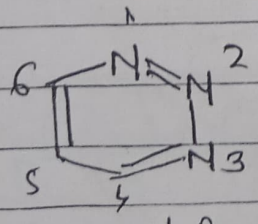
Agrochemicals.

- Herbicides also commonly known as weed killers, are substances used to control unwanted plants. or Herbicides are chemicals used to control or kill weeds.
- It is widely used in agriculture & in landscape turf management.
- Some herbicides are selective and only kill certain types of plants, while other ~~can~~ are non-selective and kill almost any type of plant.
- Herbicides have been used in warfare & conflict
- modern herbicides are synthetic mimics of natural plant hormones which interfere with growth of target plants.

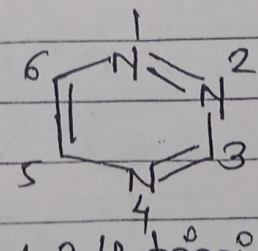
Synthesis and mode of action :- $C_3H_3N_3$

1) Triazines :-

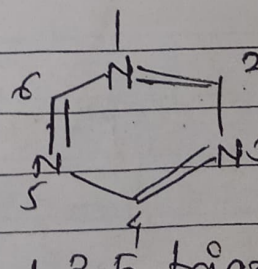
- Triazines are nitrogen containing heterocycles In organic chemistry the term heterocycle refers to a ring system that consists at least 2 diff. elements that make up the ring. A triazine is a heterocyclic str. that contains 3 nitrogen atoms & 3 carbon atoms.
- from a str. there are 3 diff. triazins isomers an isomer have the same chemical formula but diff. atom conectivity.
- The isomers are 1,2,3 triazine, 1,2,4 triazine & 1,3,5 triazine.



1,2,3 triazine



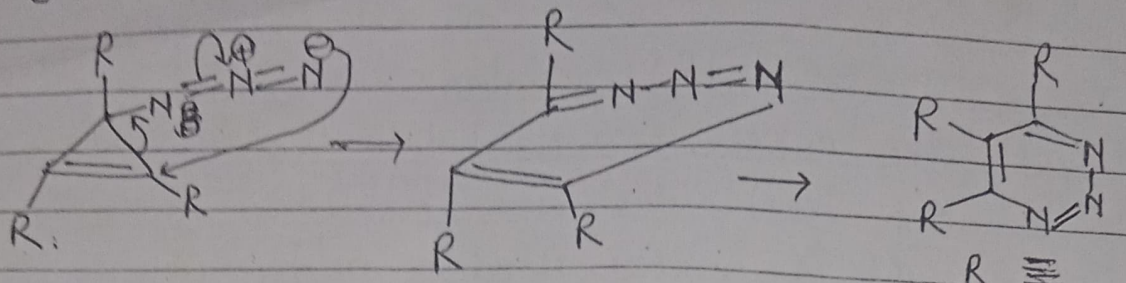
1,2,4 triazine



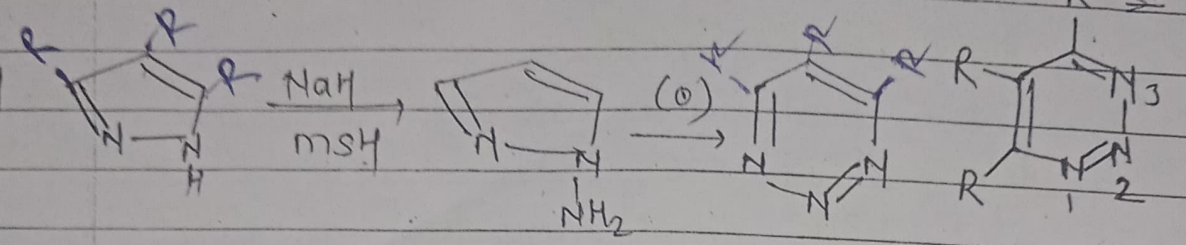
1,3,5 triazine

✱ synthesis of 1,2,3 Triazine :→

1)



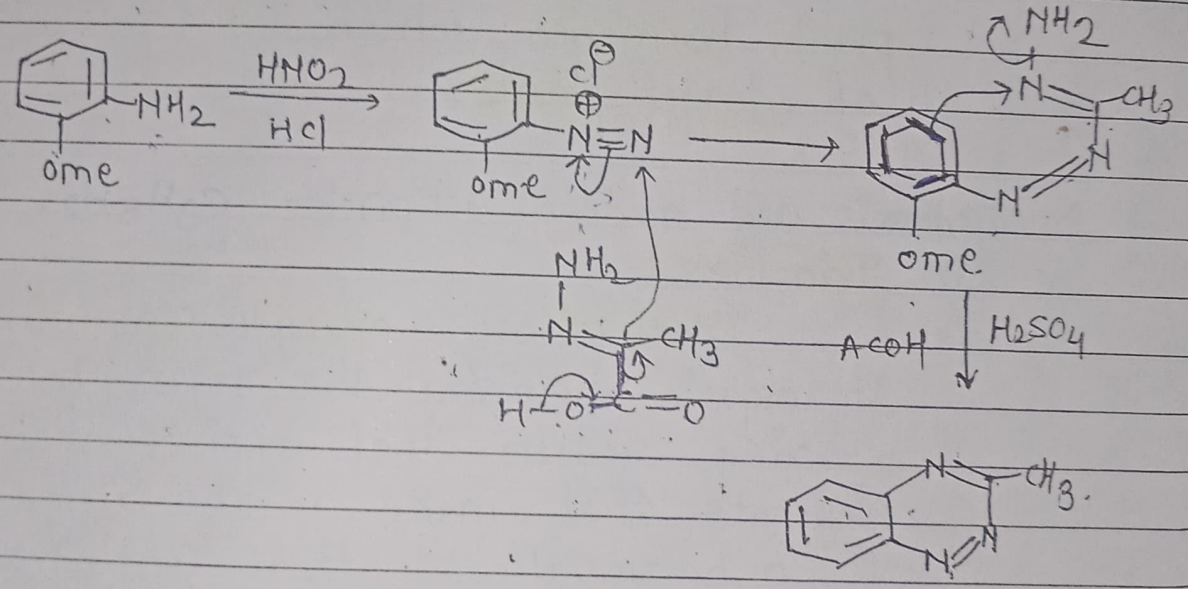
3)



