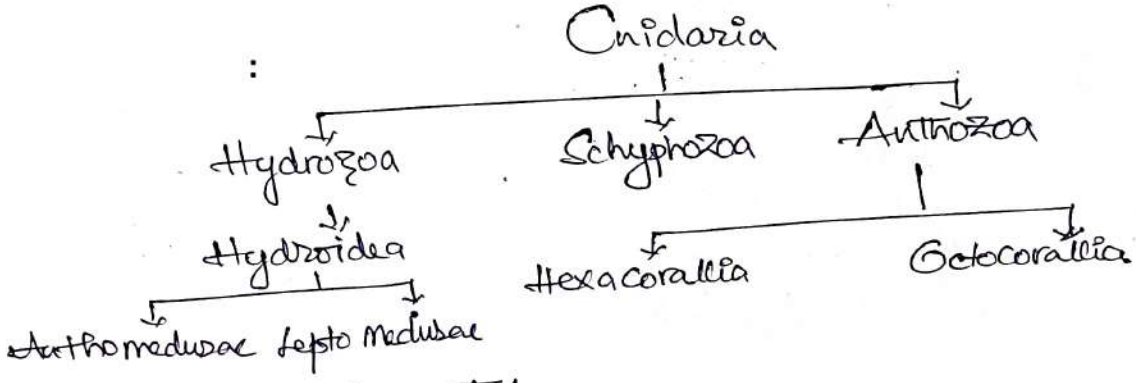
Hours required : 1 hr

Learning Objectives : ✓ To know the organisms belongs to the classes

Previous knowledge to be reminded : ✓ To understand the diversification in organisms
✓ To differentiate polyp & Medusa life of coelenterates

(Continue on the reverse side if needed)

Topic Synopsis :



Examples/Illustrations : Pennatula
Gorgonia, Tubipora, Aurelia

Additional inputs : Corals & Coral Reefs

Teaching Aids used : Specimens and models of the organisms

References cited : The Invertebrates - R.L. Kotpal

Student Activity Planned after the teaching : Each Students - Each example belongs to class / order.

Activity planned outside the Class Room. if any : Draw a chart showing classification of Coelenterata.

Any other activity : Collect addnl. info ~~regarding~~ through internet.

Ravi Babu

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Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : polymorphism in Coelenterata (Hydrozoa)

Hours required : 1 hr

Learning Objectives : ✓ To know the polymorphism
✓ To understand the developed Zooids & its work.

Previous knowledge to be reminded : ✓ To appreciate the division of labour by organism.

(Continue on the reverse side if needed)

Topic Synopsis :

polymorphism in hydrozoa

polyp	Medusa
① Gastrozoids	① pneumatophore
② Dactylozoids	② Nectocalyces
③ Gonozoids	③ phyllozooids
	④ Gonophores

Examples/Illustrations : physalia - Zooids
Halistemma -

Additional inputs : Division of labour - tissue level organisms

Teaching Aids used : polyp & Medusa polymorphism chart

References cited :
1. The Invertebrates - R.L. Kotpal
2. Invertebrates - Jordan & Verma

Student Activity Planned after the teaching : Students groups speak out each Zooid characters.

Activity planned outside the Class Room. if any : Draw the chart showing different Zooids

Any other activity : Assignment

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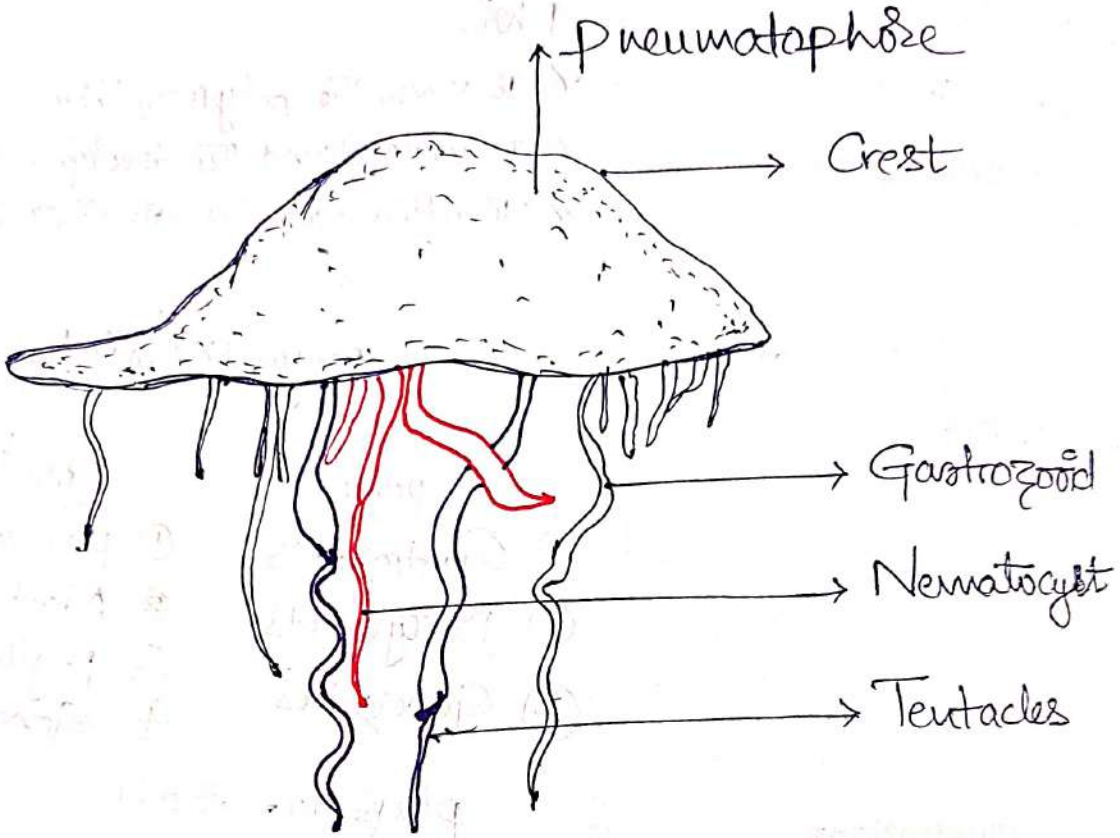
Physalia



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Corals & Coral reefs formation

Hours required : 1 Hr

Learning Objectives :
- ✓ To know the Coral reef formation
- ✓ To understand the Coral reef structure & importance
- ✓ To appreciate the Coral reef importance.

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :

Types of Corals
- Hydrozoan Corals
- Octocorallian Corals
- Hexa Corallian Corals

Coral formation
- Coral polyp
- Coral Skeleton
- Coral Growth

Types of Coral reefs
- Fringing reefs
- Barrier reefs
- Atolls reef

Examples/Illustrations : The Great barrier reef of Australia

Additional inputs : Aldabra in the Indian Ocean.

Teaching Aids used : Videos and visual images of Coral reefs in various Countries.

References cited :
- The invertebrates – L. H. Hyman
- The invertebrates – R. L. Kotpal

Student Activity Planned after the teaching :

Activity planned outside the Class Room. if any : Collect the Corals present in Surrounding India in Indian ocean.

Any other activity : Assignment

Sivala. R

Signature of the Lecturer

Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu. S
Course / Group	:	I sem – BZC
Paper	:	I – Biology of non chordates
Name of the Topic	:	Ctenophora – General Characters & Evolutionary relationship
Hours required	:	1 hr
Learning Objectives	:	✓ To know the Ctenophora organisms and characters ✓ To understand the evolutionary relationship
Previous knowledge to be reminded	:	

(Continue on the reverse side if needed)

Topic Synopsis	:	* All are Marine animals * Commonly called as – Sea walnuts / Comb jellies * Biradial Symmetry – Oral - aboral axis * Locomotion – 8 vertical rows of comb plates * Acoelomates / Triploblastic * Special adhesive Sensory cells – Colloblasts * It shows resemblance – polyclad turbellarians
Examples/Illustrations	:	Pleurobrachia Velamen, Cestum
Additional inputs	:	Biradial Symmetry
Teaching Aids used	:	Microscopic Slides of Ctenophora
References cited	:	The Invertebrates – R. L. Kotpal
Student Activity Planned after the teaching	:	make a chart of types of Symmetry with emphasis of Bi-radial Symmetry
Activity planned outside the Class Room. if any	:	Assignment
Any other activity	:	

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem - BZC

Paper : General characters and classification of platyhelminthes

Name of the Topic :

Hours required : I - Biology of Non chordates
1 hr

Learning Objectives :
✓ To know the P.H organisms and its causative diseases
✓ To understand the parasitic adaptation.

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :
* P.H are free living, Commensal or parasitic forms
* Worm like body - body flattend - leaf like
* First Triploblastic organisms
* Bilateral symmetry
* Incomplete digestive system
* Life cycles Complicated involved one & more hosts.

P.H ← Turbellaria / Trematoda / Cestoda

Examples/Illustrations : Planaria

Additional inputs : Fasciola

Teaching Aids used : Chart showing all the P.H. organisms

References cited : The Invertebrates - Jordan & Verma

Student Activity Planned after the teaching : "Each Student - Each Character"

Activity planned outside the Class Room. if any : Draw the P.H. classification on chart

Any other activity :

Siva. R

Signature of the Lecturer

Phylum.

platyhelminthes

Class

1. Turbellaria
2. Trematoda
3. Cestoda

Orders

- Acoela — Ex:- Convoluta
- Rhabdocoela — Ex:- Microstomum
- Alloeocoela — Ex:- Bothinoplana
- Tricladida — Ex:- planaria
- polycladida — Ex:- planocera

- Monogenea — Ex:- polystomum, Gyrodactylus
- Aspidogastraea — Ex:- Aspidogaster, Stichocotyle
- Digenea — Ex:- Fasciola, paragonimus

- Amphilinidea — Ex:- Amphilina
- Gyrocotylidea — Ex:- Gyrocotyle
- Tetraphyllidea — Ex: phyllobrothium
- Diphyllidea — Ex: Echinobothrium
- Taenioidea — Ex: Taenia

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu.S

Course / Group : I sem – BZC

Paper : I – Biology of Non Chordates

Name of the Topic : Life cycle and pathogenesis of fasciola

Hours required : 1 Hr

Learning Objectives : ✓ To know the pathogenicity of fasciola

✓ To understand the life cycle of fasciola

Previous knowledge to be reminded : Taenea Solium

(Continue on the reverse side if needed)

Topic Synopsis :

* F. Hepatica – Sheep liver – Liver rot disease
* Digenetic life cycle – 1st host – Sheep
  2nd host – Lymnaea (snail) (Intermediate host)
* Self fertilization / Cross fertilization
* Internal fertilization – Copsual formation
  eggs – cleavage – embryonic dev.. → Larvae
  ① Miracidium Larva
  ② Sporocyst Larva
  ③ Redia Larva
  ④ Circaria Larva
  ⑤ Metacircaria Larvae

Examples/Illustrations :

Additional inputs :

Teaching Aids used : Life cycle of Fasciola – chart
observe fasciola slides under Microscope

References cited : The Invertebrates – R.L. Kotpal

Student Activity Planned after the teaching : Speak out one by one fasciola Larvae in life cycle and its characters.

Activity planned outside the Class Room. if any : Collect the path. organisms and its causative diseases and prophylactic information.

Any other activity : polyembryony importance – information – Collection

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem – BZC

Paper : I – Biology of Non chordates

Name of the Topic : parasitic adaptations in helminthes

Hours required : 1 hr

Learning Objectives : ✓ To know the morphological adaptations.
✓ To understand the significance of adaptations

Previous knowledge to be reminded : Ascaris, Taenia solium

(Continue on the reverse side if needed)

Topic Synopsis :

parasitic adaptations

Morphological adaptations
1. Loss of organs
2. Formation of new organs
3. Modification of existing organs

physiological adaptations
1. Aerobic respiration
2. Osmo regulation
3. Anti enzymes
4. Reproductive potential

Examples/Illustrations : Ascaris
Taenia

Additional inputs : Helminth parasites – Causative diseases

Teaching Aids used : Chart – showing – adaptations

References cited : The Invertebrates – R.L. Kotpal

Student Activity Planned after the teaching : Group activity – 2 Groups
1. Morphological adaptations
2. physiological adaptations

Activity planned outside the Class Room. if any : Draw the chart

Any other activity : Quiz on helminthes parasites – diseases

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem – BZC

Paper : I – Biology of Non chordates

Name of the Topic : General characters and classification of Nemathelminthes

Hours required : 1 Hr

Learning Objectives :
- ✓ To know the nemathelminthes characters
- ✓ To understand the evolutionary position and significance of N. Helminthes

Previous knowledge to be reminded : Ascaris

(Continue on the reverse side if needed)

Topic Synopsis :
- * Commonly called – thread worm / round worm
- * Body Covers – resistant cuticle
- * Triploblastic – Pseudo coelomates
- * Organ System level of body organisation

N. Helminthes

classes

Rotifera | Gastrotricha | Kinorhyncha | Nematoda | Priapulida

Nematomorpha

Examples/Illustrations : Oxyuris
Enterobius

Additional inputs :

Teaching Aids used : General characters & classification } – chart

References cited : The Invertebrates – Jordan & Verma

Student Activity Planned after the teaching : Draw the classification of nemathelminthes and examples

Activity planned outside the Class Room. if any : Collect the information about Causative parasites and its hosts through internet

Any other activity :

Girala. R Babu

Signature of the Lecturer

Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu. S
Course / Group	:	I Sem - BZC
Paper	:	I - Biology of Non chordates
Name of the Topic	:	Life Cycle and pathogenicity of Ascaris
Hours required	:	1 hr
Learning Objectives	:	✓ To know the Ascaris life cycle ✓ To understand the pathogenicity of Ascaris
Previous knowledge to be reminded	:	round worms

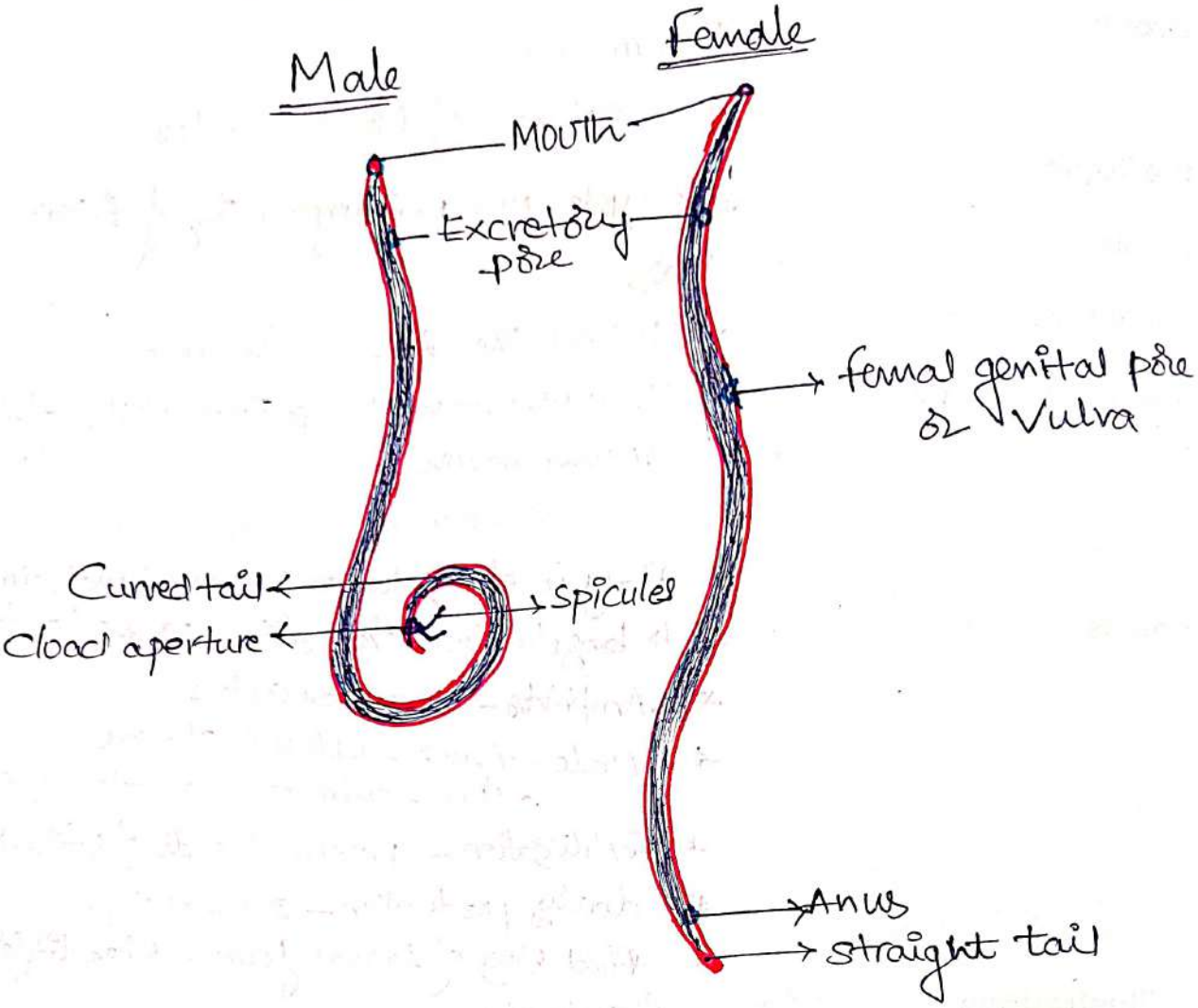
(Continue on the reverse side if needed)

Topic Synopsis	:	* Body is elongated and shows sexual dimorphism * 4 longitudinal Stripes/lines present on body. * Amphids - Chemoreceptors * Male - Anus replaced cloaca - tail - numerous genital papella pres * Fertilization - proximal ends of uterus * daily production - 200000 eggs * First stage of Larval form - Rhabditiform
Examples/Illustrations	:	Ascaricis
Additional inputs	:	personal hygiene Helminth worms
Teaching Aids used	:	Life cycle of Ascaris - chart
References cited	:	The Invertebrates - L.H. Hyman
Student Activity Planned after the teaching	:	Group wise Students - Larval form character Sequential Orders of Larval forms
Activity planned outside the Class Room. if any	:	Draw the life cycle chart of Ascaris
Any other activity	:	Tabulation on the Nematelminth worms & diseases

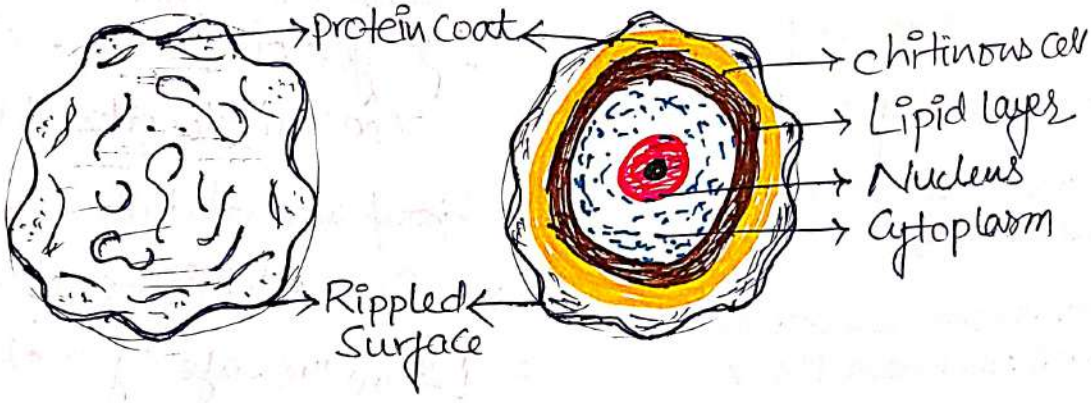
Gjala. R

Signature of the Lecturer

Ascaris lumbricoides



Mammilated eggs of Ascaris



Name of the Department / Subject:		Ravi Babu. Sivala
Name of the Lecturer	:	Department of Zoology
Course / Group	:	I sem - BZC
Paper	:	I - Biology of Non chordates
Name of the Topic	:	General Characters of Annelida
Hours required	:	1 hr.
Learning Objectives	:	✓ To know the General characters of Annelida ✓ To understand the coelome and body organization
Previous knowledge to be reminded	:	✓ To apply Economic importance of Annelida

(Continue on the reverse side if needed)

Topic Synopsis	:	* Organ System level of body organisation * Triploblastic - with endoderm, ectoderm & mesoderm * Eucoelomate - Schizocoelomates * Closed Circulatory System * Respiration by skin or Gills * Excretory System - Metamerically arranged * Hermaphrodites
Examples/Illustrations	:	Leech Earthworm, Neris
Additional inputs	:	Earthworms - Vermiculture
Teaching Aids used	:	Annelida - Examplory Organisms Visual images
References cited	:	The Invertebrates - Jordan & Verma
Student Activity Planned after the teaching	:	One Student - One General character
Activity planned outside the Class Room. if any	:	Observe the earthworm body structure and locomotion
Any other activity	:	—

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu. Sivala
Course / Group	:	I sem- BZC
Paper	:	I- Biology of Non Chordates
Name of the Topic	:	classification of Annelida
Hours required	:	1 hr.
Learning Objectives	:	✓ To understand the classification of Annelida ✓ To understand the evolutionary relationship
Previous knowledge to be reminded	:	✓ To apply the taxonomical rules

(Continue on the reverse side if needed)

Topic Synopsis :

Annelida

Polychaeta	Oligochaeta	Hirudinea	Archiannelida
Setae/parapodia	Setae	Suckers	Ciliated epidermis
Ex- Nereis	Ex:- pheritema	Ex:- Acanthobdella	Ex: polygordius

Examples/Illustrations	:	Order wise Animals
Additional inputs	:	Earthworms & Leech
Teaching Aids used	:	classification chart of Annelida
References cited	:	The invertebrates – R.L. Kotpal
Student Activity Planned after the teaching	:	Group wise – characters and examples
Activity planned outside the Class Room. if any	:	Draw the classification chart
Any other activity	:	observe and report the differences between leech and earthworm

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu.S

Course / Group : I sem – BZC

Paper : I – Biology of Non chordates

Name of the Topic : Vermiculture – Scope & Significance

Hours required : 1 hr

Learning Objectives : ✓ To know the preparation of vermiculture
✓ To understand the process of vermicompost

Previous knowledge to be reminded : ✓ To apply the knowledge to establish vermi industries

(Continue on the reverse side if needed)

Topic Synopsis :
* earthworms convert organic waste to vermicompost
* decomposing organic waste and turning in to nutrient – rich fertilizer
* beneficial way – improving – fertility of the plant & soil
* loosing the soil aeration, tilth and texture.
* Can be done in both indoor and outdoor
* it improves water retention Capacity
* Economic importance of vermiculture

Examples/Illustrations : organic manure, organic farming

Additional inputs : Vermi by products – Vermi wash, Vermi oil

Teaching Aids used : earthworms & vermicompost

References cited : Text book of Vermi Compost: Vermi wash and Biopesticides – Dr. Keshar Singh

Student Activity Planned after the teaching : Economic Importance of the vermicompost

Activity planned outside the Class Room. if any : prepare a vermiculture bed in College Campus
make farming of vermiculture.

Any other activity : Vermicompost to the plants.