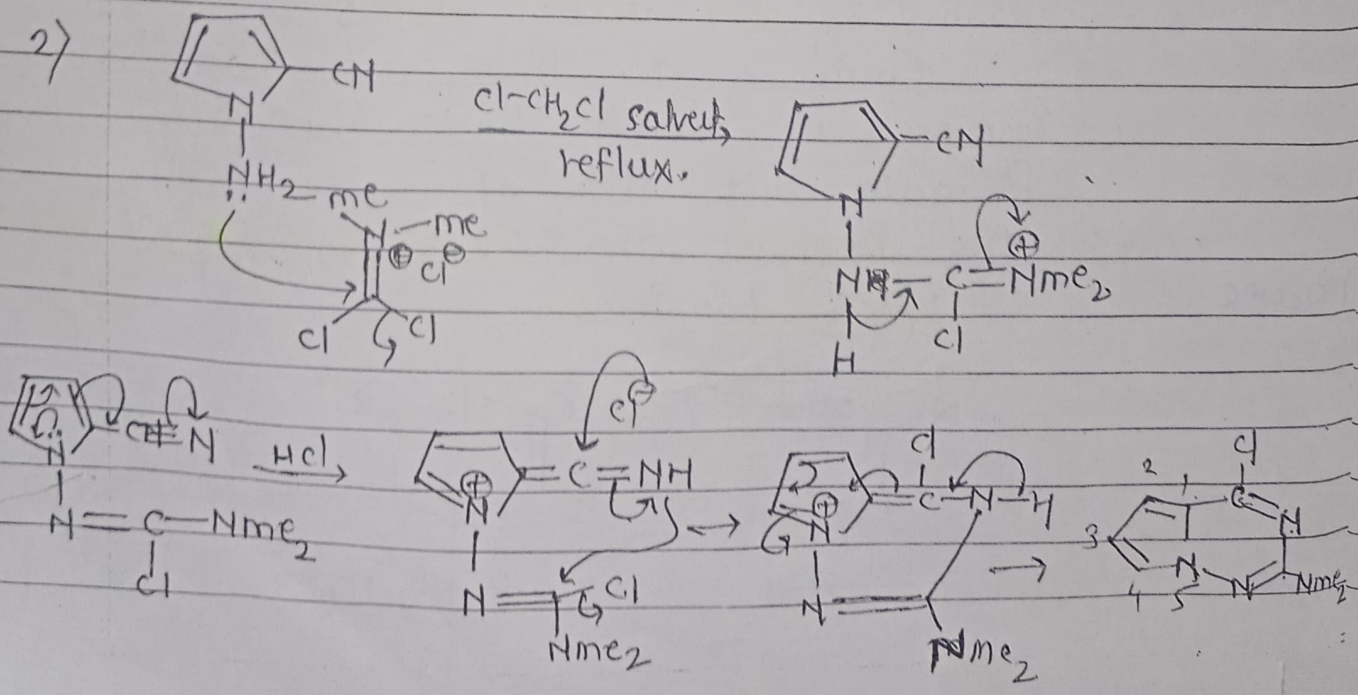
1,2,3 triazine

✱ Synthesis of 1,2,4 triazine :-

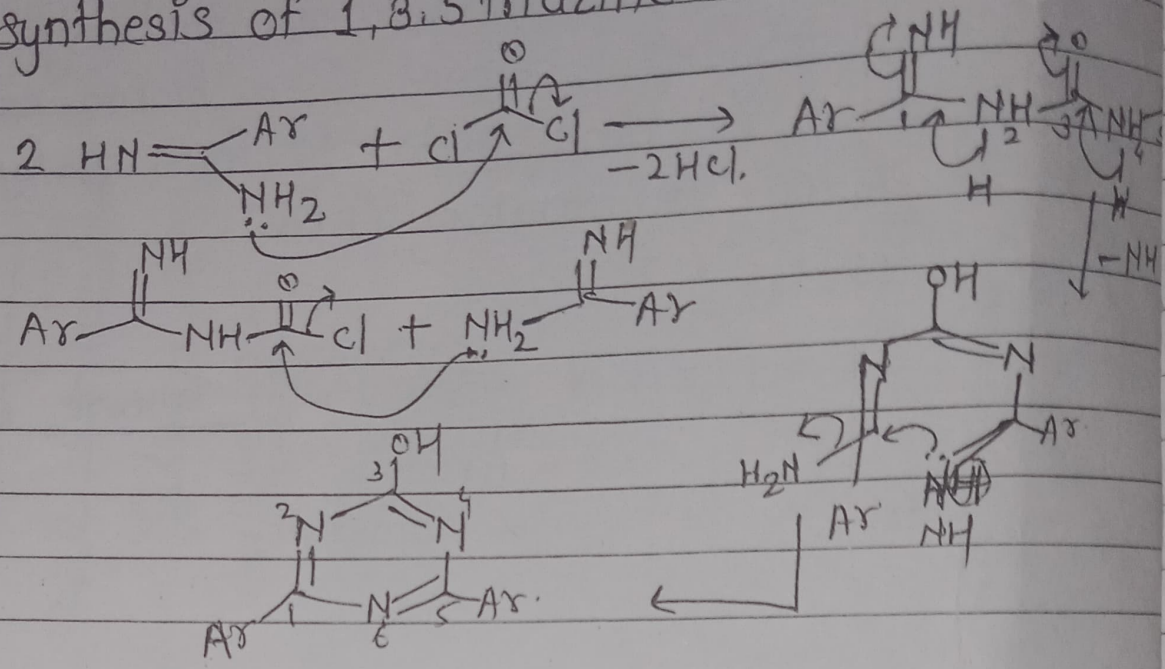
1)

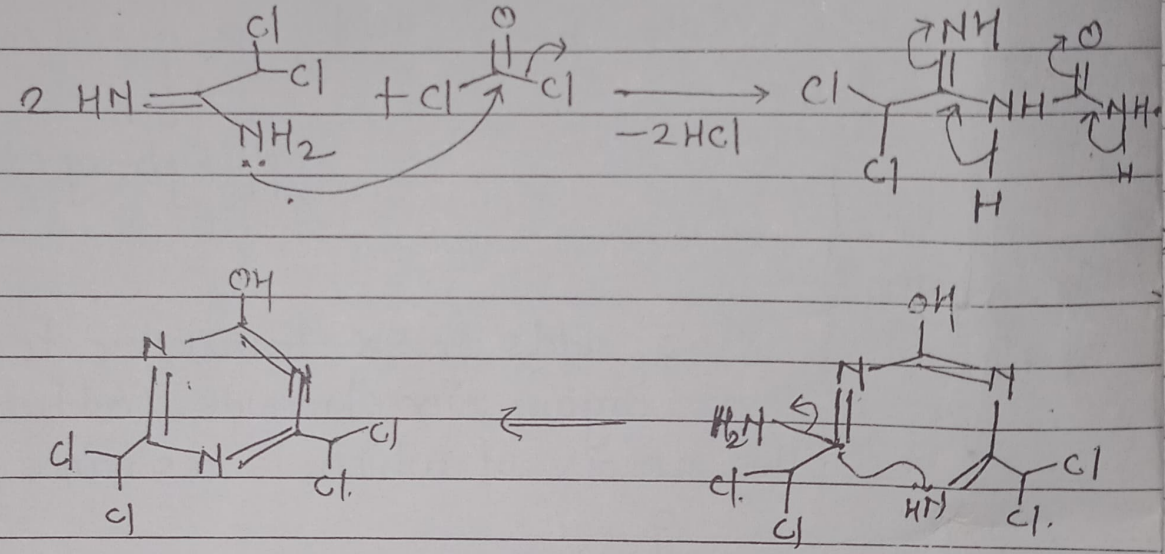


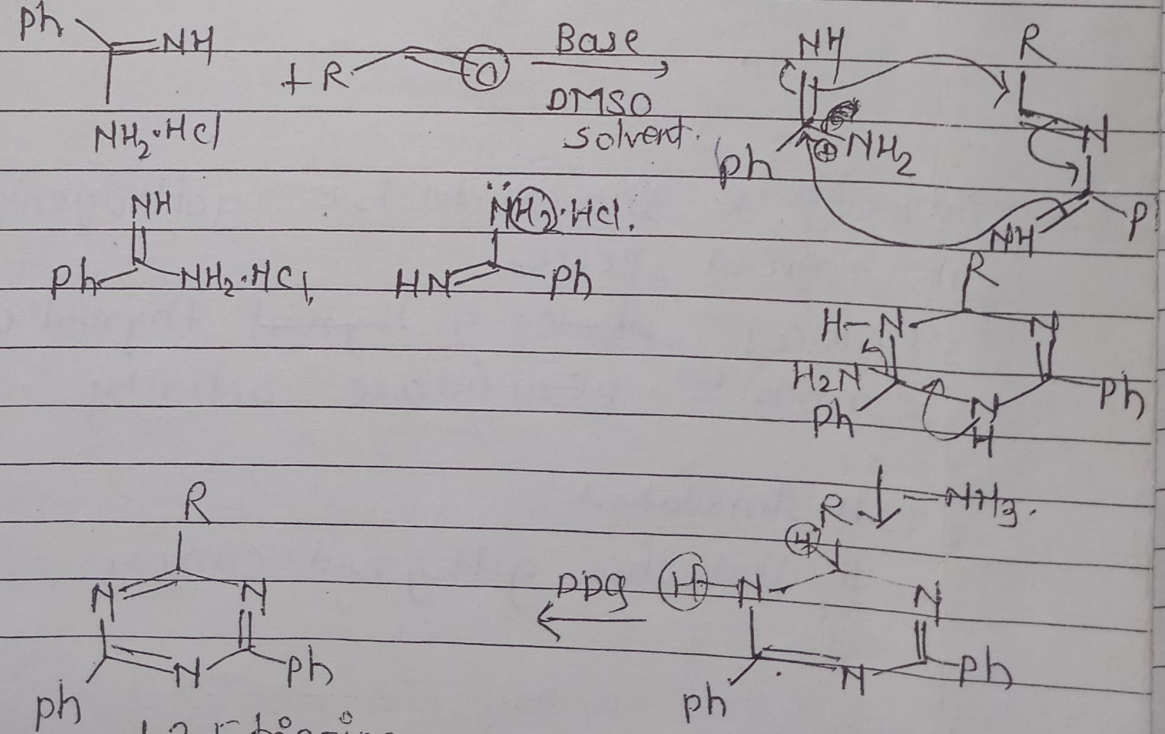
2)