Sivala. Ravi Babu
Signature of the Lecturer

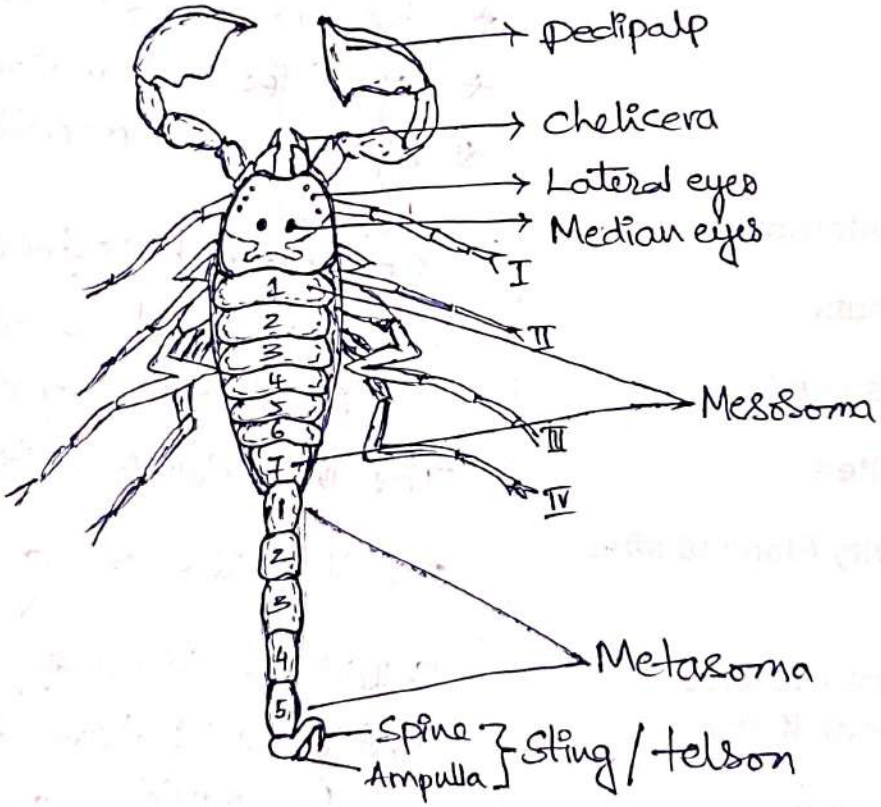
Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu.S
Course / Group	:	I sem BSC- Biology of Non chordates
Paper	:	Animal Diversity - paper-I
Name of the Topic	:	Arthropoda General characters
Hours required	:	1hr
Learning Objectives	:	✓ To know the Arthropoda General characters ✓ To understand the body organisation structure ✓ To apply the insect knowledge to real life- Sericulture epiculture
Previous knowledge to be reminded		*(Continue on the reverse side if needed)*
Topic Synopsis	:	* Triploblastic, bilaterally symmetrical and metamerically segmented. * Segments having pair of jointed appendages * Body cavity - Haemocoel * Respiration - Gills / Book lungs / Book gills * open type of circulation * Life cycle - Metamorphosis - Complete / incomplete
Examples/Illustrations	:	Insects- Cockroaches, butterflies
Additional inputs	:	Visual images of Insects
Teaching Aids used	:	Models of Arthropoda organisms
References cited	:	The Invertebrates - R.L. Kotpal
Student Activity Planned after the teaching	:	one student - one general character
Activity planned outside the Class Room. if any	:	Collect the surrounding Arthropoda organism and make it tabular form.
Any other activity	:	Assignment

Sivala. Ravi Babu

Signature of the Lecturer

Butterfly

Scorpion - External features



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem- BZC- Zoology

Paper : I - Biology of Non chordates

Name of the Topic : Classification of Arthropoda

Hours required : 1 hr

Learning Objectives : ✓ To understand the evolutionary relationship of the Arthropoda

Previous knowledge to be reminded : ✓ To apply the taxonomical hierarchy in classification

(Continue on the reverse side if needed)

Topic Synopsis :

Arthropoda

Trilobita	Crustacea	Miriapoda	Insecta	Arachnida
Oldest arthropods all are marine Ex:- Trilobite	body Covered with chitin Head - 6 segments Ex:- Apus Daphnia	Respiratory structure tracheae Trachae - Spiracles Ex:- Scolopendrella Scutigerella	Body - Head Thorax Abdomen Ex:- Grass hopper Locust	Body < prosoma opisthosoma 6 pairs - appendages Ex:- Xiphosura

Examples/Illustrations : Crustaceans Insects

Additional inputs : Economic importance of Arthropoda

Teaching Aids used : Chart showing classification of Arthropoda

References cited : The Invertebrates - R.L. Kotpal

Student Activity Planned after the teaching : each group - each order characters

Activity planned outside the Class Room. if any : Draw the chart showing Arthropoda classification

Any other activity : Assignment

Siva. R

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu.S

Course / Group : I sem – BZC

Paper : I – Biology of Non chordates

Name of the Topic : Vision & Respiration in Arthropoda

Hours required : 1 Hr

Learning Objectives : ✓ To know the parts involved in Arthropoda vision

Previous knowledge to be reminded :
✓ To understand the process of vision and working of Compound eye
✓ To compare Simple and Compound eye vision

(Continue on the reverse side if needed)

Topic Synopsis :

- Structure of ommatidium
  - Cornea
  - Corneagen cells / Lenticular cells
  - Vitrellae / Cone cells
  - Crystalline Cone
  - Retinulae
- Reproductive System
  - Male
    - Testes
    - Seminal vesicle
    - ejaculatory ducts
  - Female
    - ovaries
    - Vagina
    - Spermtheca / receptaculum seminis

Examples/Illustrations :

Additional inputs : Life history of Cockroach

Teaching Aids used : PPT and Models of R.S

References cited : The Invertebrates – L. H. Hyman
Animal Diversity – Invertebrates – Telugu Akademi

Student Activity Planned after the teaching : Speak out the process of vision & reproduction

Activity planned outside the Class Room. if any : prepare a model for Ommatidia

Any other activity : Assignment

Ravi Babu.S

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I B.Sc - Zoology

Paper : I - Biology of Non chordates

Name of the Topic : Metamorphosis in Insects

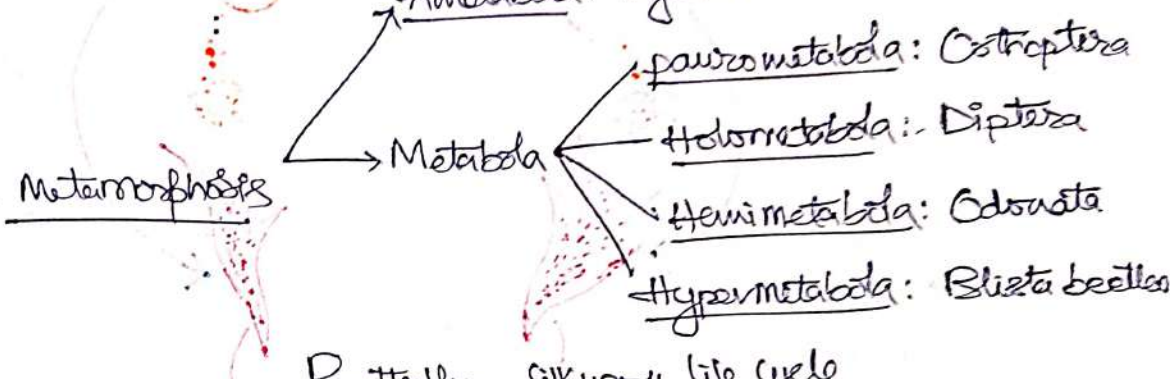
Hours required : 1 hr.

Learning Objectives : ✓ To know the developmental stages of insect
✓ To understand the hormonal influence on metabola

Previous knowledge to be reminded : ✓ To differentiation various types of metamorphosis

(Continue on the reverse side if needed)

Topic Synopsis :



Examples/Illustrations : Butterfly - Silkworm life cycle
Larvae - pupa - Cocoon

Additional inputs : Visual images of metamorphosis

Teaching Aids used : Audio - Video visual images of life-cycle

References cited : The invertebrates - R.L. Kotpal

Student Activity Planned after the teaching : identify the stages of metamorphosis of various insects

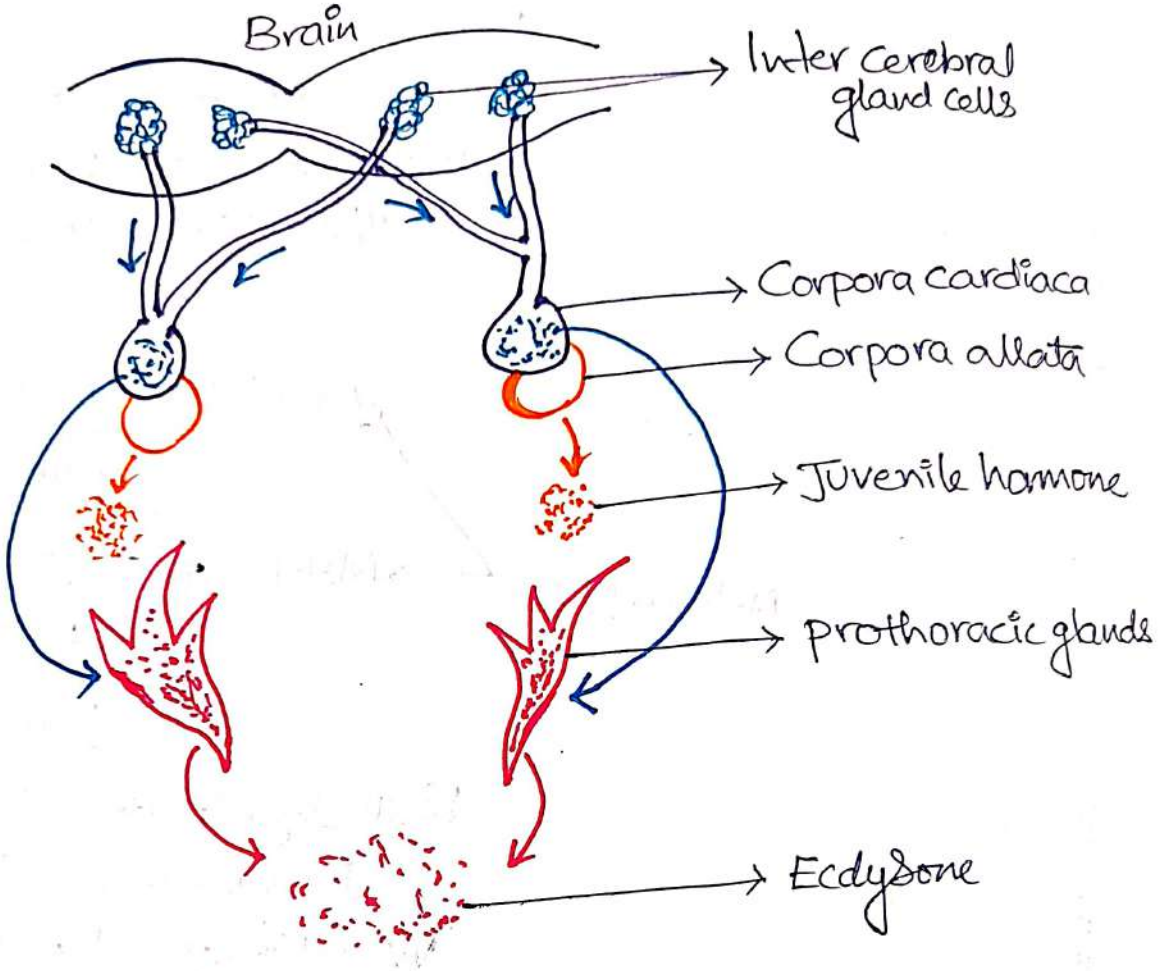
Activity planned outside the Class Room. if any : Collect the information of various stages of insects

Any other activity : Quiz

Sivala. R

Signature of the Lecturer

Hormonal Control of Metamorphosis



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non Chordates

Name of the Topic : Peripatus Structure

Hours required : 1 hr

Learning Objectives : ✓ To know the peripatus structure
✓ To understand the evolutionary relationship

Previous knowledge to be reminded : Annelida & Arthropoda characters

(Continue on the reverse side if needed)

Topic Synopsis :
* Identified by Guilding (1826)
* 2 families < Peripatidae
Peripatopsidae
* example for discontinuous distribution
* Terrestrial - living in dark places
* Body - skin - dry, soft, velvety
- devoid into segments

Examples/Illustrations : Earthworms
Insects

Additional inputs : discontinuous distribution
Sub-genera peripatus

Teaching Aids used :

References cited : 1) The Invertebrates - L.H. Hyman
2) Invertebrates - Jordan & Verma

Student Activity Planned after the teaching : Speak on the characters of peripatus

Activity planned outside the Class Room. if any : Make a model on peripatus with thermocol and Decorate with velvet cloth

Any other activity :

Sivala. Ravi Babu
Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem - BSc

Paper : I - Biology of Nonchordates

Name of the Topic : affinities of peripatus

Hours required : 1 hr.

Learning Objectives : ✓ To understand the peripatus special characters
✓ To differentiate - Annelida & Arthropoda characters

Previous knowledge to be reminded : ✓ To apply the taxonomical rules

(Continue on the reverse side if needed)

Topic Synopsis : * Shows affinities with annelida as well as arthropoda

Annelidan affinities:
- Body - external thin cellical covering
- Head - Undifferentiated
- Muscles are non straiated
- pair of simple eyes - Sensory Organs

Arthropoda affinities:-
- Body - Chitinious external covering
- Coelom - Haemocoel
- Colourless blood

Examples/Illustrations :

Additional inputs : peripatus - personal characters

Teaching Aids used : Affinities chart of both Annelida & Arthropoda

References cited : 1. The Invertebrates - R.L. Kotpal
2. Biology of nonchordates - Telugu Akademi

Student Activity Planned after the teaching : Student are divided in to 2 groups.
each group - each phyllum affinities

Activity planned outside the Class Room. if any : Make a note on affinities of peripatus

Any other activity : Assignment

Siva-Rambabu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu.S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Social life in honey Bees & ~~Termites~~ Economic importance

Hours required : 1 hr

Learning Objectives :
- ✓ To know the social life honey bee
- ✓ To understand the division of labour
- ✓ To apply the economic importance of honeybees in real life

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :

Species
1. Apis dorsata – Giant honeybee
2. Apis Mellifera – Common european honeybee
3. Apis indica – Indian honeybee
4. Apis florae – The little honeybee

- Social insects – living in colonies
- exhibit – polymorphism & division of labours
- honey bee Castes
  - Single queen – functional female
  - few hundreds of drones
  - Several thousands workers

Examples/Illustrations : Honey bees
Termites

Additional inputs : epiculture, Sericulture
economic importance

Teaching Aids used : Honey bee Cast – Mechanised Cast

References cited :
1. The invertebrates – R.L. Kotpal
2. Economic Zoology – Shukla & Mathur

Student Activity Planned after the teaching : Man is a social animal – Social life of man act

Activity planned outside the Class Room. if any : Visit Apiculture unit and submit the report.

Any other activity :

Siva. R

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : General characters of Mollusca

Hours required : 1 hr

Learning Objectives : ✓ To know the General characters of Mollusca

Previous knowledge to be reminded : ✓ To understand the Sensory Organs in Mollusca

✓ To appreciate pearl formation & pearl industry

(Continue on the reverse side if needed)

Topic Synopsis :

* Aquatic and Soft bodied Organisms
* Triploblastic, Coelomates and Unsegmented bodied
* Body ← head, foot, Mantle & viscerals
* Complete digestive System - radula, hepatopancreas
* Respiration - Gill / lungs or both
* well developed Sensory Organs.

Examples/Illustrations : Pila, Unio, Pearls

Additional inputs : Snails & pearl industry

Teaching Aids used : Corystes, Snails, charts

References cited : The Invertebrates - R. L. Kotpal

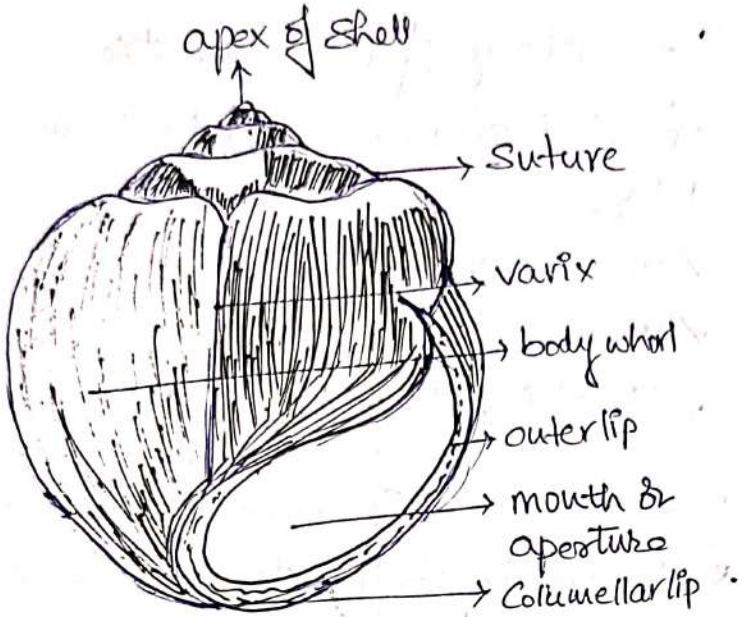
Student Activity Planned after the teaching : Each Student - each characters

Activity planned outside the Class Room. if any : Collect the Molluscan Organism information Surrounding on your residence

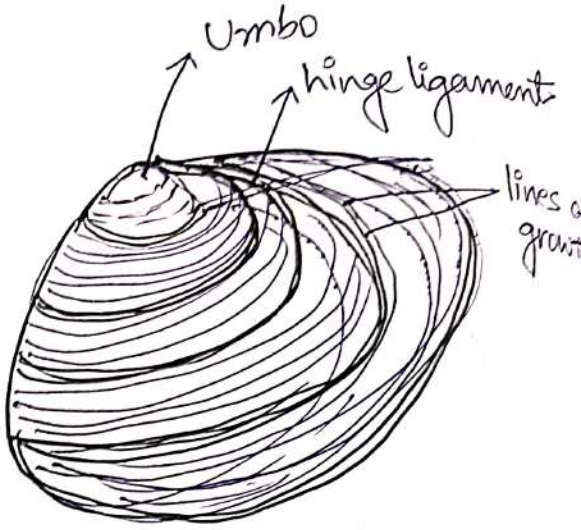
Any other activity :

Signature of the Lecturer

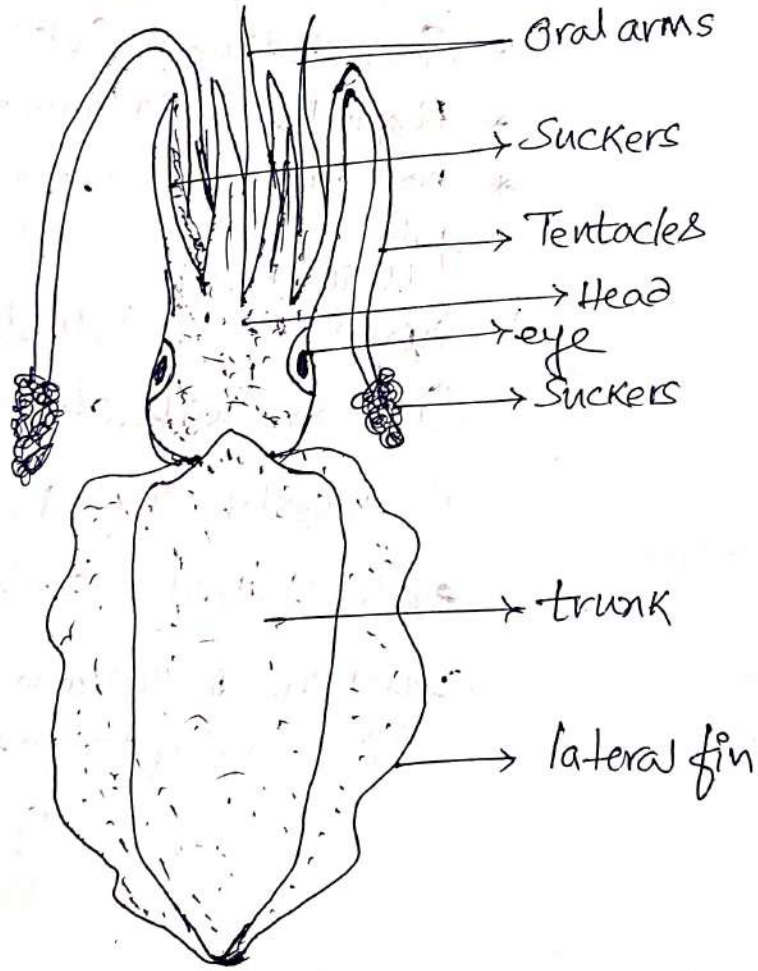
Pila globosa



Unio



Sepia



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu.S

Course / Group : Isem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Classification of Mollusca

Hours required : 1hr

Learning Objectives : ✓ To know the classes of mollusca
✓ To understand the evolutionary relationship of mollusca

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis : Mollusca

- Aplacophora & Neomenia Ex: Chiton
- Polyplacophora
- Monoplacophora & Neopilina
- Gastropoda & Lymnaea
- Scaphopoda Ex: Dentalium
- Pelecypoda & Ostrea
- Cephalopoda

Examples/Illustrations : Snails
Bi-valves, pearl oysters

Additional inputs : ✓ pearl formation
✓ Economic importance of pearl

Teaching Aids used : classification chart of mollusca

References cited : The Invertebrates - R.L. Kotpal

Student Activity Planned after the teaching : Group activity
Students groups formed accord to class and Speak on the characters

Activity planned outside the Class Room. if any : Draw the classification chart of mollusca

Any other activity :

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem- BZC

Paper : I - Biology of Non chordates

Name of the Topic : Pearl formation in pelecipoda & pearl industry

Hours required : 1 hr

Learning Objectives : ✓ To know the pearl-formation by pinctada
✓ To understand the layers in pearl forming
✓ To apply knowledge in

Previous knowledge to be reminded

(Continue on the reverse side if needed)

Topic Synopsis :
* Pearl is a result of injury of mollusc
* Secreted by mantle as means of protection
* Nacreous layer secrete pearl
* genus - Pinctada
* important species - P. vulgaris
P. Margaritifera
* Artificial pearl culture industry formed.
practised - Japanese

Examples/Illustrations : Artificial pearls
pearl industry in hyderabad

Additional inputs :

Teaching Aids used : Beading of pearls
Bivalve of Molluscs

References cited : Economic Zoology - Shukla & Mathur

Student Activity Planned after the teaching : Collect the information about pearl culture among the practised countries

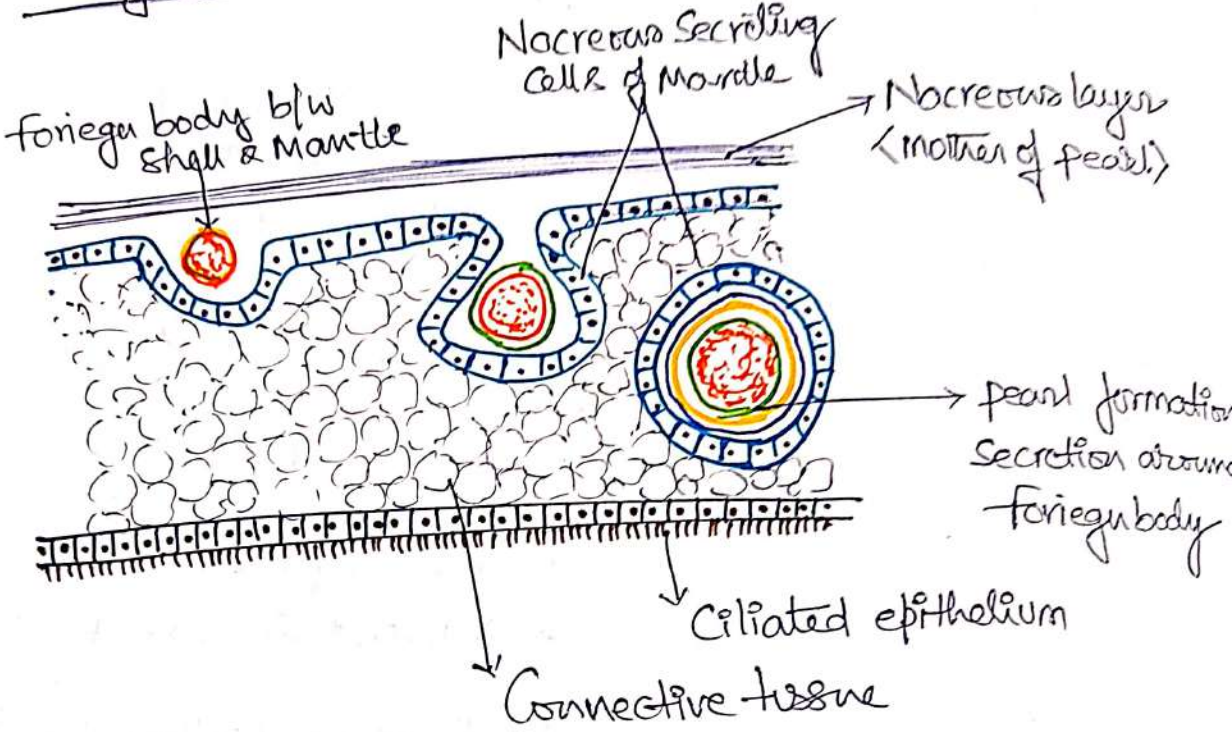
Activity planned outside the Class Room. if any : Assignment

Any other activity :

Siva. Ravi Babu

Signature of the Lecturer

Stages in pearl formation



Name of the Department / Subject:		Zoology
Name of the Lecturer	:	Ravi Babu. S
Course / Group	:	I Sem - BZC
Paper	:	I - Biology of Non Chordates
Name of the Topic	:	Echinodermata General characters
Hours required	:	1 hr.
Learning Objectives	:	✓ To know the echinodermata organisms ✓ To understand the Complexity of organisms
Previous knowledge to be reminded	:	✓ To compare Sponges and echinodermata water - Canal system.

(Continue on the reverse side if needed)

Topic Synopsis	:	* Marine organisms, mostly free living organisms * Body - Radially symmetrical - pentamerous arrangement * Body - triploblastic - 3 germinal layers * Circulatory / Haemal or blood vascular system is reduced and radiate. * Sense organs are poorly developed.
Examples/Illustrations	:	Starfishes & Feather Stars
Additional inputs	:	charts and visual images
Teaching Aids used	:	The invertebrates - R.L. Kotpal
References cited	:	The Biology of non chordates - Telugu Academy
Student Activity Planned after the teaching	:	Collect the echinodermata organisms data
Activity planned outside the Class Room. if any	:	Write the general characters of echinodermata
Any other activity	:	Assignment

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem - BZC

Paper : Biology of Non Chordates - I

Name of the Topic : Classification of Echinodermata

Hours required : 1 hr

Learning Objectives : ✓ To know the classes in echinodermata
✓ To understand the evolutionary relationship

Previous knowledge to be reminded : ✓ To Analyse the water vascular system in echinoderms

(Continue on the reverse side if needed)

Topic Synopsis :

Echinodermata

- Eleutherozoa
  - Asteroidea — Ex: Asterias
  - Ophiuroidea — Ophiothrix
  - Echinoidea — clypeaster
  - Holothuroidea — holothuria
- pelmatozoa
  - Crinoidea — Ex: Antedon

Examples/Illustrations : Sea Stars and Serpent Stars

Additional inputs : Dermis of the echinoderms
water vascular System

Teaching Aids used :

References cited : The Invertebrates - 1. L. H. Hyman
2. R. L. Kotpal

Student Activity Planned after the teaching : Students were categorised in groups according to classes and Special characters

Activity planned outside the Class Room. if any : Draw the chart showing echinodermata classification

Any other activity :

Sivala. R. Babu
Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I Sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : water vascular System in Starfish

Hours required : 1 hr

Learning Objectives : ✓ To know the structure water vascular System

✓ To understand the proces of water supply to body

Previous knowledge to be reminded : ✓ To Analyse how water vascular System carry functions

(Continue on the reverse side if needed)

Topic Synopsis : Water vascular System – process of Conduction

1) Madreporite – minute pores – pore Canals
2) Stone canal – S shaped Canal open to ring canal
3) Ring Canal – pentagonal Canal forming a ring
4) Tiedmanns bodies – open in to ring Canal
Racemose glands
5) Polian vesicles – Regulating pressure
6) Radial Canals – 5 radial Canals
7) Lateral Canal – each arm given Lateral Canals
8) Tube feet ← Ampulla, podium, Sucker

Examples/Illustrations : Working model shows - echinoderm water vascular System – locomotion function

Additional inputs :

Teaching Aids used :

References cited : The Invertebrates – L. H. Hyman

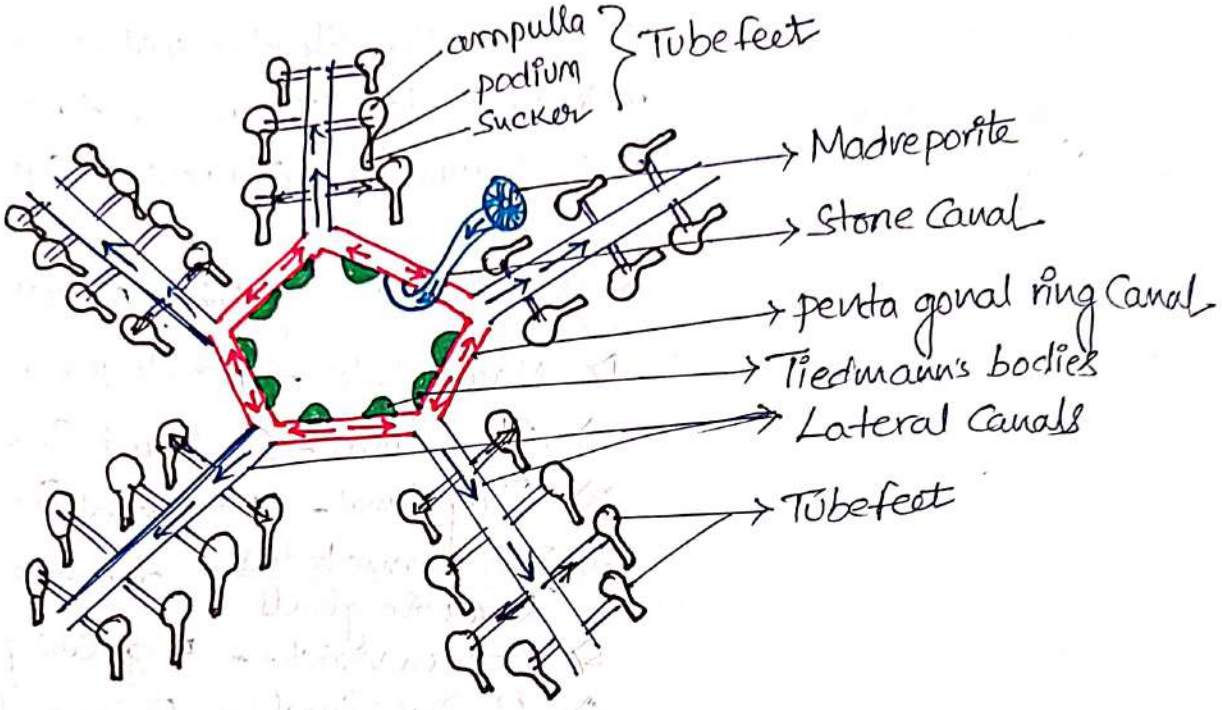
Student Activity Planned after the teaching : Spear out the Sequential path involved in water vascular System and its process

Activity planned outside the Class Room. if any : prepare a model shows - water vascular System

Any other activity : Assignment

Sivala. Ravi Babu
Signature of the Lecturer

Asterias, Water Vascular System



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BSc - Zoology - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Larval forms of Echinodermata

Hours required : 1 hr

Learning Objectives : ✓ To know the larval forms of echinodermata
✓ To understand the evolutionary significance

Previous knowledge to be reminded : ✓ To create formation of new phylum from knowledge echinodermate larva.

(Continue on the reverse side if needed)

Topic Synopsis :
i) Asteroidea — Bipinnaria, Brachiolaria
ii) Holothuroidea — ~~Auricularia~~, Doliolaria
iii) Echinoidea — Echinopleteus
iv) Ophiuroidea — Ophiopluteus
v) Crinoidea — Doliolaria, pentacrinoid.

Examples/Illustrations : larval developments. Comparison of larvae

Additional inputs : Significance and evolutionary relationship of echinodermate larvae.

Teaching Aids used : larval forms of echinodermata — chart

References cited :
1) The Invertebrates — R. L. Kotpal

Student Activity Planned after the teaching : Draw the larval forms of echinodermata

Activity planned outside the Class Room. if any : Assignments

Any other activity : —

Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : Biology of Non Chordates

Name of the Topic : General characters and classification of Hemichordata

Hours required : 1 Hr

Learning Objectives : ✓ To know the Belonglossus Systemic position

Previous knowledge to be reminded : ✓ To understand the hemichordata characters
✓ To compare the evolutionary relationship with chordata

(Continue on the reverse side if needed)

Topic Synopsis :
* Hemichordates are Solitary or Colonial
* exclusively marine
* Body → Proboscis, Collar, Trunk
* Triploblastic Origin
* Entero Coelic Coelom
* Fertilization external

Examples/Illustrations : Invertebrates — Hemichordata — Chordata
Balanoglossus

Additional inputs :

Teaching Aids used : PPT

References cited : The Invertebrates - R. L. Kotpal

Student Activity Planned after the teaching : each Student - each character

Activity planned outside the Class Room. if any : write two notes on general characters of — hemichordata.

Any other activity :

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : I sem - BZC

Paper : I - Biology of Non chordates

Name of the Topic : Balanoglossus - Structure & affinities

Hours required : 1 hr

Learning Objectives : ✓ To know the Structure of balanoglossus

Previous knowledge to be reminded : ✓ To understand the affinities of balanoglossus
✓ To compare the evolutionary relationships of balanoglossus

(Continue on the reverse side if needed)

Topic Synopsis :

* Balanoglossus - Sedimentary life - "U" shape

* Body
  - Proboscis : proboscis skelk & pore Communicate with outside
  - Collar : short, cylindrical form
  - Trunk
    - Branchiogenital region :
    - Hepatic region :
    - Abdominal region :

Examples/Illustrations : * Larval form → Tornaria larva → chordates

Additional inputs : evolutionary relationship & Systematic position

Teaching Aids used : Balanoglossus - Specimen

References cited : The Invertebrates - Jordan & Verma

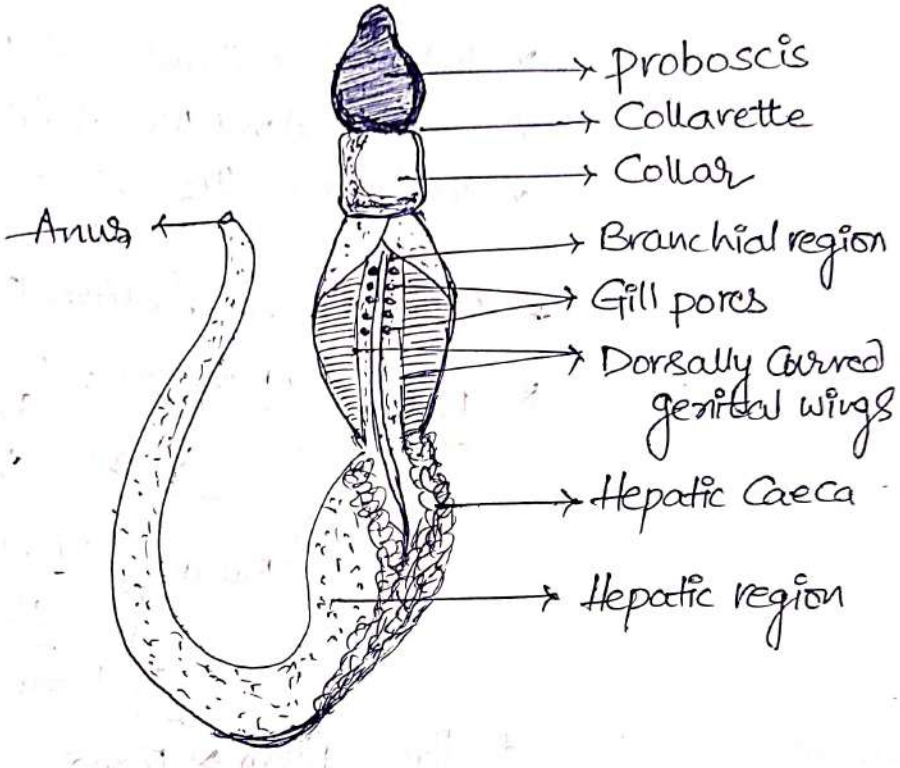
Student Activity Planned after the teaching : Read out the evolutionary relationship & affinities of balanoglossus

Activity planned outside the Class Room. if any : Assignment

Any other activity :

Signature of the Lecturer

Balanoglossus



Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : VI sem - BZC & BtZC

Paper : VII A

Name of the Topic : Handling, Storage, Transportation of - - fresh fish.

Hours required : 1hr

Learning Objectives :
- ✓ To know the handling of fresh fish
- ✓ To understand the process of storage
- ✓ To apply knowledge in real life of fish culture

Previous knowledge to be reminded :

(Continue on the reverse side if needed)

Topic Synopsis :
* Harvesting the products in aquaculture-very important
* Harvesting ← Complete harvesting - drain harvest
  partial harvesting
* Indian Major carps need special care - kept alive
* harvested fish often kept in bamboo baskets.
* Gutting, washing, packing - transported

Examples/Illustrations : Different Catching Mechanism
Storage types.

Additional inputs :

Teaching Aids used : PPTs and fish. bamboo baskets, tanks

References cited : Economic Zoology - Shukla & Upadhyay

Student Activity Planned after the teaching : Observe fish market and make a report on handling and storage of fresh fish.

Activity planned outside the Class Room. if any :

Any other activity : Assignment

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : VI sem – BZC & BtZC

Paper : VII-A - Post Harvesting Technology

Name of the Topic : Spoilage & postmortem changes in marine and freshwater fishs.

Hours required : 1 hr

Learning Objectives :

Previous knowledge to be reminded :

✓ To know the causes of spoilage of fish
✓ To understand the process of spoilage
✓ To differentiate the fish between good & bad fish

(Continue on the reverse side if needed)

Topic Synopsis :

* Spoilage - deterioration in the quality ← appearance, odour, taste
* Factors - biomolecules breakdown
* Spoilage fish – putrefaction
* Spoilage caused micro organisms – Specific Spoilage Organisms
* Spoilage ← Enzymatic degradation, Bacterial degradation, chemical decomposition, Mechanical damage

Examples/Illustrations :

Additional inputs : ~~Fishy Smell~~ Firmness of the flesh

Teaching Aids used : Spoilage dead fish - live example to show Smell & Slimness of flesh

References cited :

Student Activity Planned after the teaching : Post harvest technology of fish & fish products - K. Balachandran

Activity planned outside the Class Room. if any : Collect the spoilage fish from market and write down the characters of Spoilage

Any other activity :

Girala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : VI Sem - BZC & BtZC

Paper : VII A - post Harvesting Technology

Name of the Topic : principles of preservation

Hours required : 1 hr

Learning Objectives : ✓ To know the various preservative methods

Previous knowledge to be reminded : ✓ To understand the principles of preservation
✓ To adopt the preservation methods

(Continue on the reverse side if needed)

Topic Synopsis :

preservation techniques

1) Curing - Salting, Drying & Smoking
2) Chilling - Temperature near to 0c
3) Freezing - " maintain subzero levels
4) MAP - Creating unfavourable environment
5) Irradiation - by damaging DNA by radiation
6) fermentation - by lowering pH use acid & salt
7) freeze drying

Examples/Illustrations : Chilling freezing process

Additional inputs : preservation Methods

Teaching Aids used : PPT

References cited : post Harvest Technology of fish and fish products - K Balachandran

Student Activity Planned after the teaching : write down the preservative principles

Activity planned outside the Class Room. if any : Collect the information from near by processed unit / market and make a report on preservation

Any other activity :

Sivaka. R

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : VI Sem - BZC, BLZC

Paper : VII A - p&H Harvesting Technology

Name of the Topic : Fish preservation - Traditional Methods

Hours required : 1 hr.

Learning Objectives : ✓ To know the various traditional preservative methods
✓ To understand the principles of preservation

Previous knowledge to be reminded : preservation principals

(Continue on the reverse side if needed)

Topic Synopsis :
① Drying of fish - Inexpensive, no energy required
② Smoking of fish - reasonable quality
③ Salting of fish - long storage life
④ fermentation of fish - nutritional value often high
⑤ Marinating of fish - odour and flavour

Examples/Illustrations : Various processed fish products

Additional inputs : Advanced Storage methods using by Machines

Teaching Aids used : examples of processed fish
Dried and Smoked fish

References cited : Post Harvest Technology of fish and fish products - K Balachandran

Student Activity Planned after the teaching :

Activity planned outside the Class Room. if any : Collect the various processed fish by using traditional methods available in your surrounds

Any other activity :

Sivala. Ravi Babu
Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : VI Sem – BZC and BLZC

Paper : VII-A - post Harvesting Technology

Name of the Topic : Fish preservation – Advanced methods

Hours required : 1 hr

Learning Objectives : ✓ To know the various advanced methods
✓ To understand the process of preservation

Previous knowledge to be reminded : ✓ To apply the knowledge while storage products.

(Continue on the reverse side if needed)

Topic Synopsis :

① chilling – Superchilling
ICing – Icing of fish
② Freezing
③ MAP (Modified Atmospheric packaging)
④ Canning and Retort pouch packaging
⑤ Irradiation
⑥ Freeze-drying

Examples/Illustrations : preservative principles and techniques

Additional inputs : PPT, freezed ice
pouched processed food

Teaching Aids used :

References cited : post harvest Technology of fish and fish products – K. Balachandran

Student Activity Planned after the teaching : Collect the Advanced preservative methods information and make it report

Activity planned outside the Class Room. if any : Assignment

Any other activity :

Sivala. Ravi Babu

Signature of the Lecturer

Name of the Department / Subject: Zoology

Name of the Lecturer : Ravi Babu. S

Course / Group : VI sem - BZC & BLZC

Paper : VII A - post Harvesting Technology

Name of the Topic : Fish products & fish by products

Hours required : 1 hr

Learning Objectives : ✓ To know the various fish product
✓ To understand the process of fish product

Previous knowledge to be reminded : preservation methods

(Continue on the reverse side if needed)

Topic Synopsis :

* Fish minced meat
* Mince based products
  - Fish finger
  - Salted fish cake
  - Fish Burger
  - Fish fingers
* Fish meal
* Fish oil
  - entire body
    - drying
    - Semi drying
  - Liver
    - Shark liver oil
    - Cod liver oil
* Fish liquid (ensilage)

Examples/Illustrations : * Fish chowder
* Fish cake

Additional inputs : PPT

Teaching Aids used : various processed fish products

References cited : Post Harvest Technology of fish and fish products
— K. Balachandran

Student Activity Planned after the teaching : Fish products - Benefits - group activity

Activity planned outside the Class Room. if any : Collect the information about various processed fish products available in market and make it note

Any other activity : Assignment

Sivala. Ravi Babu
Signature of the Lecturer

Semester - II / paper - II - F, G, H - sections

F → CBZ (EM)
G → CBMB (EM)
H → Bt.ZC (EM)

Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc CBZ (F), CBMB (G), Bt.ZC (H)

Paper : II

Name of the Topic : Alkanes

Hours required :

Learning Objectives : Methods of prep. of alkanes, Halogenation of alkanes

Previous knowledge to be reminded : Definition & classification of hydro carbons

(Continue on the reverse side if needed)

Topic Synopsis :

① Methods of preparation of Alkanes:

(a) Wurtz Reaction: $2R-X + 2Na \xrightarrow{\text{dry ether}} R-R + 2NaX$

(Alkyl halide) → alkane

$2CH_3Br + 2Na \xrightarrow{\text{dry ether}} H_3C-CH_3 + 2NaBr$

$2CH_3-CH_2-Cl + 2Na \xrightarrow{\text{dry ether}} CH_3-CH_2-CH_2-CH_3$

n-butane

Examples / Illustrations :

Additional inputs : Study material supplied to slow learners

Teaching Aids used :

References cited : Unified course - Vol-I by O.P. Agarwal, organic chemistry - Morison & Boyd

Student Activity Planned after the teaching :

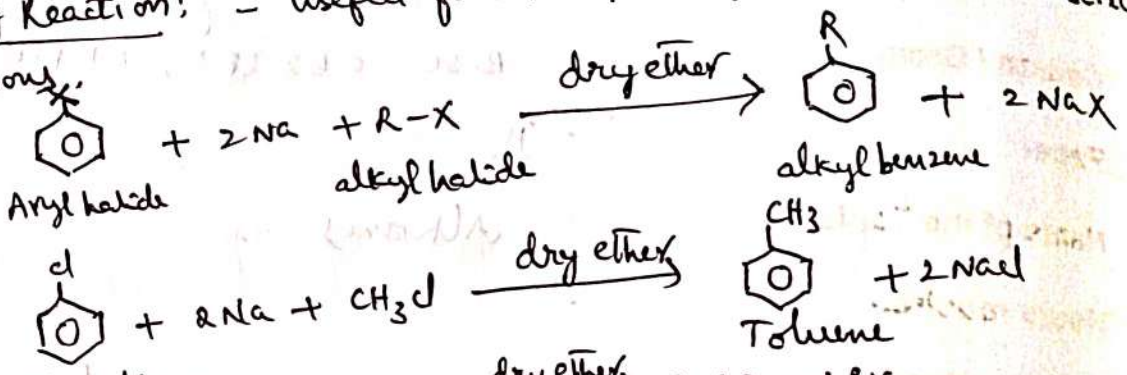
Activity planned outside the Class room. If any :

Any other activity : Assignment work

Signature of the Lecturer

Wurtz Reaction is suitable for the prep. of symmetrical alkanes. When a mixture of two different alkyl halides used, a mixture of three alkanes is obtained. These mixture of alkanes cannot be separable because they have very close boiling points.

(b) Wurtz - Fittig Reaction: - useful for the prep. of aromatic substituted hydro carbons.



(c) Corey - House Reaction:

$$RX + 2Li \xrightarrow{\text{dry ether}} R\text{-}Li + LiX$$

$$2\,R\text{-}Li + CuI \longrightarrow \underset{\text{(Gilmann Reagent)}}{LiR_2Cu} + LiI$$

$$LiR_2Cu + R\text{-}X \longrightarrow \underset{\text{alkane}}{R\text{-}R} + RCu + LiX$$

$$(CH_3)_2CuLi + CH_3Br \longrightarrow CH_3\text{-}CH_3 + CH_3Cu + LiBr$$

$$\left(H_3C\text{-}\underset{H_3C}{CH}\right)_2CuLi + CH_3\text{-}CH_2\text{-}Br \longrightarrow \underset{\text{(2-Methyl butane)}}{H_3C\text{-}\underset{H_3C}{CH}\text{-}CH_2\text{-}CH_3} + (CH_3)_2CHCu + LiBr$$

Suitable for the prep. of unsymmetrical alkanes.