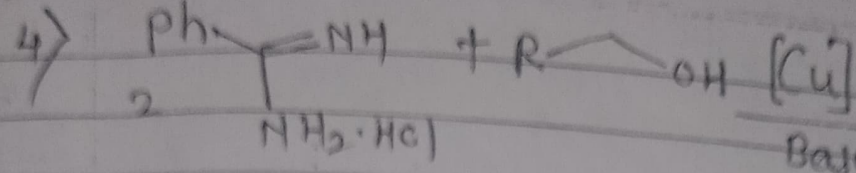


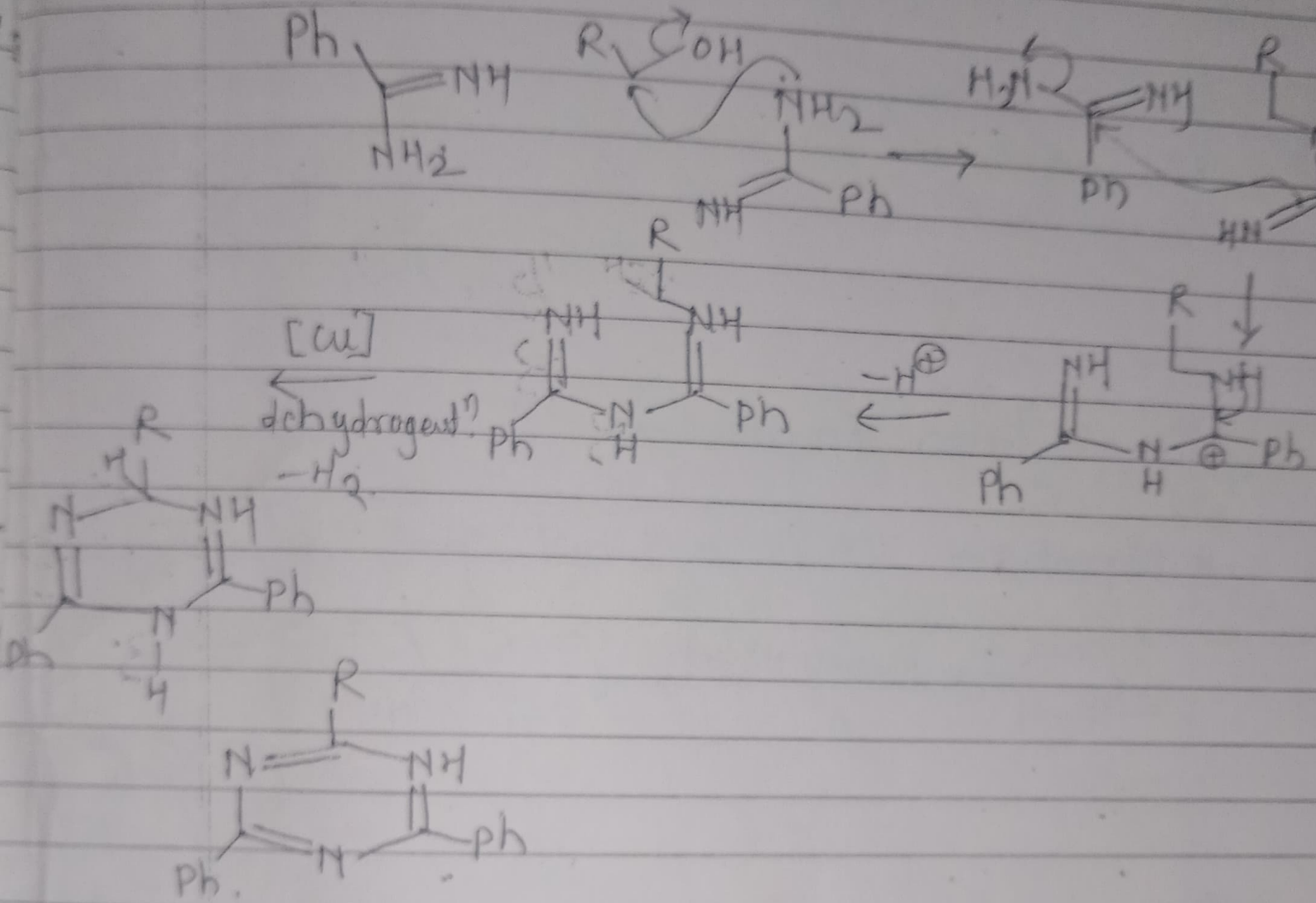
✱ synthesis of 1,3,5 triazine :→

1) 

2) 

3) 

4) 

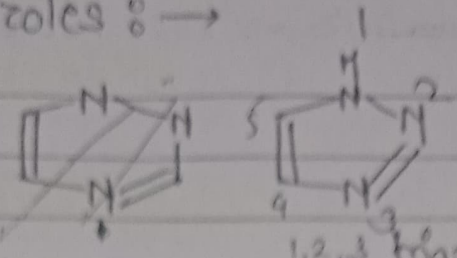


1,3,5 triazine.

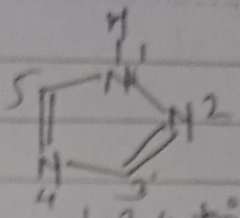
* 1) Inhibit photosystem in plants & in all organism with oxygen evolving photosystems.
2) several effects of triazine on soil organisms especially in fungi causing soilborne diseases.

$C_2H_3N_3$

Triazoles :→



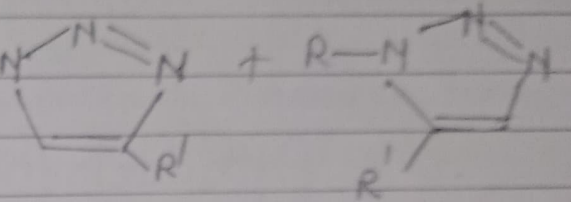
1,2,3 triazole



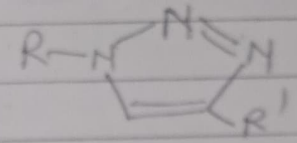
1,2,4 triazole

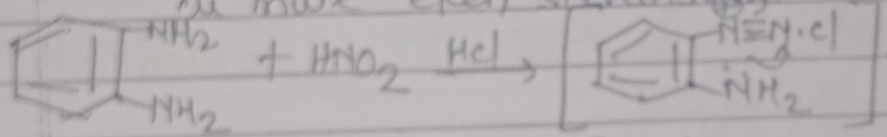
1) Triazoles are involved in inhibiting the synthesis of ergosterol
2) used on non food & food crop plants to control annual grasses & broadleaf & aquatic weeds

Synthesis :→ 1) 1,2,3 triazole

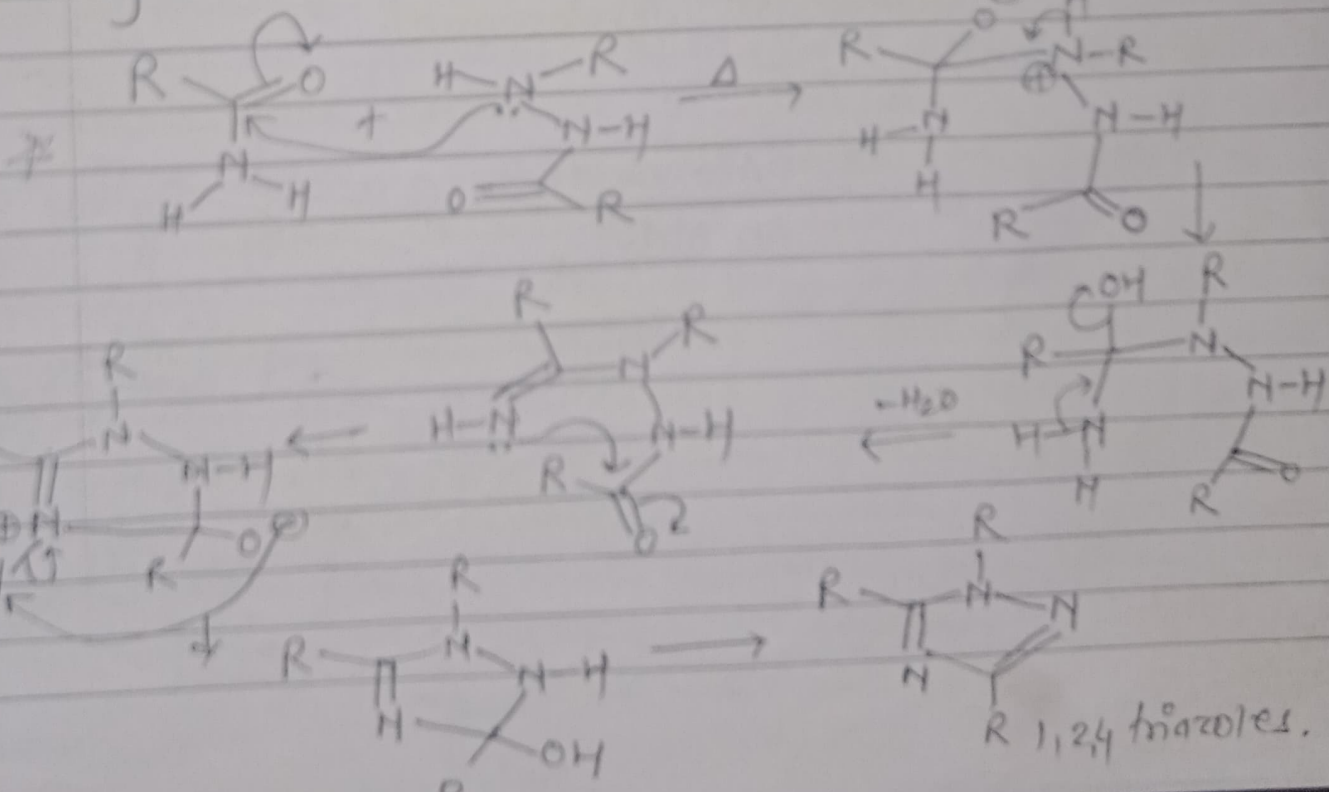
1) $R-N_3 + \equiv R' \xrightarrow{\Delta}$ 

1,2,3 triazole.

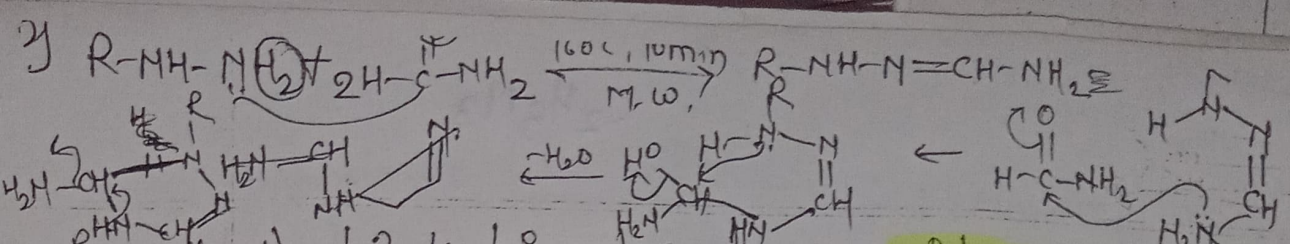
2) $R-N_3 + \equiv R' \xrightarrow[H_2O.]{CuI\ cat}$ 

3) 

synthesis of 1,2,4 triazole :—



R 1,2,4 triazoles.



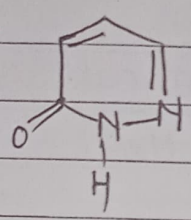
1,2,4 triazole.

1) 1,2,4 triazoles has a wide range of biological functions.
2) 1,2,4 triazoles have antibacterial, antifungal properties.
3) 1,2,3 triazoles derivatives are used in agrochemistry as insecticides, fungicides & plant growth regulators.