(2) Halogenation: $R\text{-}H + X_2 \xrightarrow[(or)\ 250\text{-}400^\circ C]{UV\ light} R\text{-}X + HX$

(Alkane) (Cl_2/Br_2) Alkyl halide

Chlorination of Methane:

$$CH_4 + Cl_2 \xrightarrow[-HCl]{h\nu} CH_3Cl \xrightarrow[-HCl]{Cl_2/h\nu} CH_2Cl_2 \xrightarrow[-HCl]{Cl_2/h\nu} CHCl_3 \xrightarrow[-HCl]{Cl_2/h\nu} CCl_4$$

Mechanism: (i) chain initiation step: $Cl_2 \xrightarrow{h\nu} Cl^\cdot + Cl^\cdot$

(ii) chain propagation step:

$$Cl^\cdot + H_3C\text{-}H \longrightarrow HCl + \dot{C}H_3$$

$$\dot{C}H_3 + Cl\text{-}Cl \longrightarrow CH_3Cl + Cl^\cdot$$

(iii) chain Termination step:

$$Cl^\cdot + Cl^\cdot \longrightarrow Cl_2 \quad \text{etc.}$$

$$\dot{C}H_3 + Cl^\cdot \longrightarrow CH_3Cl$$

$$\dot{C}H_3 + \dot{C}H_3 \longrightarrow H_3C\text{-}CH_3$$

Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc, - F, G H (Sem - II)

Paper : II / Semester - II

Name of the Topic : Alkanes & cyclo alkanes

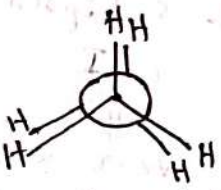
Hours required :

Learning Objectives : Conformers of ethane, n-butane, cyclohexane and Mono Sub cyclohexane

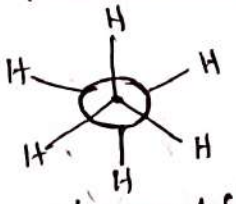
Previous knowledge to be reminded : Isomerism, classification, Conformational isomerism (Stereo isomerism)

(Continue on the reverse side if needed)

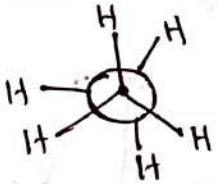
Topic Synopsis : Conformations of Ethane: $[H_3C-CH_3]$



Eclipsed form
(More unstable)



Staggered form
(More Stable)



(Skew form)

order of stability:
Staggered > Skew > Eclipsed

Examples / Illustrations :

Additional inputs : study material supplied, APPGCET, CU CE Bits

Teaching Aids used : Ball & stick Models

References cited : Unified course Vol-I by O.P. Agarwal, Morrison and Boyd → org. chemistry

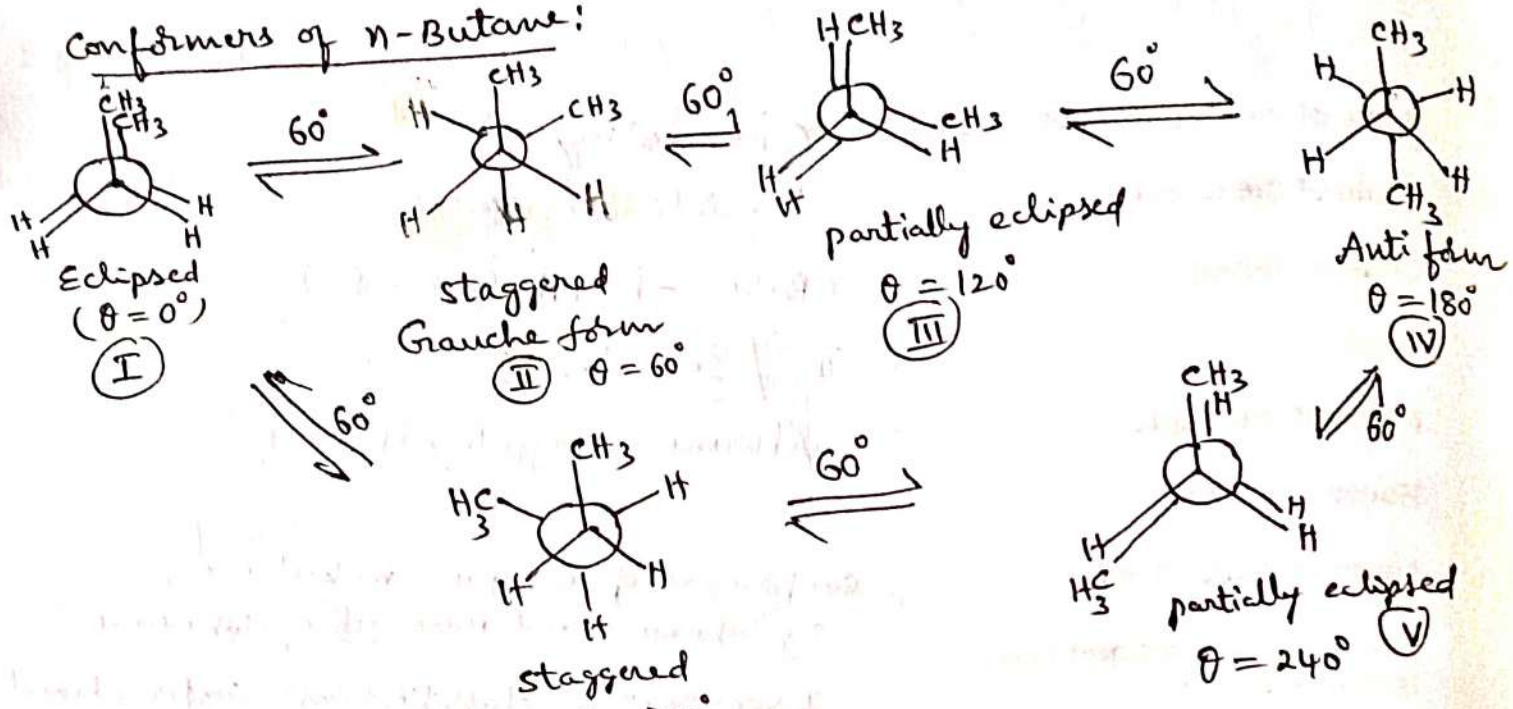
Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment

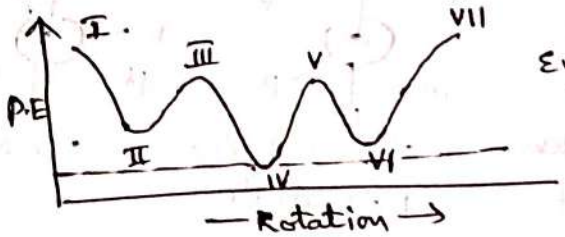
Signature of the Lecturer

Conformers of n-Butane:



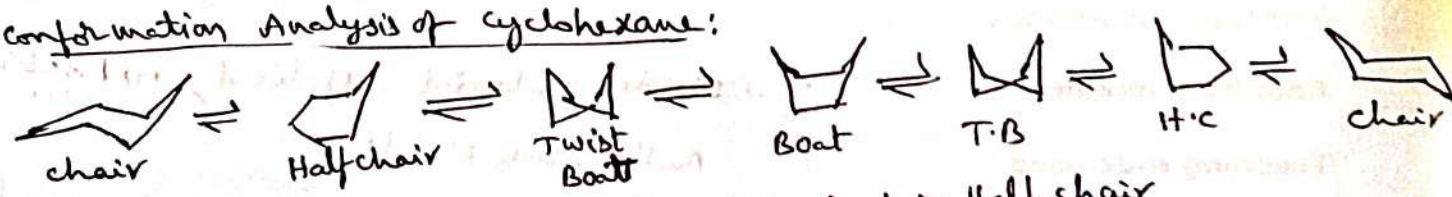
Stability: Anti (I) > Gauche (II) = Gauche (VI) > partially eclipsed (III) = partially eclipsed (V) > Eclipsed I

Energy level diagram:

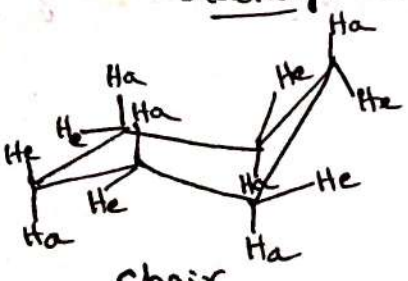


Energy diff:
IV ⇔ I → 5.3 kcal
IV ⇔ III → 3.5 kcal
IV ⇔ II → 0.9 kcal

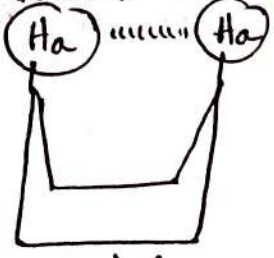
⇒ Conformation Analysis of cyclohexane:



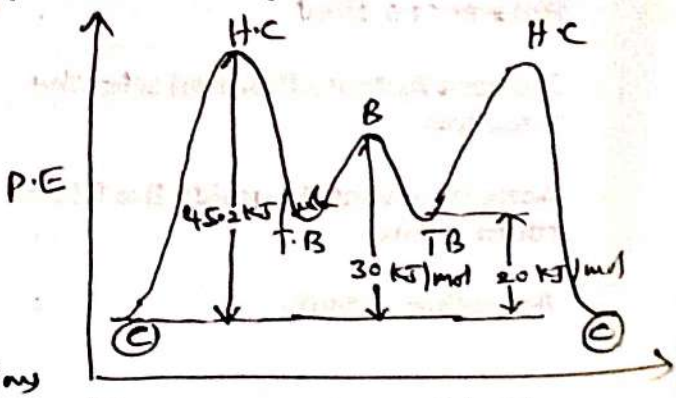
Stability: chair form > Twist Boat > Boat > Half chair



Chair
- No angle, torsional strain
- No flag pole interactions
- More stable



Boat form
- No angle strain
- Flag pole interactions
- Torsional strain present
- Less stable



Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc (F, G, H)

Paper : II / Sem-II

Name of the Topic : cycloalkanes

Hours required :

Learning Objectives : Baeyer strain Theory, Mon sub cyclo-hexane conformers

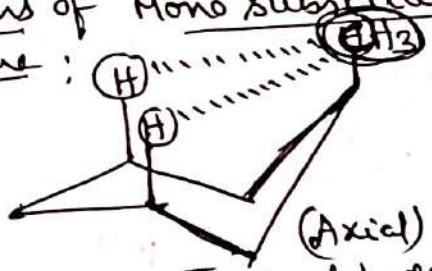
Previous knowledge to be reminded : properties of cycloalkanes

(Continue on the reverse side if needed)

Topic Synopsis : Conformations of Mono Substituted cyclohexane :

Examples / Illustrations :

(Equitorial)
1-methyl cyclohexane
NO 1,3-diaxial interactions
(More stable)



(Axial)
1-methyl cyclohexane
(Less stable)
1,3-diaxial interactions

Additional inputs : Learning / study material supplied

Teaching Aids used : Ball and Stick Models

References cited : O.P. Agarwal – Unified Course

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

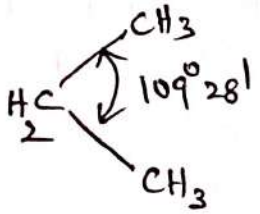
Any other activity : Assignment Work

Signature of the Lecturer

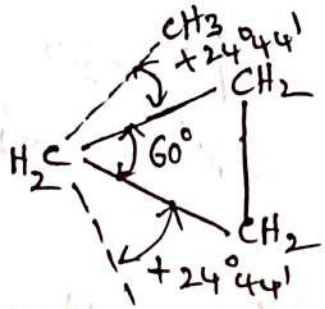
Baeyer Strain Theory: Bayer strain theory was proposed to explain the relative stability of cycloalkanes.

Angle strain, $d = \frac{1}{2}[109°28' - \alpha]$

α = Bond angle in cyclohexane



Propane



CH3 (cyclopropane)

cycloalkane	α	d
△	60°	+24°44'
□	90°	+9°44'
⬠	108°	+0°44'
⬡	120°	−5°16'
⬡	128°34'	−9°33'
⯃	135°	−12°46'

This theory explains the relative stability of first three cycloalkanes but failed beyond this.

Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc FGH (CBZ(EM), CBMB(EM), BTZ(EM))

Paper : II | Sem-II

Name of the Topic : Alkenes

Hours required :

Learning Objectives : Methods of preparation of alkenes, Saytzeff rule E_1, E_2 & E_1cB Mechanisms

Previous knowledge to be reminded : Def. of unsaturated hydrocarbons, physical properties, Nomenclature

(Continue on the reverse side if needed)

Topic Synopsis :

General Methods of preparation of Alkenes:-

(a) By dehydration of alcohols: $-\overset{|}{\underset{H}{C}}-\overset{|}{\underset{OH}{C}}- \xrightarrow[\Delta]{\text{Acid catalyst}} \underset{\text{Alkene}}{>C=C<} + H_2O$

Ease of dehydration of alcohols : $3^\circ > 2^\circ > 1^\circ$

$CH_3-CH_2OH \xrightarrow[170^\circ C]{Conc.\ H_2SO_4} H_2C=CH_2$

$CH_3-CH_2-\overset{OH}{\underset{|}{CH}}-CH_3 \xrightarrow[100^\circ C]{60\%\ H_2SO_4} CH_3-CH=CH-CH_3$ 2-butene (80%)

$+\ CH_3-CH_2-\overset{+}{C}H=CH_2$ 1-butene (20%)

Examples / Illustrations :

Additional inputs : APPGCET, CUCET Concepts, Study material

Teaching Aids used :

References cited : Organic Chemistry - Morrison and Boyd

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity :

Signature of the Lecturer

(b) Dehydrohalogenation of alkyl halides: $CH_3CH_2Cl \xrightarrow[\Delta]{alc.\ KOH} H_2C=CH_2$

$CH_3-CH_2-\underset{Cl}{CH}-CH_3 \xrightarrow[\Delta]{alc.\ KOH} CH_3-CH=CH-CH_3$ (Major)

$CH_3-CH_2-\overset{+}{C}H=CH_2$ 1-butene (Minor)

* Saytzeff Rule: In the dehydration of alcohols and dehydrohalogenation of alkylhalides, the hydrogen is preferentially eliminated from the adjacent carbon with the fewer no. of hydrogens.

(c) Dehalogenation of Vicinal dihalides:

$CH_3-\underset{Br}{CH}-\underset{Br}{CH_2} \xrightarrow[\Delta]{Zn\text{-}dust} CH_3-CH=CH_2 + ZnBr_2$

(d) partial Hydrogenation:

$R-C\equiv CH + H_2 \xrightarrow[\text{Lindlar catalyst}]{Pd-BaSO_4/\text{quinoline}} R-CH=CH_2$

Alkyne → Alkene

⇒ E_1 Mechanism: - Unimolecular elimination Reaction follows 1st order kinetic
- Takes place in Two steps.

Eg: Dehydrohalogenation of 3°-alkylhalides

$(CH_3)_3C-Br \xrightarrow{OH^\ominus} (CH_3)_2C=CH_2 + H_2O$

$\therefore$ Rate $\propto [(CH_3)_3CBr]^1$

Mech: (i) $(CH_3)_3C-Br \xrightarrow{slow} (CH_3)_3\overset{\oplus}{C} + Br^-$

(ii) $(CH_3)_3\overset{\oplus}{C} + OH^\ominus \xrightarrow{fast} (CH_3)_2C=CH_2$

⇒ E_2 Mechanism: Bimolecular, one step, second order

Eg: Dehydrohalogenation of 1°-alkyl halides.

$:B + R-CH-CH_2 \xrightarrow{slow} R-CH=CH_2 + B:H + :X^\ominus$

Rate $\propto [RX][Base]$

⇒ The E_1CB Mechanism: - Unimolecular conjugate base elimination takes pla in Two steps.

Mech: (i) $C_2H_5O^\ominus + CH_3-\underset{CH_3}{\overset{H}{C}}-\underset{Br}{C}-CH_3 \underset{-C_2H_5OH}{\overset{fast}{\rightleftharpoons}} CH_3-\underset{CH_3}{\overset{\ominus}{C}}-\underset{Br}{C}-CH_3$

Rate $\propto$ [conjugate base]

(ii) $H_3C-\underset{CH_3}{\overset{\ominus}{C}}-\underset{Br}{C}-CH_3 \xrightarrow[RDS]{slow} H_3C-\underset{H_3C}{C}=\underset{CH_3}{C}-CH_3$ (CB)

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc (CBZ, CBMB, BTZC) - EM

Paper : II | Sem - II

Name of the Topic : Alkenes and Alkadienes

Hours required :

Learning Objectives : Markownikoff and Anti-Markownikoff rule, Types of Dienes - Diel's-Alder Reaction.

Previous knowledge to be reminded : Methods of prep. of alkenes, Saytzeff Rule

(Continue on the reverse side if needed)

Topic Synopsis :

Markownikoff's Rule: Electrophilic addition to a carbon-carbon double bond involves the formation of more stable intermediate carbocation.

Eg: Electrophilic addition Reaction: $CH_3-CH=CH_2 + HBr \longrightarrow CH_3-\underset{Br}{CH}-CH_3$ (Major) + $CH_3-CH_2-CH_2-Br$ (Minor)

Examples / Illustrations :

Additional inputs : study material provided

Teaching Aids used :

References cited : Morrison and Boyd - org. chemistry

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment work

Signature of the Lecturer

Mech: (i) $HBr \rightleftharpoons H^+ + Br^-$

(ii) $CH_3-CH=CH_2 + H^{\oplus}$ → $CH_3-\overset{\oplus}{C}H-CH_3$ (2°-carbocation (More stable))

→ $CH_3-CH_2-\overset{\oplus}{C}H_2$ (1°-carbocation (less stable))

(iii) $CH_3-\overset{\oplus}{C}H-CH_3 \xrightarrow{Br^{\ominus}} CH_3-\underset{Br}{CH}-CH_3$ (Major)

$CH_3-CH_2-\overset{\oplus}{C}H_2 \xrightarrow{Br^{\ominus}} CH_3-CH_2-CH_2-Br$ (Minor)

Anti-Markownikoff rule : Kharasch effect (or) peroxide effect :

$CH_3-CH=CH_2 + HBr \xrightarrow[R_2O_2]{\text{org. peroxide}} CH_3-CH_2-CH_2Br + CH_3-\underset{Br}{CH}-CH_3$

(Major) (Minor)

This reaction proceeds via free radical addition mechanism.

Mech: (i) $R-O\overset{\curvearrowleft}{-}O-R \longrightarrow RO^{\cdot} + {}^{\cdot}OR$

(ii) $RO^{\cdot} + H\overset{\curvearrowleft}{-}Br \longrightarrow ROH + Br^{\cdot}$

(iii) $CH_3-CH=CH_2 \xrightarrow{Br^{\cdot}}$ $CH_3-\dot{C}H-CH_2Br$ (2°-free radical) (more stable)

$CH_3-CH-\dot{C}H_2$ (Br above CH) (1°-free radical) (less stable)

(iv) $CH_3-\dot{C}H-CH_2Br \xrightarrow{H\overset{\curvearrowleft}{-}Br} CH_3-CH_2-CH_2Br + Br^{\cdot}$ (Major)

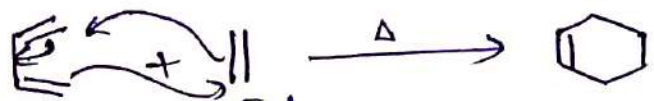
$CH_3-CH-\dot{C}H_2$ (Br below CH) $\xrightarrow{H\overset{\curvearrowleft}{-}Br}$ $CH_3-\underset{Br}{CH}-CH_3 + Br^{\cdot}$ (Minor)

---

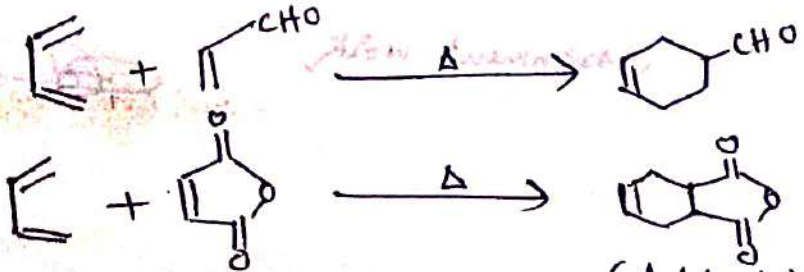
* **Diel's - Alder Reaction:** The [4+2] - cyclo addition of a conjugated diene and dienophile in the presence of heat forms a six membered cyclic product.

- Electron withdrawing groups on dienophile enhances the rate of reaction.
- It is a Concerted reaction (single step)

Eg:



1,3-butadiene (Diene) Ethylene (Dienophile)



(Adduct)

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc – CBZ-B & CBMb-G

Paper : I

Name of the Topic : Solutions

Hours required : 6h

Learning Objectives : Azeotropes, CST: Phenol-water system, Nernst Distribution law and its applications

Previous knowledge to be reminded : Definition of solution, binary solution, types of solutions, Raoult's law.

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ Azeotropes: A mixture which boils at a constant temperature and distils over completely at the same temperature without change in composition called Azeotropic mixture (or) constant boiling point mixtures.

Maximum boiling point Mixtures: Eg: HCl (20.24%) + water (79.76%)
- show large -ve deviation from Raoult's law. Mixture boils at 108.6°C.

Examples / Illustrations :

Additional inputs : Study material, APPGCET, CUCET Bits

Teaching Aids used : Iodine, CS_2, water

References cited : Tel. Academy; puri, sharma – Principles of Physical chemistry.

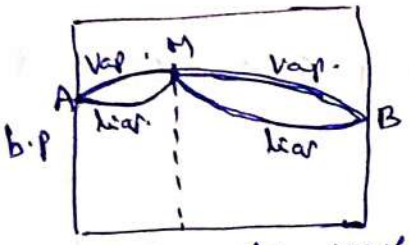
Student Activity Planned after the teaching :

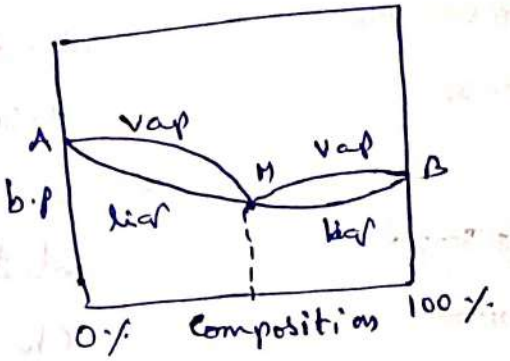
Activity planned outside the Class room. If any :

Any other activity : Assignment work

Minimum boiling point azeotrope mixtures: 95.57% deviation from Raoult's law. Eg: H_2O (95.57%) + alcohol (4.43%). (Ethanol)

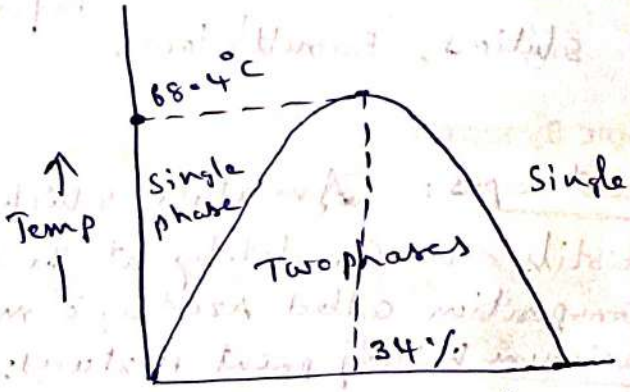
Boils at 78.17°C





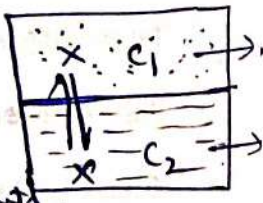
⇒ Critical Solution Temperature (CST): The temperature at which the two partially miscible liquids becomes completely miscible is called CST.

Eg: water + phenol → UCST



⇒ Nernst Distribution law: A solute distributes between two immiscible liquids in contact with each other in such a way that the ratio of its concentrations in the two layers is constant at constant temperature irrespe of its total amount.

$$\frac{\text{Conc. of X in Solvent A}}{\text{Conc. of X in Solvent B}} = \frac{C_1}{C_2} = K \text{ (Constant)}$$



Case (i): If the solute undergoes association with one of the solvents,

$$\frac{C_1}{\sqrt[n]{C_2}} = K$$

Case (ii): If the solute undergoes dissociation in one of the solvents (ie) $\frac{C_1}{C_2(1-\alpha)} = K$

Applications: (i) To det. molecular complexity
(ii) Distribution indicators
(iii) In partition chromatography
(iv) To det. the dissociation constant of complex ions like KI_3 (or I_3^-)

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc – F, G, H ⇒ F – CBZ
G – CBMb
H – BtZc

Paper : III

Name of the Topic : Spectroscopy

Hours required : 02

Learning Objectives : Introduction to spectroscopy

Previous knowledge to be reminded : Emr – properties, Hydrogen Spectrum

(Continue on the reverse side if needed)

Topic Synopsis :

1) What is spectroscopy ?
2) What is the aim of spectroscopy ?
3) How a spectrum arises ?

Spectroscopy: Spectroscopy may be defined as the interaction between emr and matter.

Examples / Illustrations :

Additional inputs :

Teaching Aids used : ppt.

References cited : Physical chemistry – puri & Sharma ; Spectroscopy – Y.R. sharma ; Banwell ; William Kemp etc.

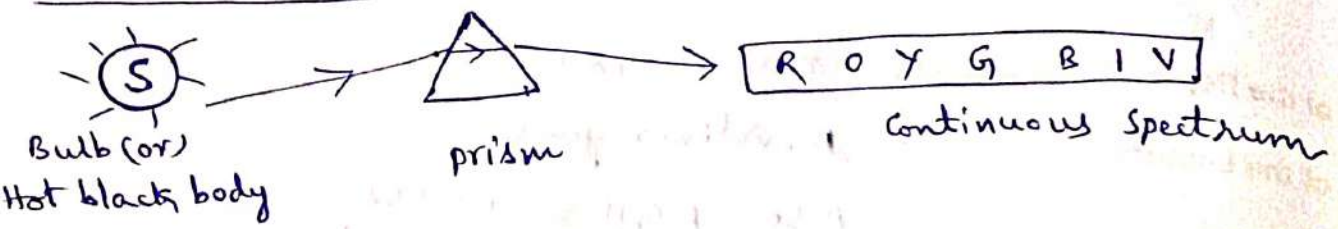
Student Activity Planned after the teaching :

Activity planned outside the Class room, if any : Allow the students to read differe text books for Spectroscopy [For introd

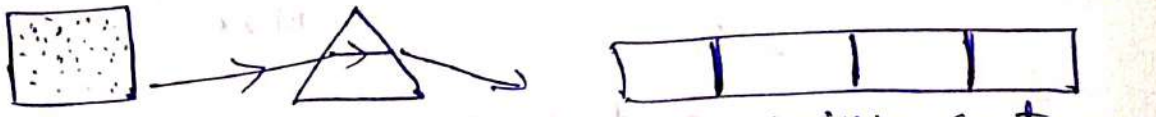
Any other activity :

Signature of the Lecturer

Types of Spectrum:

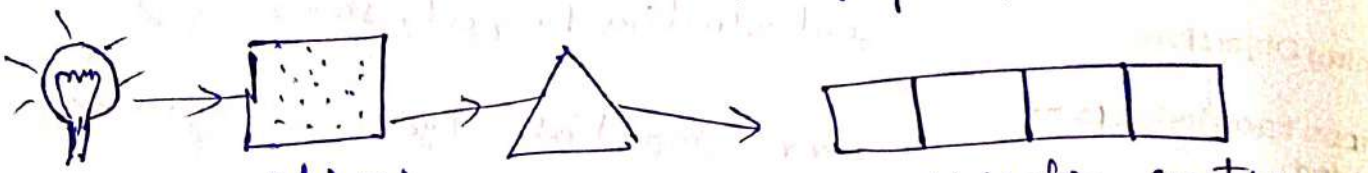


Bulb (or) Hot black body — prism — Continuous Spectrum



Hot gas — Emission Spectrum

Some characteristic wave lengths on bla photographic plate



Bulb — Cold gas — Absorption Spectrum

Black spectral lines on white photographic plate.

Types of Spectra

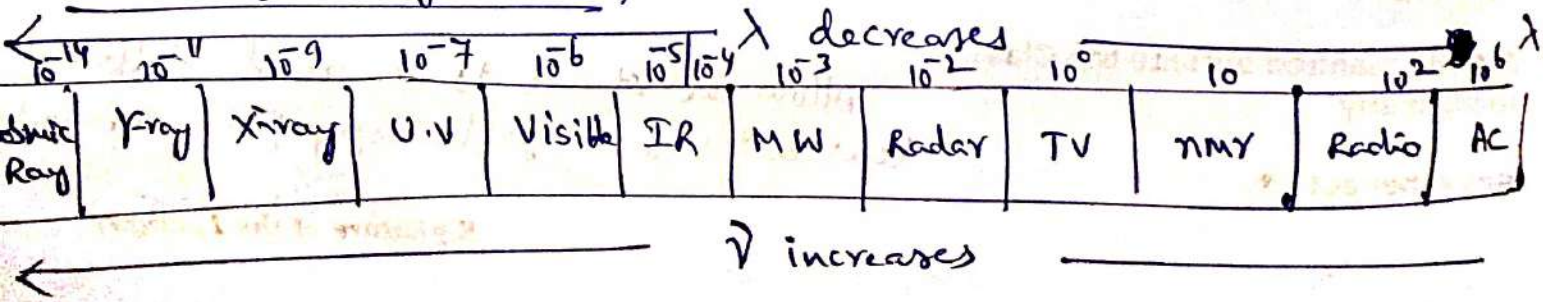
Electronic spectra: (UV-visible) – Electronic transitions
– To detect chromophore

Vibrational spectra: (IR) – Vibrational transitions
– To identify functional groups

Rotational Spectra: (MW) – Rotational transitions

NMR: (Radio frequencies) – Nuclear spin energy level transitions.

Electromagnetic Spectrum:



Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : III

Name of the Topic : Electronic spectroscopy

Hours required :

Learning Objectives : Beer-Lambert's law and its limitations
Types of Electronic transitions in molecules
Effect of conjugation.

Previous knowledge to be reminded : M.O.T, emr, Electromagnetic spectrum

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ Beer-Lambert's law: When a beam of monochromatic radiation is passed through a solution of an absorbing medium, the rate of decrease of intensity of radiation with thickness of the absorbing medium is directly proportional to the intensity of incident radiation as well as the concentration of the solution.

Examples / Illustrations :

$$-\frac{dI}{dx} \propto IC \Rightarrow I_t = I_0 \cdot 10^{-\epsilon C x}$$

Additional inputs :

$$\therefore I_{abs} = I_0 \left[1 - 10^{-\epsilon C x}\right]$$

Teaching Aids used :

$$\therefore \boxed{A = \epsilon C x}$$

References cited : Org. spectroscopy by, Y. R. Sharma; William Kemp; Donald pavia.

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

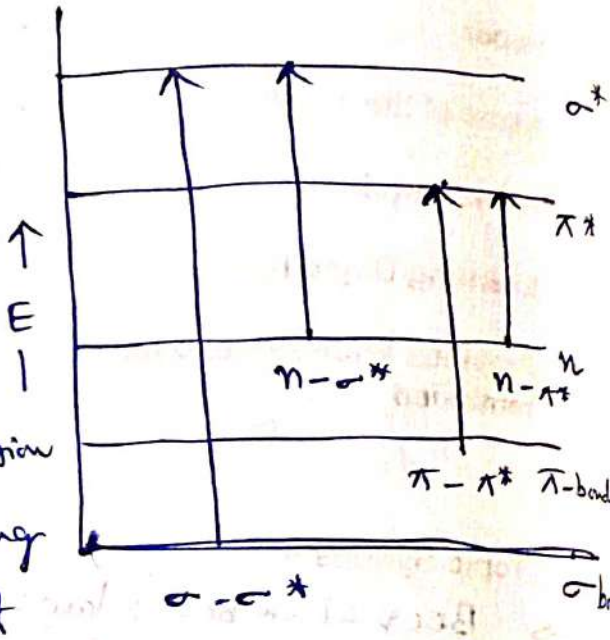
Any other activity : Assignment work

Signature of the Lecturer

$A = \epsilon c x$

A = Absorbance
ϵ = molar extinction coefficient
x = Thickness of the medium
c = Conc. of the solution

⇒ Types of Electronic Transitions:



order of Energy:

$\sigma - \sigma^* > n - \sigma^* > \pi - \pi^* > n - \pi^*$

$\sigma - \sigma^*$: Saturated hydrocarbons

UV radiations ~ 150 nm

λ below 200 nm → Vaccum UV-region

$n \to \sigma^*$: Saturated compounds containing one hetero atom with lone pair of electrons;

Eg: $R\ddot{X}:$, $R-\ddot{O}-H$, $R-\ddot{O}-R'$, Carbonyl Compounds

Note that, H-bonding shifts the UV-absorptions to shorter wavelength

$\pi \to \pi^*$: unsaturated compounds,

170 - 190 nm

$\pi \to \pi^*$ at 180 nm – more intense

K-bands: $\pi - \pi^*$ transitions from a compound containing Conjugation.

$n - \pi^*$: Carbonyl Compounds at 290 nm

R-bands: forbidden bands

K → Konjugierte
R → Radikalartig
} German

Effect of Conjugation: With the increase in conjugation in a molecule absorption shifts longer wavelengths. (ie) Bathochromic Shift (or) Red shift.

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : I BG

Paper : I

Name of the Topic : d-block elements

Hours required :

Learning Objectives : Definitions of d-block elements, transition elements, General characteristics of d-block elements, Electronic configurations and Variable Valence

Previous knowledge to be reminded : Definitions of s, p, d, f block elements.

(Continue on the reverse side if needed)

Topic Synopsis :

→ The elements in which the differentiating electron enters into (n-1) d-orbital are known as d-block elements.

→ Gen. electronic configuration of d-blocks elements : $(n-1)d^{1-10}\ ns^{0-2}$

→ " " of transition elements : $(n-1)d^{1-9}\ ns^{0-2}$

→ Gen. characteristics: i) All are metals and they display metallic lustre

Examples / Illustrations :

Additional inputs : Material, Concepts for Competitive Exams

Teaching Aids used : Periodic Table chart

References cited : Inorganic chemistry by J.D. Lee ; Telugu Academy ; unified course by O.P. Agarwal.

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment work

Signature of the Lecturer

(ii) High m.p, b.p and densities.
(iii) They are very hard and brittle.
(iv) Good Conductors of heat and electricity.
(v) They are malleable and ductile.
(vi) Transition metals are chemically less reactive than S & P-block elements.

* Electronic Configurations & Variable Valence:

3d : Sc (21) → Zn (30) → $3d^{1-10}\ 4s^{1\text{ or }2}$
4d : Y (39) → Cd (48) → $4d^{1-10}\ 5s^{0-2}$
5d : La (57) → Hg (80) → $5d^{1-10}\ 6s^{1-2}$
6d : Ac (89) → Cn (112) → $6s^{1-10}\ 7s^{1-2}$

3d-Series:

Element	Z	Electronic Configuration	Variable Valence
Sc	21	[Ar] $3d^1\ 4s^2$	+2, +3
Ti	22	[Ar] $3d^2\ 4s^2$	+2, +3, +4
V	23	[Ar] $3d^3\ 4s^2$	+2, +3, +4, +5
* Cr	24	[Ar] $3d^5\ 4s^1$	+1, +2, +3, +4, +5, +6.
Mn	25	[Ar] $3d^5\ 4s^2$	+2, +3, +4, +5, +6, +7
Fe	26	[Ar] $3d^6\ 4s^2$	+2, +3, +4, +5, +6
Co	27	[Ar] $3d^7\ 4s^2$	+2, +3, +4, +5
Ni	28	[Ar] $3d^8\ 4s^2$	+2, +3, +4
* Cu	29	[Ar] $3d^{10}\ 4s^1$	+1, +2, +3
Zn	30	[Ar] $3d^{10}\ 4s^2$	+2

Pd (Z=46) : [Kr] $4d^{10}\ 5s^0$; Pt (Z=78) : [Xe] $4f^{14}\ 5d^9\ 6s^1$; Ds (Z=110) : [Rn] $5f^{14}\ 6d^8\ 7s^2$

Gen/common oxidation state of d-blocks elements : +2

The anomalies in electronic configurations may be due to $e^- - e^-$ repulsions; Nuclear-e^- attractions; electrons exchange tendency; Screening effect.

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : III

Name of the Topic : Electronic spectroscopy

Hours required :

Learning Objectives : chromophore concept, selection Rules

Previous knowledge to be reminded : Types of electronic transitions

(Continue on the reverse side if needed)

Topic Synopsis :

Selection Rules: Electronic transitions in the molecules are governed by certain restrictions called selection rules.

HOMO $\longrightarrow$ LUMO $\bar{e}$ transitions

Extinction coefficient (ϵ_{max}) $> 10^4 \longrightarrow$ Allowed transitions

$\epsilon_{max} < 10^4 \longrightarrow$ forbidden "

Examples / Illustrations : $\pi \rightarrow \pi^* \longrightarrow$ Allowed

$n \rightarrow \pi^* \longrightarrow$ forbidden "

Additional inputs : study material, PGCET Concepts

Teaching Aids used :

References cited : Organic spectroscopy by YR Sharma, William Kemp.

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity :

Signature of the Lecturer

Symmetry restrictions

Symmetry molecules → have more restrictions → simple spectra (Benzene)

unsymmetrical molecules → have no restrictions → complex spectra

{Geometry of the molecule in the G.S
" " " E.S
" }

The orientation of electric dipole of the incident light

$S_0 \longrightarrow T_0$
$\pi \longrightarrow \pi$
$n \longrightarrow \pi$
} forbidden

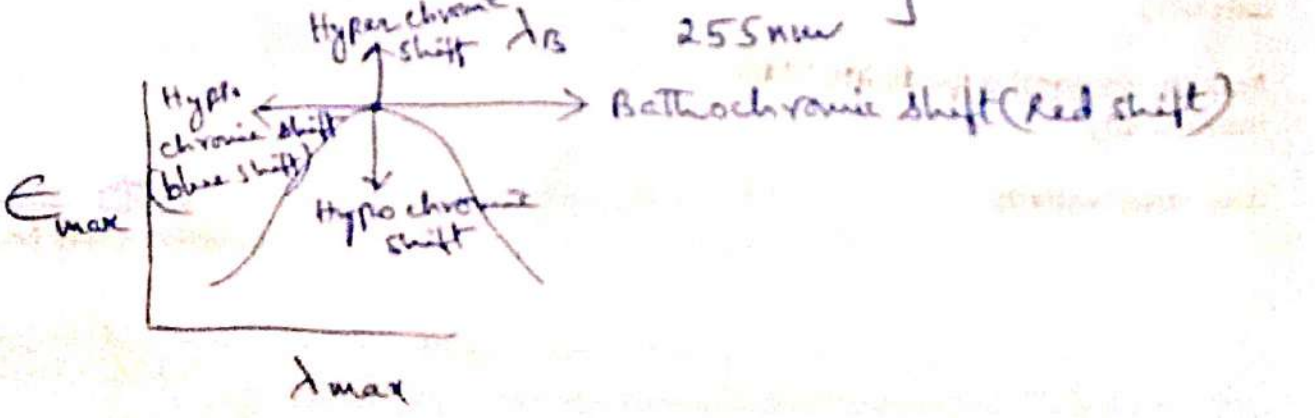
$S_0 \longrightarrow S_1$
$\pi \longrightarrow \pi$
$n \longrightarrow \pi$
} Allowed

⇒ chromophore: The group which is responsible for imparting colour [$-NO_2$, Azogroup etc.]

It is an isolated covalent bonded group shows characteristic absorption in the UV-visible region.

Chromophore	λ_{max}	Type of transition
$>C=C<$	175 nm	$\pi \longrightarrow \pi^*$
$>C=O$	160 nm	$n \longrightarrow \sigma^*$
	180 nm	$\pi \longrightarrow \pi^*$
	~285 nm	$n \longrightarrow \pi^*$
	217 nm	$\pi \longrightarrow \pi^*$
$R-NO_2$	280 nm	$n \longrightarrow \pi^*$

λ_{E_1} 180 nm
λ_{E_2} 204 nm
λ_B 255 nm
} $\pi \rightarrow \pi^*$



Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : I BG

Paper : I

Name of the Topic : Chemistry of d-block elements

Hours required :

Learning Objectives : Magnetic properties, catalytic properties, Ability to form complexes.

Previous knowledge to be reminded : Electronic configurations & variable valence

(Continue on the reverse side if needed)

Topic Synopsis :

Magnetic properties: Many of the transition metal ions are paramagnetic. → Due to the presence of unpaired d-electrons

Magnetic moment → spin angular momentum (spin motion of e^-)
→ orbital " " (orbital motion of e^-)

$\therefore \mu = \mu_S + \mu_L = \sqrt{4S(S+1) + L(L+1)}$ BM $\Rightarrow \mu_S = \sqrt{4S(S+1)}$

For, the compounds of 1st transition series (3d) → L → quenched out

Examples / Illustrations :

Additional inputs : Study material, Competitive Exams bits.

Teaching Aids used : Periodic Table chart

References cited : Inorganic chemistry → J.D. Lee
→ Huheey

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment work

Signature of the Lecturer

∴ Spin-only formula, $\mu = \sqrt{n(n+2)}$ B.M

Eg: (i) $Sc^{3+}(d^0) \rightarrow \mu = 0 \longrightarrow$ diamagnetic

(ii) $Ti^{3+}(d^1) \rightarrow \mu = 1.732$ BM $\rightarrow$ paramagnetic

(iii) $Fe^{3+}(d^5) \rightarrow \mu = 5.92$ BM $\rightarrow$ "

⇒ Catalytic properties: The catalytic activity of transition metals is due to the presence of vacant (n-1)d-orbitals and they exhibit variable valence. They have large surface area in their finely divided form.

Eg: Ziegler-Natta catalyst } → polymerisation of ethylene at low temp.
$TiCl_4 + (C_2H_5)_3Al$ }

$V_2O_5 \longrightarrow$ Manufacture of H_2SO_4 by contact process

$Fe/Mo \longrightarrow$ " of NH_3 by Heber's process

Raney Ni → Hydrogenation of oils

Ni / Pd / Pt → Hydrogenation of unsaturated hydrocarbons

$FeSO_4 + H_2O_2$ } → oxidation of glucose.
Fenton's Reagent }

⇒ Complex formation: The tendency of complex formation is due to

(i) The cations are relatively small in size and have high charge

(ii) have vacant (n-1)d & np orbitals

In the metal complex, metal atom/ion → acceptor → Lewis acid

Ligand → Dodon → Lewis base

The bond between metal ion and ligand is a Co-ordinate Covalent bond.

Eg: $Ni(CO)_4$, $[Fe(CN)_6]^{4-}$, $[CoF_6]^{3-}$, $[Cu(NH_3)_4]^{2+}$, etc

Name of the Department / Subject : Chemistry B → CBZ

Name of the Lecturer : D. Adinarayana G → CBMb

Course / Group : I BG

Paper : I

Name of the Topic : Chemistry of f-block elements

Hours required :

Learning Objectives : Lanthanide Contraction & its Consequences; magnetic properties

Previous knowledge to be reminded : Introduction, electronic configurations and oxidation states

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ Lanthanide contraction: The phenomenon of a regular decrease in the size of atoms / ions with increase in atomic number from La to Lu due to very poor shielding of 4f-electrons is called lanthanide contraction.

$La \rightarrow Lu \longrightarrow 1.88\,A^\circ \rightarrow 1.73\,A^\circ$

$La^{3+} \rightarrow Lu^{3+} \rightarrow 1.06\,A^\circ \rightarrow 0.85\,A^\circ$

} Eu (2.04 A°); Yb (1.94 A°)

Examples / Illustrations :

Additional inputs : study material supplied

Teaching Aids used : periodic Table chart

References cited : Inorganic chemistry by J.D. Lee

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Mid-Term Examinations

Signature of the Lecturer

Consequences: i) occurance of yittrium with heavier lanthanides in natural minerals

Y^{3+} (0.9 A°) ; Dy^{3+} (0.912 A°); Ho^{3+} (0.901 A°)

ionic radii: Zr (1.59 A°) } Nb (1.43 A°) } Mo (1.36 A°)
Hf (1.56 A°) } Ta (1.43 A°) } W (1.37 A°)

ii) Basicity differences:

Basicity: $La(OH)_3 \longrightarrow Lu(OH)_3$ decreases

iii) Hydrolysis: The rate of hydrolysis increases from La^{3+} to Lu^{3+}

iv) Ability to form complexes: increases from La^{3+} to Lu^{3+}

⇒ Magnetic properties: (due to the presence of unpaired f-electrons)

Magnetic moment, $\mu_{S+L} = \sqrt{4S(S+1) + L(L+1)}$ BM

(or)

$\mu_{eff} = \mu_J = g\sqrt{J(J+1)}$ BM

where g = Lande splitting factor $= 1 + \frac{J(J+1)+S(S+1)-L(L+1)}{2J(J+1)}$

Note that, Ln^{3+} ions like $La^{3+}(4f^0)$, $Gd^{3+}(4f^7)$; $Lu^{3+}(4f^{14})$ have only S-term symbol, $L = 0$

$\therefore J = S \Rightarrow g = 2$

$\therefore \mu_s = \sqrt{n(n+2)}$ BM

$Gd^{3+}(4f^7) \rightarrow \mu_s = \sqrt{7(7+2)} = 7.9$ BM

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : III

Name of the Topic : NMR spectroscopy

Hours required :

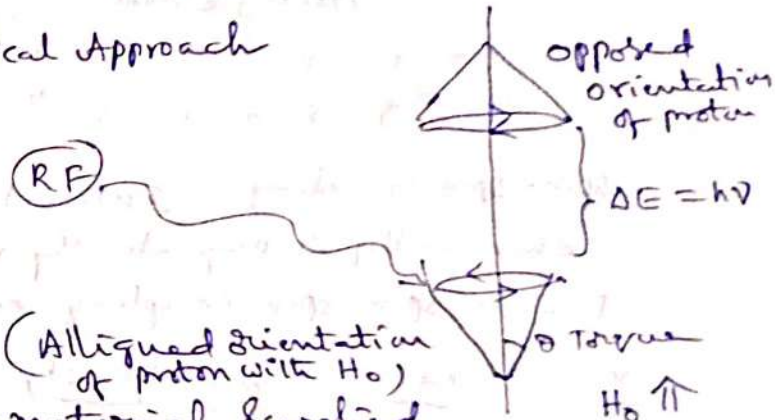
Learning Objectives : Basic principles, chemical shift, spin-spin coupling, coupling constant.

Previous knowledge to be reminded : Nuclear spin, Larmor precessional frequency

(Continue on the reverse side if needed)

Topic Synopsis :

Basic principles of nmr : ① classical Approach



Examples / Illustrations :

Additional inputs : Study material Supplied

Teaching Aids used :

References cited : Organic Spectroscopy by Y. R. Sharma; ~~Bassett~~ Jagmohan; Donald pavia.