3) Oxidative coupling rea? →

* Pyradazinones :→

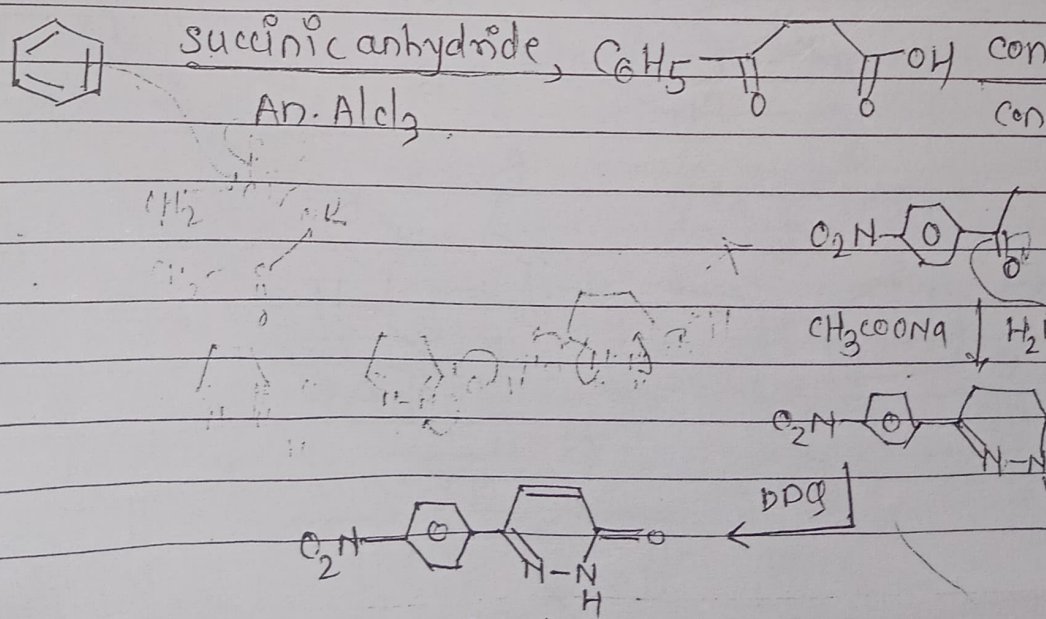
* structure :—



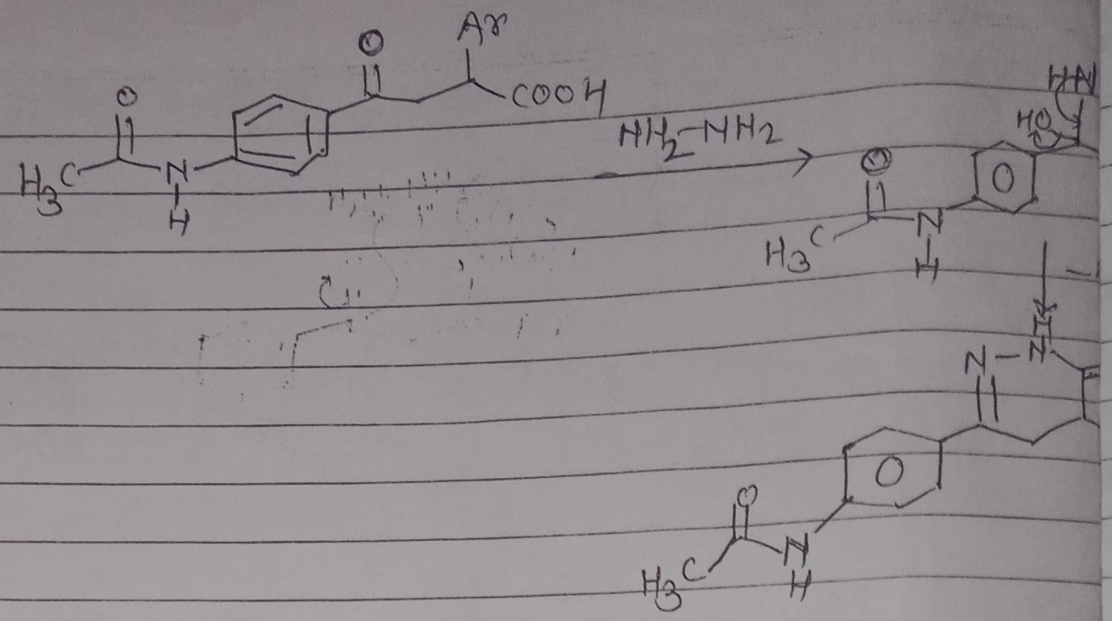
1) it resistant to metabolic detoxication in plants & it possesses
2) mode of action involving interference with chloroplast developement.

* synthesis :—

1)

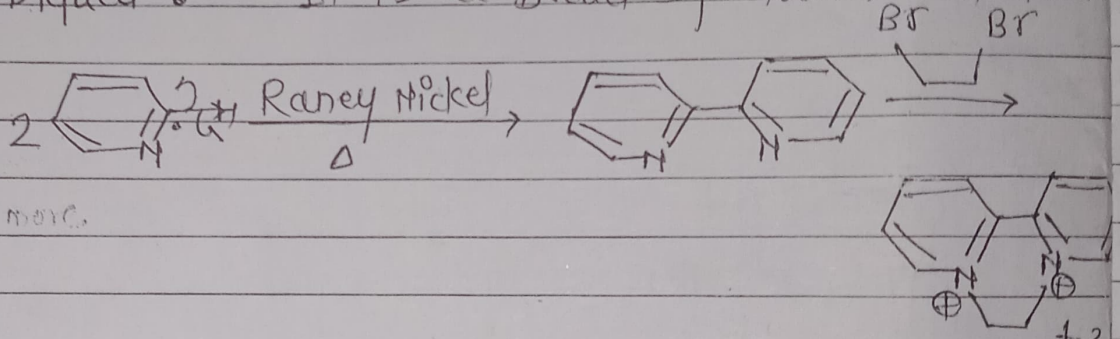


Pyradazinone.

2) 

Bipyridylium compds :→

* Diquat :- It is a broad spectrum contact ins



1) Diquats herbicidal properties were recognize in 1955 in the imperial chemical indust
2) When acting as a herbicide diquat inhib photosynthesis. I. In light exposed plants accepts an electron from photosystem to for green radical cation
3) Diquat is an unusual herbicide becoz it is not used for weed control but it is ins applied directly on mature crops. this cau desication making the crop easier to ha particularly with mechanised equipment
4) it is used as a conventional herbicide f weed control परंपरागत
5) It has properties similar ~~properties~~ to that of but is less ~~re~~ active.
6) they kill submerged aquatic weeds becoz of quick

5) it is fast acting in sunlight & more effective on broad leaved weeds than grasses.

6) It has a role as a herbicide & a defoliant

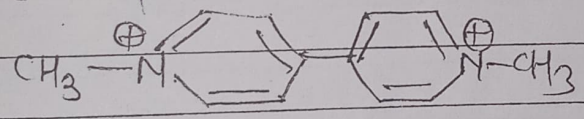
7) it is used to desiccate potato vines & seed crops to dry plant quickly. to control flowering of sugarcane & for industrial & aquatic weed control in enviroments such as catfish farms.