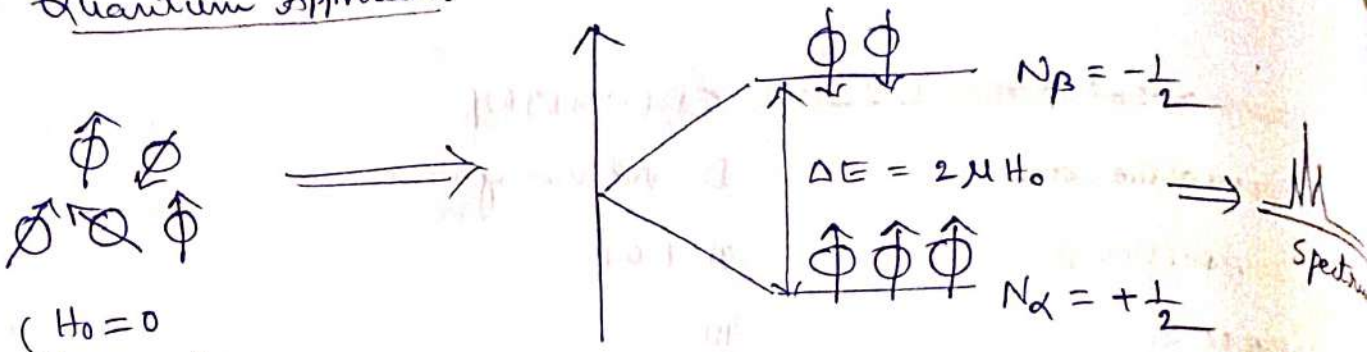
Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment work.

Signature of the Lecturer

② Quantum Approach:



($H_0 = 0$ degenerate protons)

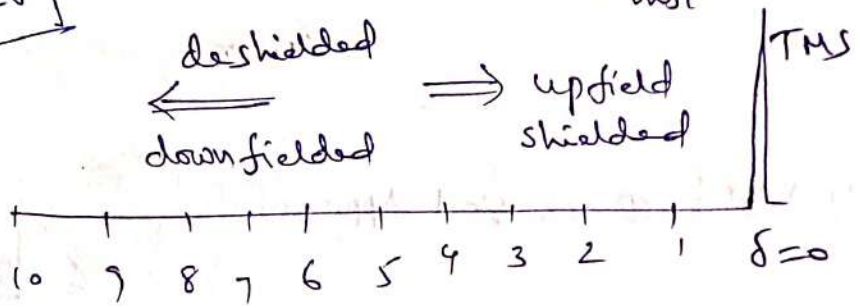
$$\nu_L = \frac{\gamma H_0}{2\pi}, \quad \gamma = \frac{2\pi\mu}{Ih}$$

$\therefore$ For a proton, $\Delta E = h\nu = 2\mu H_0$

⇒ Chemical shift:

$$\delta = \frac{\nu_{sample}^{(Hz)} - \nu_{TMS}^{(Hz)}}{\nu_{inst}^{(Hz)}} \times 10^6 \text{ ppm}$$

$\tau = 10 - \delta$



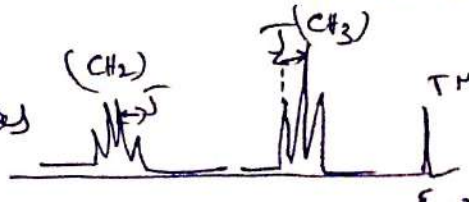
⇒ Spin-spin coupling: Interaction of Two different spins of protons.
(chemically or magnetically non-equivalent)
Due to spin-spin coupling each nmr-signal undergoes splitting.

n	n+1	multiplicity	peak intensities
0	1	s	1
1	2	d	1 : 1
2	3	t	1 : 2 : 1
3	4	q	1 : 3 : 3 : 1
4	5	qt	1 : 4 : 6 : 4 : 1
⋮	⋮	⋮	etc.

⇒ Coupling constant: (J): independent of Applied magnetic field strength

for eg: CH_3-CH_2-Br

Distance between two adjacent peaks in a multiplet. → units (H_2)



Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : II FG H

Paper : III

Name of the Topic : NMR - Spectroscopy

Hours required :

Learning Objectives : Applications of nmr Spectroscopy.

Previous knowledge to be reminded : Chemical shift, Spin-Spin coupling; Coupling Constant.

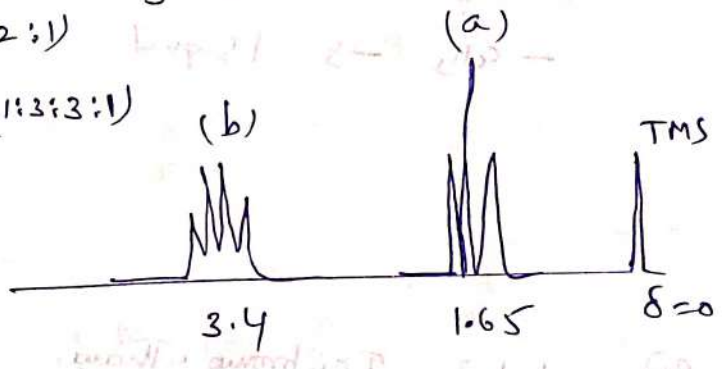
(Continue on the reverse side if needed)

Topic Synopsis :

① NMR spectrum of ethyl bromide: $\overset{a}{CH_3}-\overset{b}{CH_2}-Br$

a → $-CH_3$ protons → triplet (1:2:1)

b → $-CH_2-$ protons → quartet (1:3:3:1)



Examples / Illustrations :

Additional inputs :

Teaching Aids used :

References cited : Organic spectroscopy by William Kemp; Donald pavia, Jagmohan, Y.R. Sharma.

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Mid-II Exams

Signature of the Lecturer

② Ethanol : CH_3-CH_2-OH → '3' different kinds of protons

$R-OH + R-OH^*$ ⟶ (Impurities, proton exchange very fast) $R-OH^* + R-OH$

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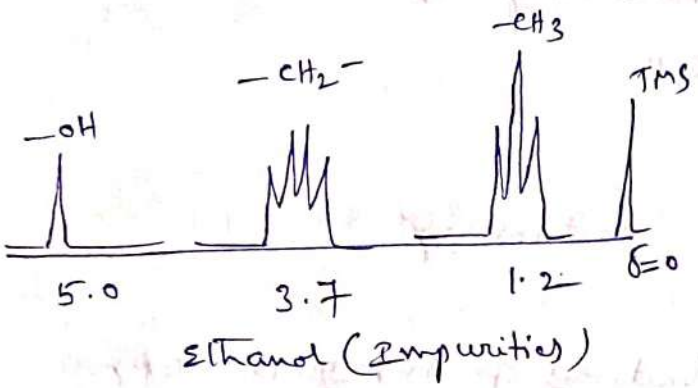
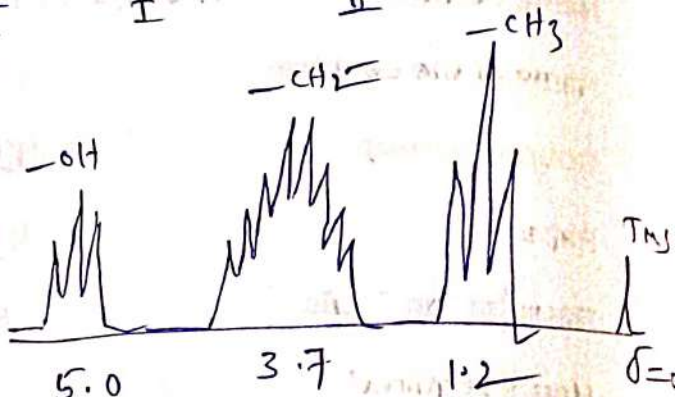


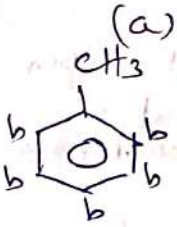
Ethanol (Impurities)



(pure Ethanol)

-OH proton undergo coupling with $-CH_2-$ protons.

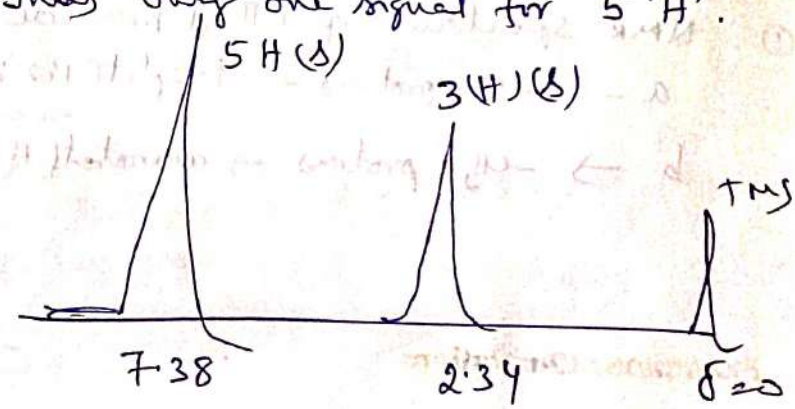
③ Toluene:



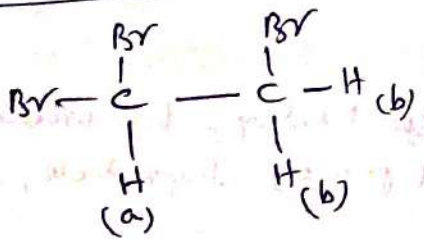
In case of alkyl group in benzene, nmr cannot distinguish o, p, m protons. Thus only one signal for 5 'H'.

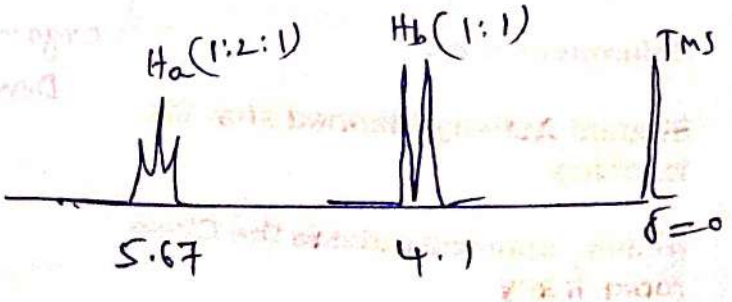
$-CH_3$ ⟶ 1 signal

$-C_6H_5$ ⟶ 1 signal



④ 1, 1, 2 - Tribromo ethane





Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

F - CBZ
G - CBMb
H - Bt. ZC

Course / Group : II FGH

Paper : III

Name of the Topic : Applications of Electronic spectroscopy

Hours required : 04

Learning Objectives : Cal. of λ_{max} of conjugated dienes and α,β-Unsaturated Carbonyl Compounds (Woodward - Fieser Rules)

Previous knowledge to be reminded : Absorption, molar extinction coefficient

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ Woodward - Fieser Rules for calculating Absorption Maximum (λ_{max}) :

(i) Parent value for acyclic conjugated diene = 217 nm
(ii) For homo annular conjugated diene = 253 nm
(iii) For hetero " " = 214 nm

Increments for Substituents :

for alkyl Sub (or) ring residue = +5 nm
for each exocyclic double bond = +5 nm
for each d.b extending conjugation = +30 nm

Increments for Auxochromes

-Cl, -Br	→ +5 nm
-OR	→ +6 nm
-SR	→ +30 nm
$-NR_2$	→ +60 nm
$-OCOCH_3$	→ +0 nm

Examples / Illustrations :

Additional inputs : Study material

Teaching Aids used :

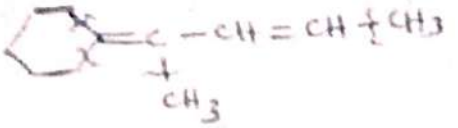
References cited : Organic spectroscopy by Y.R. Sharma

Student Activity Planned after the teaching :

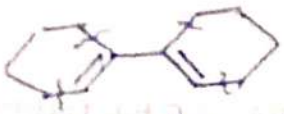
Activity planned outside the Class room. if any : Cal. of λ_{max} of more no. of Compounds

Any other activity :

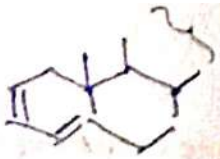
Signature of the Lecture



Basic Value = 217 nm
2- R·R's = 10 nm
2- Alkyl Sub = 10 nm
1- exocyclic d·b = 5 nm
$\therefore \lambda_{max}$ = 242 nm



Basic Value = 214 nm
4-RR's = 20 nm
$\therefore \lambda_{max}$ = 234 nm



in ethanol
Basic value
Homo Annu. diene } = 25
3 RR's =
1-Exocyclic d·b =
Total λ_{max} = 27

⇒ Woodward - Fieser Rules for Cal. of λ_{max} in α,β-unsat. carbonyl compounds:-

[=CH-COX]

→ The basic value for α,β-unsaturated Ketone (may be acyclic / 6-M) (X = alkyl group) = 215 nm
→ The basic value for 5-Membered Ketone (α,β-unsaturated) (if X = R) = 202 nm
→ Basic value for parent α,β-unsaturated aldehyde (X = H) = 207 nm
→ Basic " α,β-unsaturated acid / ester (X = -OH, -OR) = 195 nm

Increments:

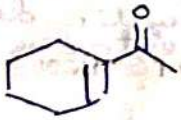
For each exocyclic d·b = +5 nm
For each d·b extending conjugation } = +30 nm
For a homo annular diene = +39 nm
For each alkyl Sub / R·R at α-position = +10 nm
" β- " = +12 nm
γ, δ, higher = +18 nm

Chromophore increments:

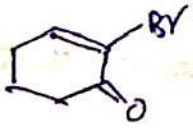
chromophore	α	β	γ	δ-/higher
-OH	+35	+30	-	+50 nm
-OAc	+6	+6	+6	+6 nm
-Cl	+15	+12	-	-
-Br	+25	+30	-	-
-OR	+35	+30	+17	+31 nm
-SR	-	+85	-	-
$-NR_2$	-	+95 nm	-	-

Examples:

Basic value = 215 nm
2 β-alkyl Sub = 24 nm
$\therefore \lambda_{max}$ = 239 nm



Basic value = 215 nm
R R at α-position = 10 nm
" β-position = 12 nm
$\therefore \lambda_{max}$ = 237 nm



Basic value = 215 nm
α - Bromo Sub = 25 nm
R·R at β-position = 12 nm
$\therefore \lambda_{max}$ = 252 nm

Semester – IV / Paper – IV & V – 2022

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II F G H Sections

F – CBZ
G – CBMb
H – BtZC

Paper : IV

Name of the Topic : organometallic compounds

Hours required : 05

Learning Objectives : Definition, classification, Haptacity, 18-electron Rule

Previous knowledge to be reminded : EAN Rule, RMgX, Alkyl lithium etc.

(Continue on the reverse side if needed)

Topic Synopsis :

Definition: An organometallic compound is generally defined as one That contains atleast one metal–carbon bond.

$-\underset{|}{C}-M$; M = Li, Na, Mg, Ti, V, Cr, Mn, Fe, Co, Ni, Zn, U, Pb, Si As, P etc.

classification: (i) Ionic Bonded O.M.C: Highly electro +ve metals form This Compounds. Eg: $(C_5H_5)_2Ca$, $(C_6H_5)_3^{\ominus}C\,Na^{\oplus}$

Examples / Illustrations : RMgX, $(C_5H_5)_2Fe$, RLi, $(C_6H_5)_3^{\ominus}C\,Na^{\oplus}$, Fe

Additional inputs : study material, PGCET Concepts

Teaching Aids used : Periodic Table chart, Black board, chalk

References cited : Inorganic chemistry by Huhey, OMC by Vijay Kumar

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any : preparation of Notes

Any other activity : Assignment work

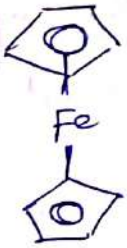
Signature of the Lecturer

(ii) σ-bonded OMC: Metals with low electro +ve [illegible]

Eg: TEL ⇒ $(C_2H_5)_4Pb$; $(CH_3)_2SiCl_2$, $(CH_3)_2Zn$ etc.

(iii) π-bonded OMC: Transition & Inner transition elements

Eg: Ferrocene



(iv) Alkyl bridged OMC: $(AlR_3)_2$; $[Be(CH_3)_2]_n$

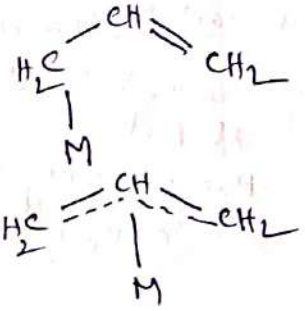
⇒ Concept of Haptacity: The symbol @ η^x gives ligand's haptacity.

x = The no. of ligand atoms simultaneously bound to central metal

η^1: M–R, R = $-CH_3$, $-C_2H_5$, $-C_6H_5$ (Monohapto ligands)

η^2: M—CH₂=CH₂ η^2-ethylene → dihapto ligand

η^3: trihapto ligands:

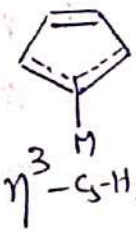


η^1-allyl (monohaptoallyl)

η^3-allyl (Trihaptoallyl)

η^5:

$\eta^1-C_5H_5$ (or) η^1-Cp ;



$\eta^3-C_5H_5^-$

$\eta^5-C_5H_5^-$

⇒ The 18-electron Rule : Electron count method:

$(n-1)d^{10}\,ns^2\,np^6$ → Stable Valence shell electronic Configuration

Examples: Metal carbonyl – Electron count method (Neutral atom method)

$Fe(CO)_5$: Fe 8e⁻; 5 CO 10e⁻; 18e⁻

$Mn_2(CO)_{10}$: 2Mn 14e⁻; 10 CO 20e⁻; Mn–Mn 2e⁻; 36e⁻; ∴ 18e⁻/Mn

$Co_2(CO)_8$: 2 Co 18e⁻; 8 CO 16e⁻; Co–Co 2e⁻; 36e⁻; ∴ 18e⁻/Co

$Fe_2(CO)_9$: 2Fe 16e⁻; 9 CO 18e⁻; Fe–Fe 2e⁻; 36e⁻; ∴ 18e⁻/Fe

$HMn(CO)_5$: Mn 7e⁻; 5 CO 10e⁻; H 1e⁻; 18e⁻

$V(CO)_6$: V 5e⁻; 6 CO 12e⁻; 17e

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : IV

Name of the Topic : Organometallic Compounds

Hours required : 03

Learning Objectives : Gen. methods of prep. of Mono and binuclear Metal carbonyls of 3d-series, MO diagram of CO — π-acceptor behaviour & synergistic effect.

Previous knowledge to be reminded : The 18-electron rule, Hapticity

(Continue on the reverse side if needed)

Topic Synopsis : General Methods of prep. of mono and binuclear Metal Carbonyls :

(i) $Ni + 4CO \xrightarrow[25^\circ C]{1\ atm} Ni(CO)_4$

$Fe + 5CO \xrightarrow[200^\circ C]{200\ atm} Fe(CO)_5$

$2Co + 8CO \xrightarrow[200-300^\circ C]{220\ atm} Co_2(CO)_8$

(Direct Interaction Method)

(ii) Photolysis

$2\,Fe(CO)_5 \xrightarrow{h\nu} Fe_2(CO)_9 + CO$

Examples / Illustrations : —

Additional inputs : PG CET Bits, Study material

Teaching Aids used : Black Board & chalk, PT chart

References cited : O.M.C. by Ajay Kumar

Student Activity Planned after the teaching : —

Activity planned outside the Class room. if any : Notes preparation

Any other activity : Assignment work

Signature of the Lecturer

(iii) Reduction followed by carbonylation:

$$VCl_3 + 6CO + 3Na \xrightarrow{THF} V(CO)_6 + 3NaCl$$

$$CrCl_3 + 6CO + Al \xrightarrow{AlCl_3/C_6H_6} Cr(CO)_6 + AlCl_3$$

$$2CoS + 8CO + 4Cu \xrightarrow[200\ atm]{200^\circ C} Co_2(CO)_8 + 2Cu_2S\downarrow$$

(iv) By direct reaction of metal compound with CO:

$$NiX_4 + 4CO \xrightarrow{\Delta} Ni(CO)_4 + 2X_2\uparrow$$

$$Ni(CN)_2 + 4CO \longrightarrow Ni(CO)_4 + (CN)_2\uparrow$$

⇒ M.O. diagram of CO – π-Acceptor behaviour of CO ligand – Synergistic effect:

In the formation of metal carbonyl, CO is considered to be a good σ-donor as well as a π-acceptor ligand. This can be explained by M.O. diagram.

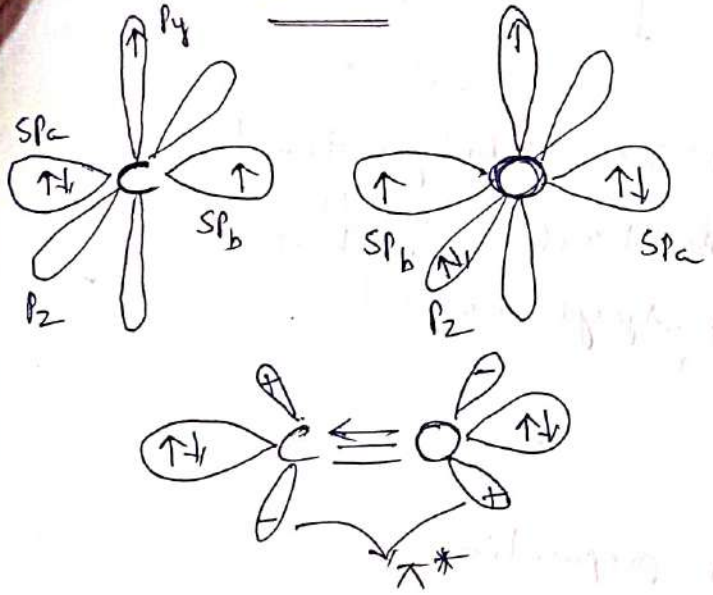
$_6C - 1s^2\ 2sp_a^2\ 2sp_b^1\ 2p_y^1\ 2p_z^0$

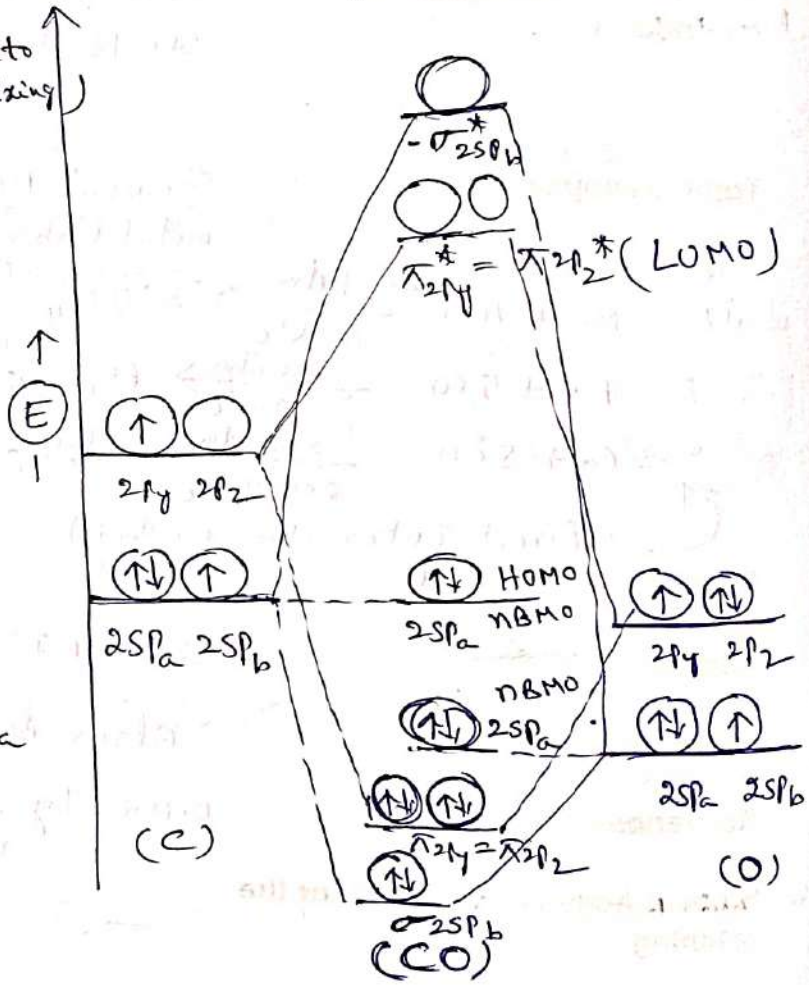
$_8O - 1s^2\ 2sp_a^2\ 2sp_b^1\ 2p_y^1\ 2p_z^2$

} due to (s, p_z mixing)

$$B.O = \frac{N_b - N_a}{2} = \frac{8-2}{2} = 3$$

C≡O





M ← C≡O: (↔) M−C≡O:

M ⇌ C=O: ⟷ M−C≡O:

Evidence for CO synergistic bonding: $\bar{\nu} = \frac{1}{2\pi c}\sqrt{\frac{K}{\mu}}$

$\bar{\nu} \propto K$

IR freq ∝ Bond strength ∝ Bond order ∝ 1/Bond length

* The stretching frequency of free CO = 2143 cm⁻¹

But in $Cr(CO)_6$ → 2000 cm⁻¹

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc., BH Sections

Paper : V

Name of the Topic : phase Rule

Hours required :

Learning Objectives : Gibb's phase Rule, phase, Components, degrees of freedom

Previous knowledge to be reminded : System, Surroundings, homogeneous & heterogeneous Systems.