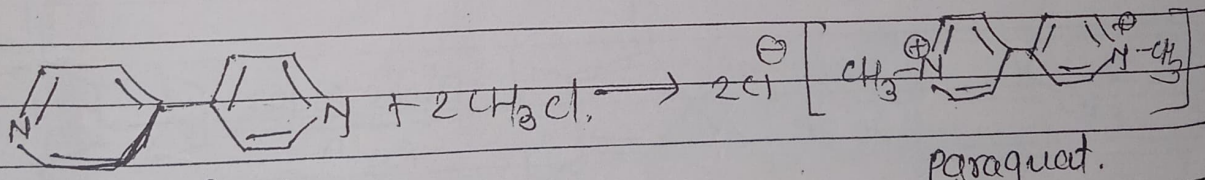
2) paraquat :- N,N' dimethyl-4,4' bipyridinium dichloride.

1) This salt is one of most widely used herbicides

2) It is quick acting & non-selective killing green plant tissue on contact.

* structure →





Bipyridyl

paraquat.

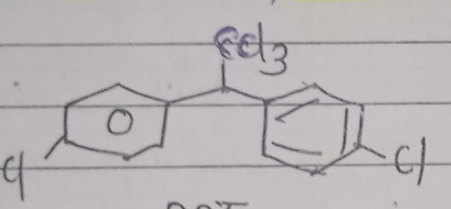
3) it kills a wide range of annual grasses & broad leaved weeds.

4) used in cultivated agriculture, forest management, Home garden & control of aquatic vegetation.

* Organochlorine pesticides *

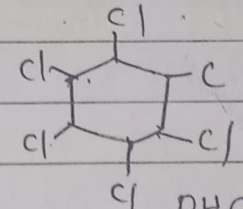
- Organochlorine pesticides (OC) pesticides are organic compds with 5 or more chlorine atoms.
- (OC) pesticides are synthetic pesticides widely used all over the world.
- It is a group of synthetic organic compd produced from hydrocarbons in which 1 or more hydrogen atoms are replaced by chlorine atoms.
- organochlorine pesticides are chlorinated hydrocarbon used from 1940s through the 1960 in agriculture & mosquito control
- Representative examples in organochlorine pesticides are DDT, dieldrin, BHC, chlordane, kepone, endrin, aldrin, endosulfan.

DDT dichloro diphenyl trichloroethane



DDT

benzene hexachloride



BHC

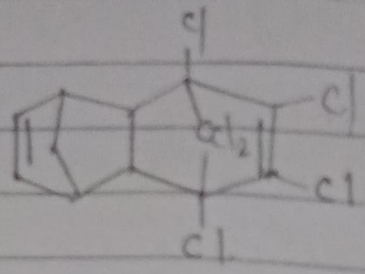
pesticides termite.

- pesticides are a group of chemicals used for the destruction of insects, weeds, fungi, bacteria etc. they are generally called insecticides, fungicides, bactericides, herbicides or rodenticides.
- they have the ability to destroy a variety of pests or weeds.
- these compds are known for their high toxicity, slow degradation & bioaccumulation.
- It acts as nervous system disruptors leading to convulsions & paralysis of insect & its eventual death.
- (OC) p are chlorinated hydrocarbon used in agriculture & mosquito control.

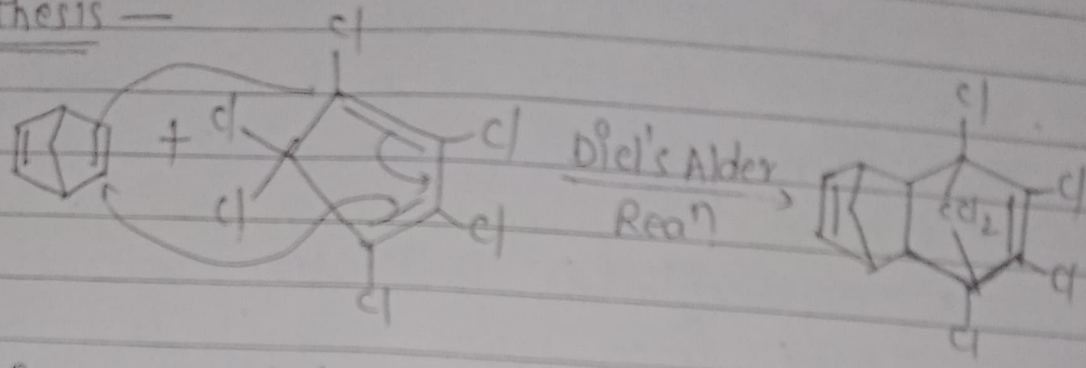
scientist Kulz alder

1) Aldrin :→

* structure :—



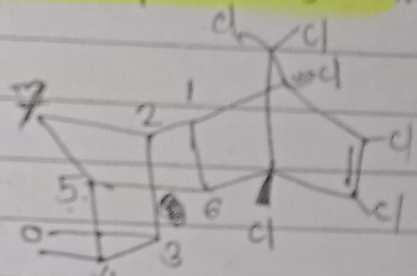
synthesis —



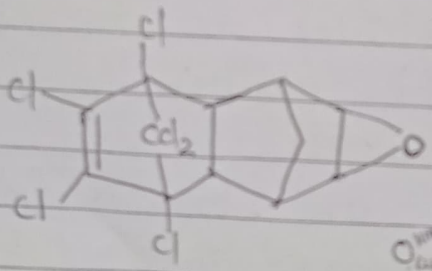
1) It is produced by rean of hexachlorocyclopentadiene with bicycle (2,2,1) heptadiene-2,5
2) It is broad spectrum insecticides used for control of insect pests of fruits, vegetables, cottons as a soil insecticides.
3) It is used to control soil insects such as termites, corn rootworm, wireworms & grasshoppers.
4) It is used to protect crop such as potatoes, corn.

2) Endrin :→ below

* structure —



Hydan
co denver



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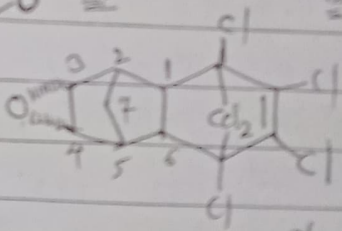
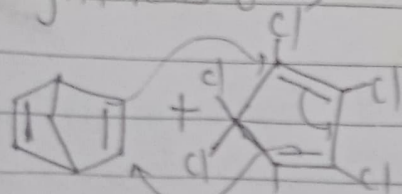


xenobiotic & carcinogenic

* synthesis :→



dienophile diene

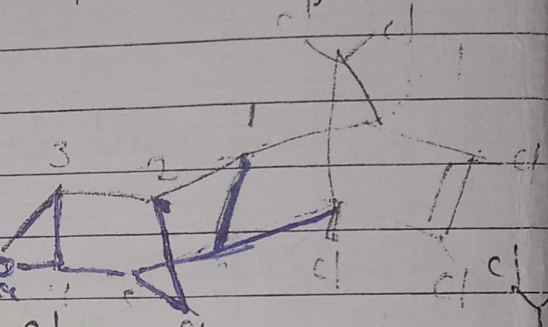
Neurotoxicity - 2 diff. mechanism

1) ability to inhibit brain calcium atapase

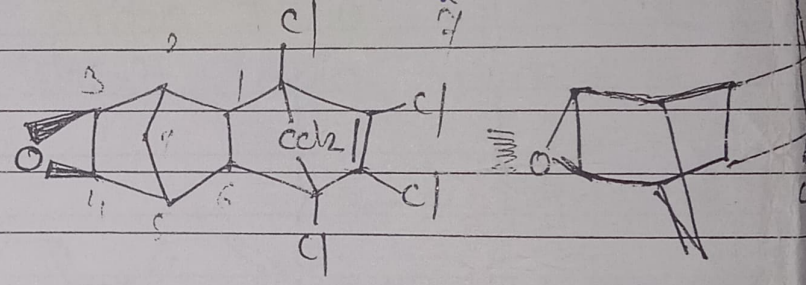
11) ability to block gamma amino butyric GABA → inhibitory neurotransmitter in CNS

1) It is used for control of lepidopterous larvae attacking cotton field & vegetable crop.
2) Endrin has beed used as an agricultural insecticide on tobacco, apple, trees, cotton, sugar rice, cereal & grains.
3) It effective against variety of species including cotton, bollworms, corn borers & grass hoppers
4) It is used as rodenticide, aviside & Piscicide insecticide.

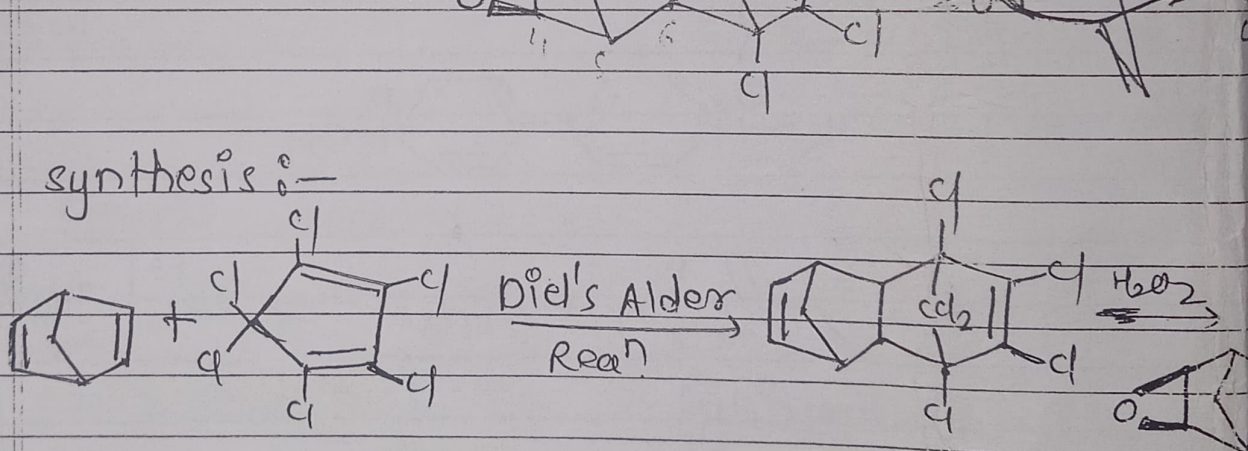
3) Dieldrin :- epoxide above



* structure :→



* synthesis :-



*) It is an insecticide used on fruit, soil
2) It is broad spectrum insecticides that are stomach & inhalation poisons.

endrine epoxide below the plane
Dieldrin - epoxide above

IPM - Integrated Pest Management -

① Pets are organism damage or interfere with desirable plant in our fields.
② Pets also include organism that impact humar and animal health.
③ A pest can be vertibrates (birds, rodents, or other mammals) invertibrates (snail, pathagen, nematod, snake, bacterial, mites, virus or fungus.) That causes diseases.

* Pesticides -
Its chemical design controll the attack of various paste and agricultural crop insect of several kinds plat a havoc to weeds and with economical annua income loss so. These are controlled by using pesticid

Que:- What is integrated pest management ?
→ ① Integrated pest management is an ecosystem based strategy that focuses on long-term preventi on of pests or their damage through a combinatior of technique such as biological control habited manuculation modification of cultural practices & use of resistant varieties.
② Under these methods pesticides are only used according to standard established guidelines & treatment is done with a goal of removing only a forget organism.
③ It is method which is used to so past problen without at lowlevel of risk to the people & environment.
④ It is an ecofriendly method of pets control

⑥ Further more IPM can also be considered as a pest control programe that combine several method for prevention of pests & protection of plants.
⑦ IPM incorporates several biological ecological physical & chemical strategy for controlling pest management.
① Biological control -
It is use of the natural enemies predators, parasites, pathogen & competitors to control pest & their damage.
Invertebrates plant pathogens, nematodes, weeds & vertebrates & many natural enemies.
② Cultural control -
Cultural control are practices that reduces pest establishment reproduction, dispersion & survival. For example - changing irrigation practices can reduces pests problem.
③ mechanical & physical control -
① Mechanical control are kill a pest the environment unsuitable for it.
② Chemical control is a use of pesticides in IPM
③ Pesticides are used only when needed & incombination with other approaches for more effective long term control.
④ Pesticides are selected and apply in a way that minimizes their possible harm to people.
⑤ Non target organism & the environment with IPM.