(Continue on the reverse side if needed)

Topic Synopsis :

phase Rule : Willard Gibb's $\boxed{F = c - p + 2}$

Where F = Number of degrees of freedom

p = No. of phases

c = No. of Components

Examples / Illustrations :

Additional inputs : study material, Video on phase Rule - terms with examples.

Teaching Aids used : Youtube Video, Black Board, chalk

References cited : physical chemistry by puri, sharma & pathan

Student Activity Planned after the teaching : To prepare notes

Activity planned outside the Class room. if any :

Any other activity : Assignment

Signature of the Lecturer

⇒ **phase(P)**: The homogeneous part of a heterogeneous system in equilibrium, which is physically distinct and mechanically separable is termed as phase.

eg(i) i) Air, $P=1$

ii) $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$; $P=3$

iii) $Ice(s) \rightleftharpoons water(l) \rightleftharpoons Water\ vapour(g)$; $P=3$

⇒ **Components (C)**: The min. number of Constituents or molecular species sufficient for determining the composition of all phases of the system are termed as the components of the system.

Eg(i): $Ice(s) \rightleftharpoons water(l) \rightleftharpoons Vapour(g)$; $C=1$

one component system.

ii) $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$; $C=2$

Two component system

⇒ **Degrees of Freedom (F)**: The min. no. of independent Variables such as temp, pressure and composition (Concentration) of the phases, which must be arbitrarily fixed in order to define the condition of the system completely is termed as degrees of freedom.

Eg(i) $Water(l) \rightleftharpoons Water\ vapour(g)$

$F = C - P + 2 = 1 - 2 + 2 = 1$ Univariant

ii) At 0.0098^0C temp, 4.58 mm pressure

$Ice(s) \rightleftharpoons water(l) \rightleftharpoons Water\ vapour(g)$

$C=1$, $P=3$

$\therefore F = C - P + 2 = 1 - 3 + 2 = 0$ (invariant system)

Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH Sections

Paper : IV

Name of the Topic : Carbohydrates

Hours required :

Learning Objectives : Definition, classification of carbohydrates

Previous knowledge to be reminded : —

(Continue on the reverse side if needed)

Topic Synopsis :

Definition of carbohydrates: Carbohydrates are defined as the optically active polyhydroxy aldehydes or ketones or substances which yield these compounds on hydrolysis.

Examples / Illustrations : Glucose, Fructose, Maltose, Lactose, Sucrose.

Additional inputs :

Teaching Aids used : Unified Course – Vol-III by O.P. Agarwal

References cited :

Student Activity Planned after the teaching : —

Activity planned outside the Class room. if any : —

Any other activity : Assignment

Signature of the Lecturer

carbohydrates

Sugars
Sweet, crystalline, soluble in water, low molecular weights

Monosaccharides
$-CHO$ | $\geq C=O$

- **Aldoses** — Eg: Glucose, Mannose, Arabinose
- **Ketoses** — Eg: Fructose

oligosaccharides
Eg:- Disaccharides
- Trisaccharides
  - Eg: Raffinose = Glucose + Fructose + Galactose

Disaccharides
Sucrose = Glucose + Fructose
Lactose = Glucose + Galactose
Maltose = 2 Glucose

Sucrose — Cane Sugar
Lactose — Milk Sugar
Glucose — grape Sugar, blood sugar, corn Sugar, dextrose
Fructose — fruit Sugar (sweetest carbohydrate), laevulose
Maltose — Malt Sugar

Non-Sugars (polysaccharides)
Tasteless, Amorphous, insoluble in water or form Colloidal Sols.

Eg: Cellulose $\xrightarrow{hyd}$ n(Glucose)
Starch $\xrightarrow{hyd}$ n(Glucose)
Inulin $\xrightarrow{hyd}$ n(fructose)

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II BSc H

Paper : V

Name of the Topic : phase Rule

Hours required :

Learning Objectives : phase diagram of one component system
– water system

Previous knowledge to be reminded : No. of phases, Components, degrees of freed

(Continue on the reverse side if needed)

Topic Synopsis :

Water system: $Ice(s) \rightleftharpoons Water(l) \rightleftharpoons Water\ vapour$ (g)

$C = 1 \rightarrow$ one Component system

$P = 3$

$F = C - P + 2 \rightarrow$ phase Rule

Examples / Illustrations : –

Additional inputs : study material, ppt

Teaching Aids used : chart, ppt

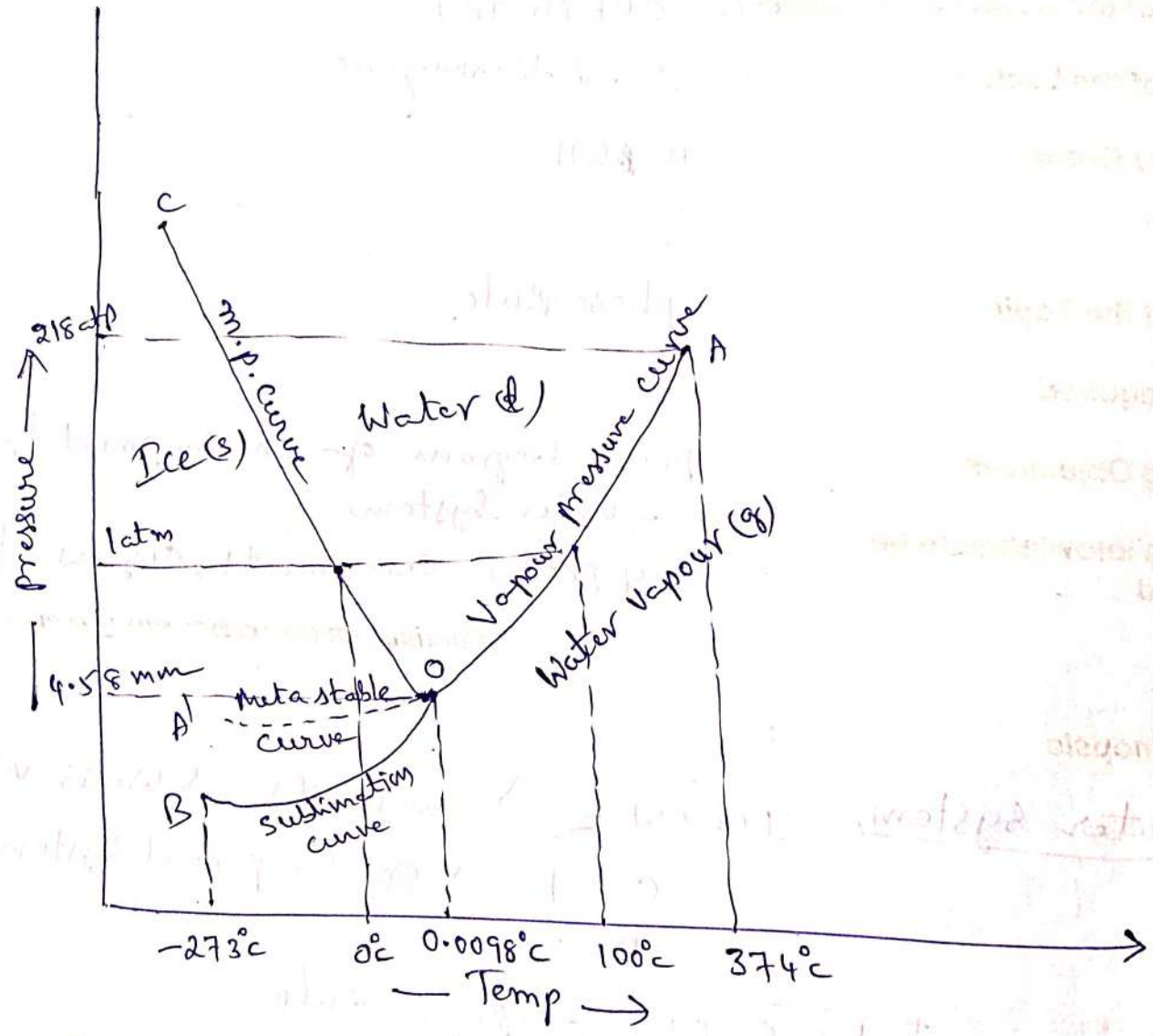
References cited : unified Course-vol-III by O.P. Agarwal

Student Activity Planned after the teaching : To prepare notes

Activity planned outside the Class room. if any :

Any other activity : Assignment

Signature of the Lecturer



Curves : OA, OA', OB, OC ⟶ univariant

Areas : AOC, AOB, BOA ⟶ bivariant

Triple point 'O' : $F = C - P + 2$

$= 1 - 3 + 2 = 0$

$\therefore F = 0$ ⟶ Invariant

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : B.Sc – II FGH

Paper : IV

Name of the Topic : Carbohydrates

Hours required :

Learning Objectives : Structure of Glucose – open chain structure, ring structure – Mutarotation, Anomers, Epimers, Det. of ring size

Previous knowledge to be reminded : classification of Carbohydrates

(Continue on the reverse side if needed)

Topic Synopsis :

Structure of Glucose: (A) Det. of open chain structure of Glucose:

→ M.F = $C_6H_{12}O_6$

→ Acylation: $C_6H_{12}O_6 \xrightarrow{(CH_3CO)_2O}$ penta acetyl glucose + $5CH_3COOH$

→ $>C=O + HCN \longrightarrow >C(OH)(CN)$ } → $C_6H_{12}O_6 \xrightarrow[(O)]{Br_2\ Water}$ Gluconic acid

→ $C_6H_{12}O_6 \xrightarrow[(O)]{Conc.\ HNO_3}$ $COOH(CHOH)_4COOH$ } → $C_6H_{12}O_6 \xrightarrow[(R)]{HI + Red\ P}$ n-hexane

Examples / Illustrations :

Additional Inputs : charts, PGCET Concepts

Teaching Aids used :

References cited : Unified Course – Vol-III by O.P. Agarwa

Student Activity Planned after the teaching :

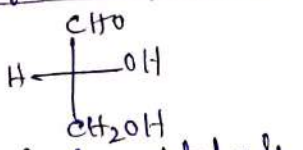
Activity planned outside the Class room, if any : Preparation of notes.

Any other activity : Assignment Work

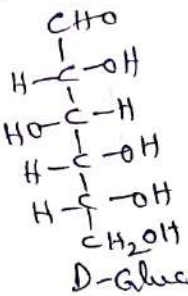
Signature of the Lecturer

Open chain structure: $HOH_2C-CH(OH)-$ (6 5 4 3 2 1)

Configuration of glucose:



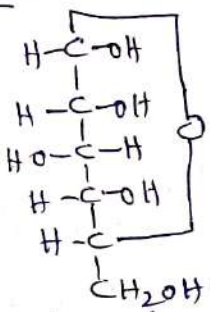
D-glyceraldehyde



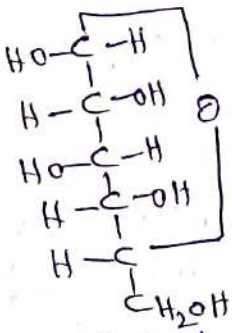
D-Glucose

⇒ Ring structure:

(i) Anomers:

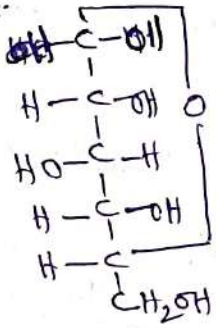


α-D-glucose



β-D-glucose

⇒ Mutarotation:

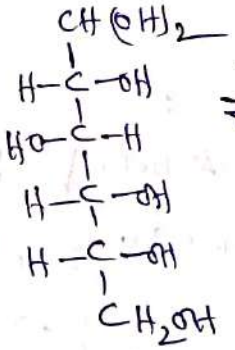


α-D-glucose

$[\alpha]_D = +112°$

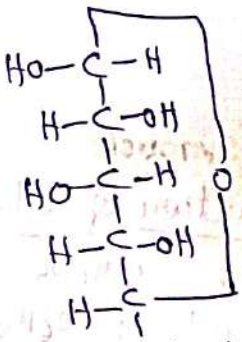
(36%)

$+H_2O$ ⇌ $-H_2O$



Aldehydrol

$-H_2O$ ⇌ $+H_2O$



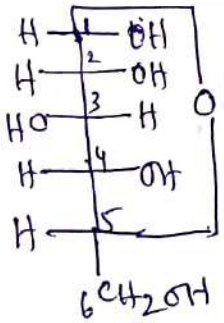
β-D-glucose

(64%)

$[\alpha]_D = +19.7°$

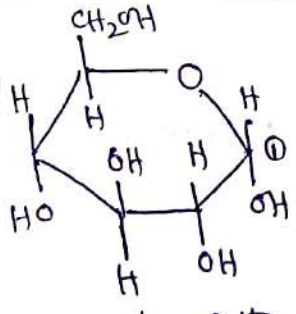
Specific rotation of equilibrium mixture = $+52.5°$

⇒ Pyranose structure & Conformation of D-glucose:



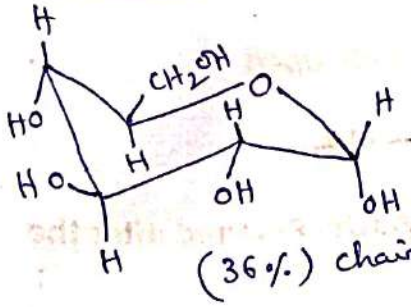
α-D-glucopyranose

≡

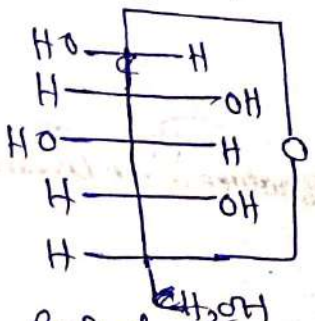


Haworth

≡

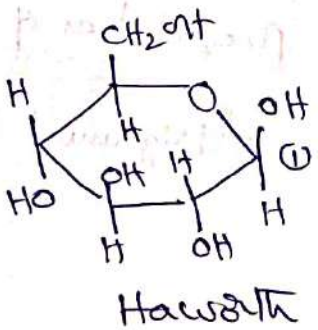


(36%) chair conformation

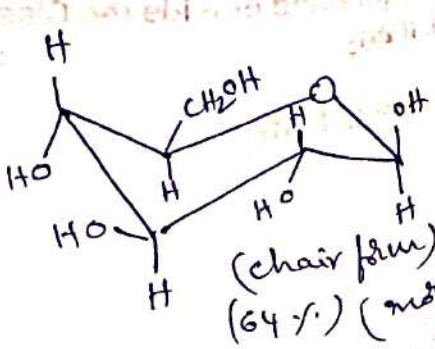


β-D-glucopyranose

≡



Haworth



(chair form)

(64%) (more stable)

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Srinarayana

Course / Group : II PGH

Paper : IV

Name of the Topic : Carbohydrates

Hours required :

Learning Objectives : Interconversions of monosaccharides

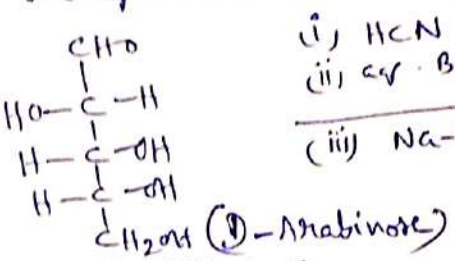
Previous knowledge to be reminded : Mutarotation, Epimers, Anomers, ring structure of glucose

(Continue on the reverse side if needed)

Topic Synopsis :

* Interconversions of Monosaccharides:

(1) Aldopentose to Aldohexose – Kiliani's Synthesis



Examples / Illustrations : Anomers, Epimers

Additional Inputs : PGCET Concepts, group discussion

Teaching Aids used : Black board & Colour chalks

References cited : Unified Course – Vol-III by O.P. Agarwal

Student Activity Planned after the teaching : —

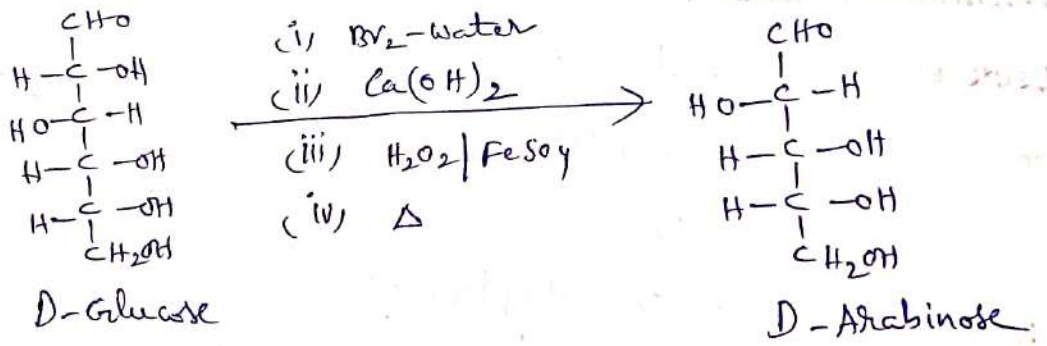
Activity planned outside the Class room. If any : prep. of notes

Any other activity : Assignment work

Signature of the Lecturer

(ii) Aldohexose ⟶ Aldopentose

D-Glucose to D-Arabinose — Ruff's degradation

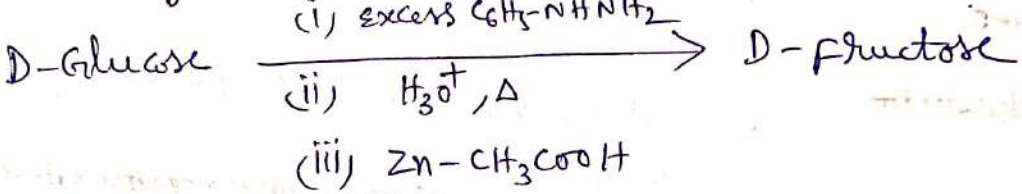


D-Glucose

D-Arabinose

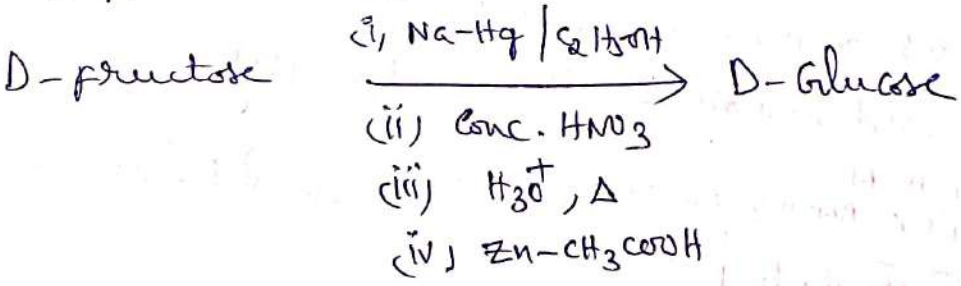
(iii) Aldohexose to Ketohexose

Eg: D-glucose to D-Fructose



(iv) Ketohexose to aldohexose

D-Fructose to D-Glucose



Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II GH

Paper : V

Name of the Topic : phase Rule

Hours required :

Learning Objectives : Condensed phase Rule : phase diagram of Ag-Pb system; NaCl-H_2O system & freezing mixtures

Previous knowledge to be reminded : phase Rule : $F = C - P + 2$

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ Freezing Mixtures : Salt-Ice mixtures at their eutectic temperatures are called freezing mixtures. These are used in producing lower temperatures for refregeration purpose

Freezing Mixture	Eutectic temp	% of Composition of Salt
$NH_4Cl + Ice$	$-16^\circ C$	23%
$NH_4NO_3 + Ice$	$-18^\circ C$	43%
$NaCl + Ice$	$-21^\circ C$	23%

Examples / Illustrations :

Additional inputs : Study material, charts

Teaching Aids used : ppt, Youtube link

References cited : physical chemistry by puri, Sharma & pathania

Student Activity Planned after the teaching : Students draw the phase diagrams of Ag-Pb & NaCl-H_2O system.

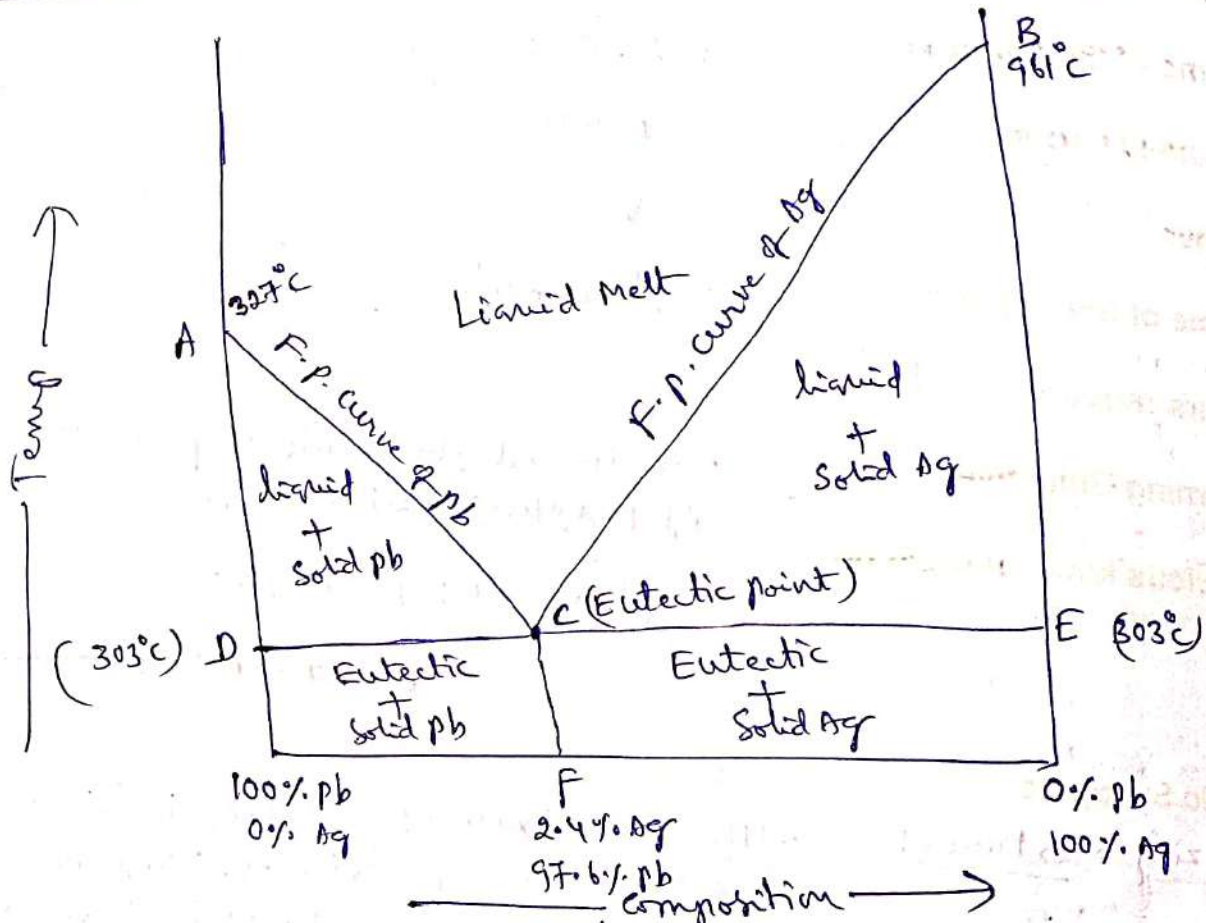
Activity planned outside the Class room. if any : Prep. of Notes by students

Any other activity : Assignment

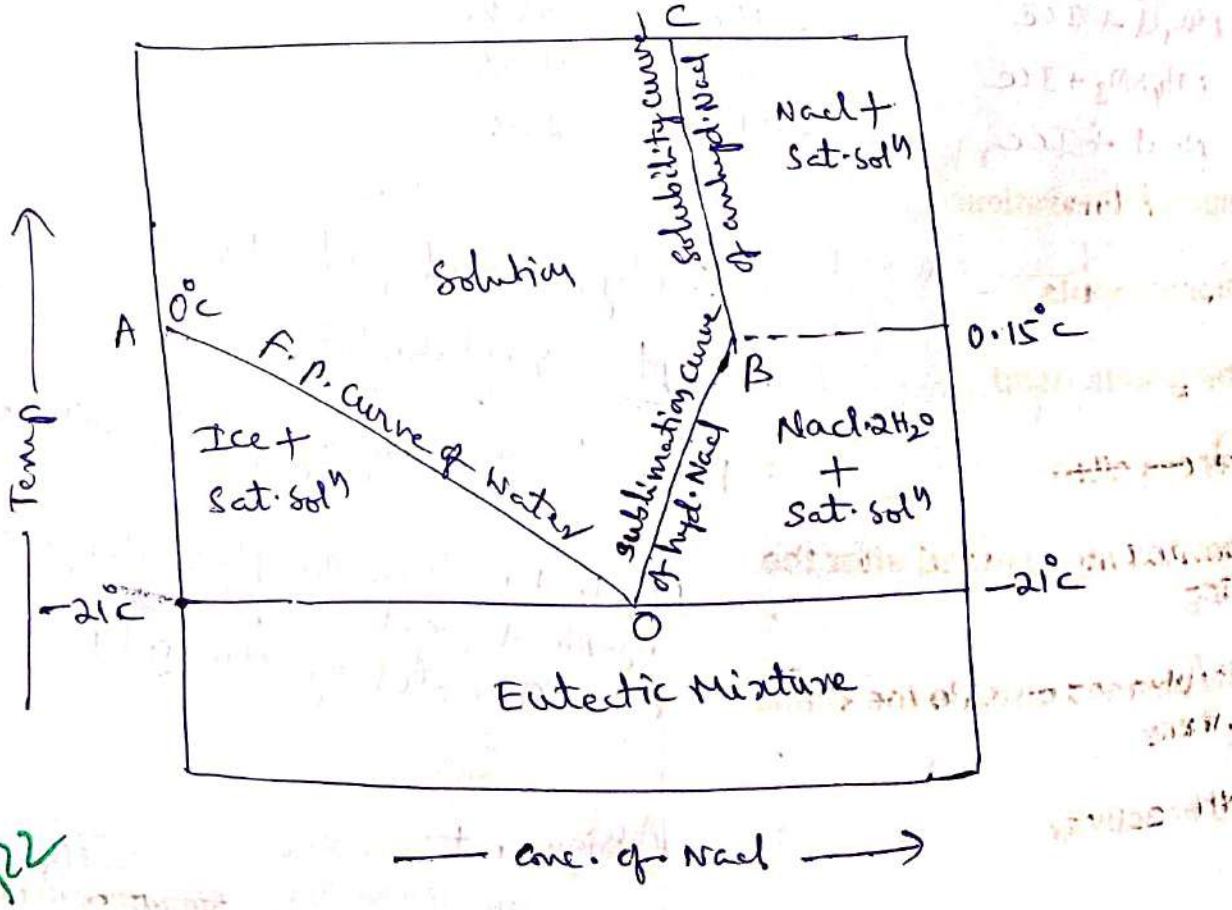
Signature of the Lecturer

⇒ Condensed phase Rule: $F = C - P + 1$

⇒ Phase diagram of Ag–Pb system:



⇒ Phase diagram of NaCl + H_2O system:



29/8/22

Name of the Department / Subject : Chemistry

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : IV

Name of the Topic : photochemistry

Hours required :

Learning Objectives : Difference between Thermochemical & photochemical reactions, Laws of photochemistry, Quantum yield.

Previous knowledge to be reminded : Thermochemical & photochemical reactions

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ Thermochemical reactions: These reactions involve absorption or evolution of heat. $\Delta G = -ve$

⇒ photochemical reactions: These reactions involve absorption of light.

$\Delta G = +ve$ (or) $-ve$

Examples / Illustrations : photosynthesis, Decomposition of $CaCO_3$

Additional inputs : TLM

Teaching Aids used : Black Board & Coloured & White chalk

References cited : Unified Series by O. P. Agarwal, puri & sharma ↓ physical chemist

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment

Signature of the Lecturer

⇒ Laws of photochemistry:

(i) Grotthus-Draper Law: It states that only radiations of light which are absorbed by the substance are effective in producing a photochemical change. It doesn't imply that the light absorbed must also cause a photochemical change.

The absorbed light may be converted into heat (light) & reemitted as fluorescence & phosphorescence. or leads to chemical change.

(ii) Einstein law of photochemical equivalence:

Each molecule or atom of a reacting substance absorbs one quantum of radiation.

(ie) $E = h\nu \Rightarrow E = Nh\nu$ for 1 mole

$$E = \frac{119.7\times10^6}{\lambda(\text{in cm})} \text{ erg/mole} = \frac{2.86}{\lambda(\text{in cm})} \text{ Cal/mole} = \frac{2.86\times10^{}}{\lambda(}$$

⇒ Quantum yield:

$$\phi = \frac{\text{No. of molecules reacting in a given time}}{\text{No. of Quanta absorbed in the same time}}$$

$$= \frac{\text{No. of moles reacting in a given time}}{\text{No. of Einsteins absorbed in the same time}}$$

$$= \frac{\text{Rate of reaction}}{\text{No. of Einsteins absorbed}}$$

Eg: (i) For High Quantum yield

$H_2 + Cl_2 \xrightarrow{h\nu} 2HCl$; $\phi = 10^6$

Mech: primary process:

$Cl_2 \xrightarrow{h\nu} Cl^\cdot + Cl^\cdot$

Sec. process:

$Cl^\cdot + H_2 \xrightarrow{\text{Exothermic}} HCl + H^\cdot$

$H^\cdot + Cl_2 \longrightarrow HCl + Cl^\cdot$

etc.

Note: $H_2S \xrightarrow{h\nu} H_2 + S$; $\phi = 1$

Einstein law is applicable to photo primary process.

Eg (ii) For a low Quantum yield

$H_2 + Br_2 \xrightarrow{h\nu} 2HBr$

$\phi = 0.01$

Mech: primary process

$Br_2 \xrightarrow{h\nu} Br^\cdot + Br^\cdot$

Sec. process

$Br^\cdot + H_2 \xrightarrow{\text{Endothermic}} HBr + H^\cdot$

$H^\cdot + Br_2 \longrightarrow HBr + Br^\cdot$

$Br^\cdot + Br^\cdot \longrightarrow Br_2$

$HBr + H^\cdot \longrightarrow H_2 + Br^\cdot$

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : IV

Name of the Topic : photochemistry

Hours required :

Learning Objectives : photophysical process – Jablonski diagram; photosensitization

Previous knowledge to be reminded : Thermochemical reactions, photochemical reactions.

(Continue on the reverse side if needed)

Topic Synopsis :

⇒ photosensitization: A substance which can absorb light and thus induces a photochemical change without taking part in the reaction is called "photosensitizer" and the phenomenon is termed as photosensitization.

Eg:) photosynthesis: $6CO_2 + 6H_2O \xrightarrow[\text{(photosensitizer)}]{*\text{chlorophyll}, h\nu} C_6H_{12}O_6 + 6O_2$

Examples / Illustrations :

Additional inputs : Study material supplied.

Teaching Aids used : chart – Jablonski diagram

References cited : physical chemistry by puri, sharma & pathania

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment

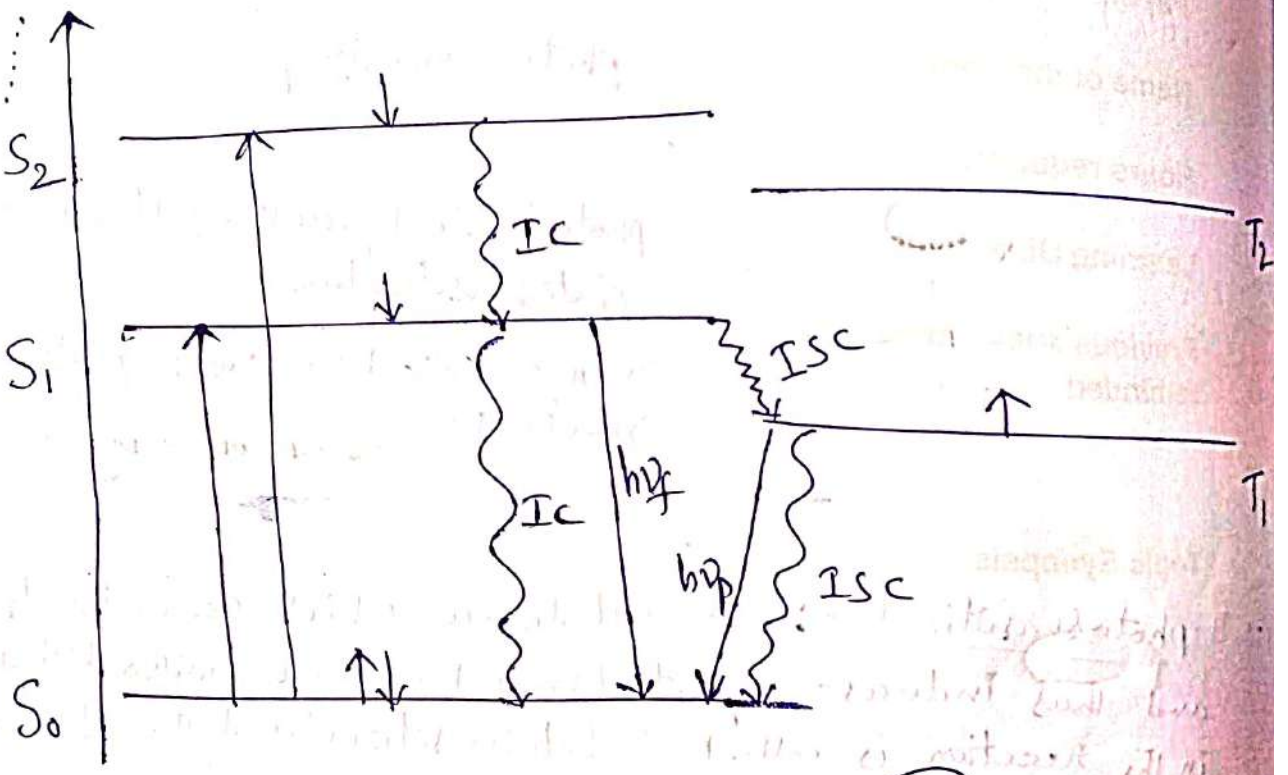
Signature of the Lecturer

(ii) $H_2 \xrightarrow[Hg]{h\nu} 2[H]$

$Hg + h\nu \longrightarrow Hg^*$

$Hg^* + H_2 \longrightarrow 2[H] + Hg$

⇒ Photophysical process - Jablonski diagram



Fluorescence: $S_1 \longrightarrow S_0 + h\nu_f$ ↘ fluorescence

Eg: fluorescein, eosin, fluorite etc.

↓ green light ↓ blue light

Phosphorescence: $T_1 \longrightarrow S_0 + h\nu_p$ ↘ phosphorescence

Eg: ZnS ; Alkaline earth metal sulphides having impurities of heavy metal sulphides.

Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II FGH

Paper : IV

Name of the Topic : Heterocyclic Compounds

Hours required :

Learning Objectives : Definition, Aromatic character of furan, pyrrole and Thiophene & preparation

Previous knowledge to be reminded : classification of Organic Compounds.

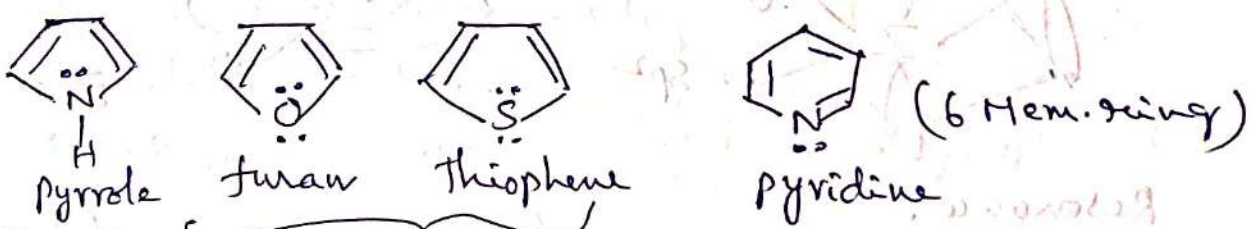
(Continue on the reverse side if needed)

Topic Synopsis :

Definition: The cyclic compounds with atleast one heteroatom (N/O/S) in the ring are known as heterocyclic compounds.

Examples / Illustrations :

Eg:



5M-rings

Additional inputs : Study material, PGCET, CUCET Bits

Teaching Aids used :

References cited : Unified Course - Vol - III by O.P. Agarwal

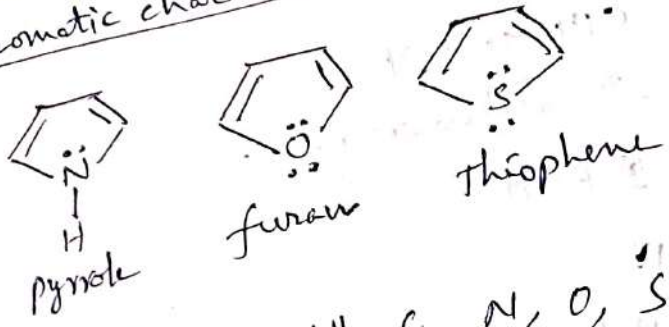
Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment work.

Signature of the Lecturer

⇒ Aromatic character of pyrrole, furan, thiophene



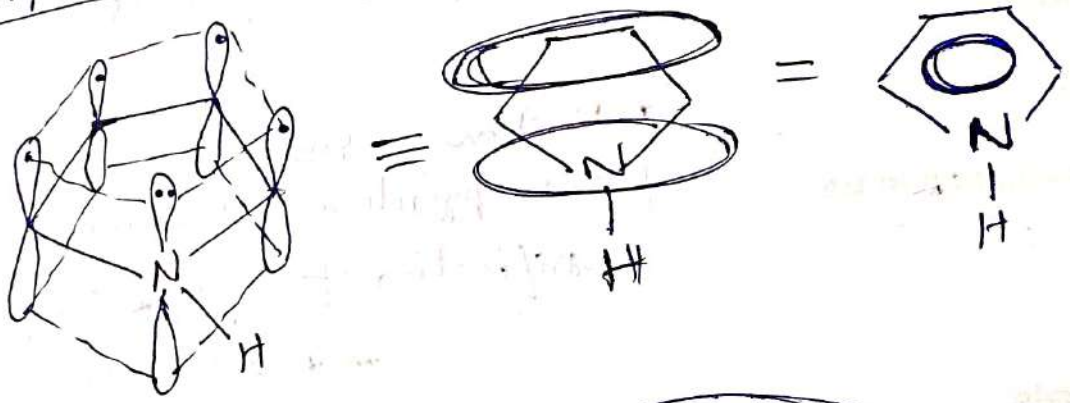
⇒ Aromatic 6 π e⁻ systems

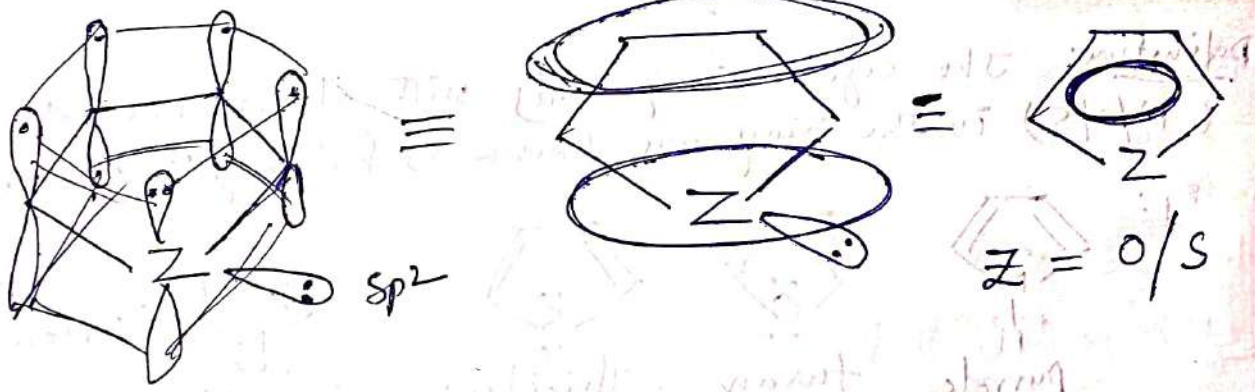
$(4n+2)\pi = 6\pi$

$4n = 4 \Rightarrow n = 1$

pyrrole furan thiophene

M.O. pictures All C, N, O, S undergo sp^2 – hybridisation

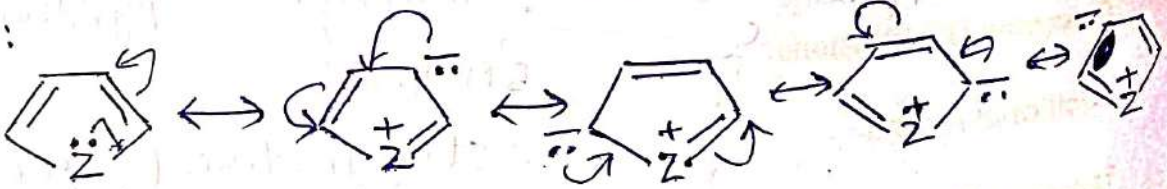




sp^2

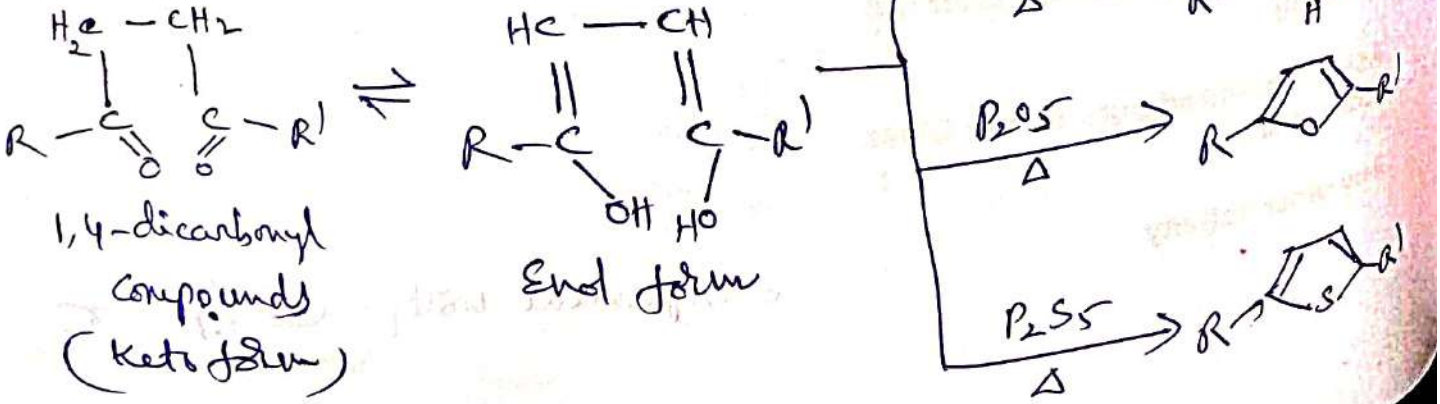
Z = O/S

Resonance:



Z = NH / O/S

⇒ Synthesis of furan, thiophene and pyrrole :- Paul-Knorr synthesis



Name of the Department / Subject : CHEMISTRY

Name of the Lecturer : D. Adinarayana

Course / Group : II GH

Paper : V

Name of the Topic : Electrochemistry

Hours required :

Learning Objectives : Transport Number, Single electrode potential, The Nernst equation's std. electrode potential

Previous knowledge to be reminded : Debye-Huckel-Theory of strong electrolytes, Kohlrausch law

(Continue on the reverse side if needed)

Topic Synopsis :

Transport Number : The fraction of the total current carried by an ion is called its transport number / Hittorf number.

Transport number of cation = $\frac{\text{current carried by cation}}{\text{Total current}}$

$t_c = \frac{u}{u+v}$

$t_a = \frac{\text{current carried by anion}}{\text{Total current}} = \frac{v}{u+v}$

$\therefore t_a + t_c = 1$

{v = speed of anion, u = speed of cation}

↳ Transport no. is determined by Hittorf method.

Examples / Illustrations :

Additional inputs : study material, PGCET, CUCET, JAM, Concepts

Teaching Aids used :

References cited : physical chemistry by puri, sharma

Student Activity Planned after the teaching :

Activity planned outside the Class room. if any :

Any other activity : Assignment work

Signature of the Lecturer

Single electrode potential: The tendency of an electrode to lose or gain electrons when it is in contact with its own ions in solution is called SEP.

Standard electrode potential: The potential of an electrode when it is in contact with its ions in solution with unit activity at 25°C is called std. electrode potential.

The Nernst Equation:

$$E = E^\circ - \frac{2.303RT}{nF} \log \frac{[P]}{[R]}$$

Case(i) $M^{n+}_{(aq)} + ne^- \rightleftharpoons M_{(s)}$

$$E = E^\circ + \frac{2.303RT}{nF} \log[M^{n+}]$$

$$= E^\circ + \frac{0.0591}{n} \log[M^{n+}]$$

Case(ii): For a non-metal electrode.

$$A_{(s)} + we^- \rightleftharpoons A^{n-}_{(aq)}$$

$$E = E^\circ - \frac{0.0591}{n} \log[A^{n-}]$$

n = No. of $\bar{e}$s involved in the cell reaction

E = Electrode potential

E° = std. electrode potential.
