Organic chemistry

III

Heterocyclic Chemistry (2)

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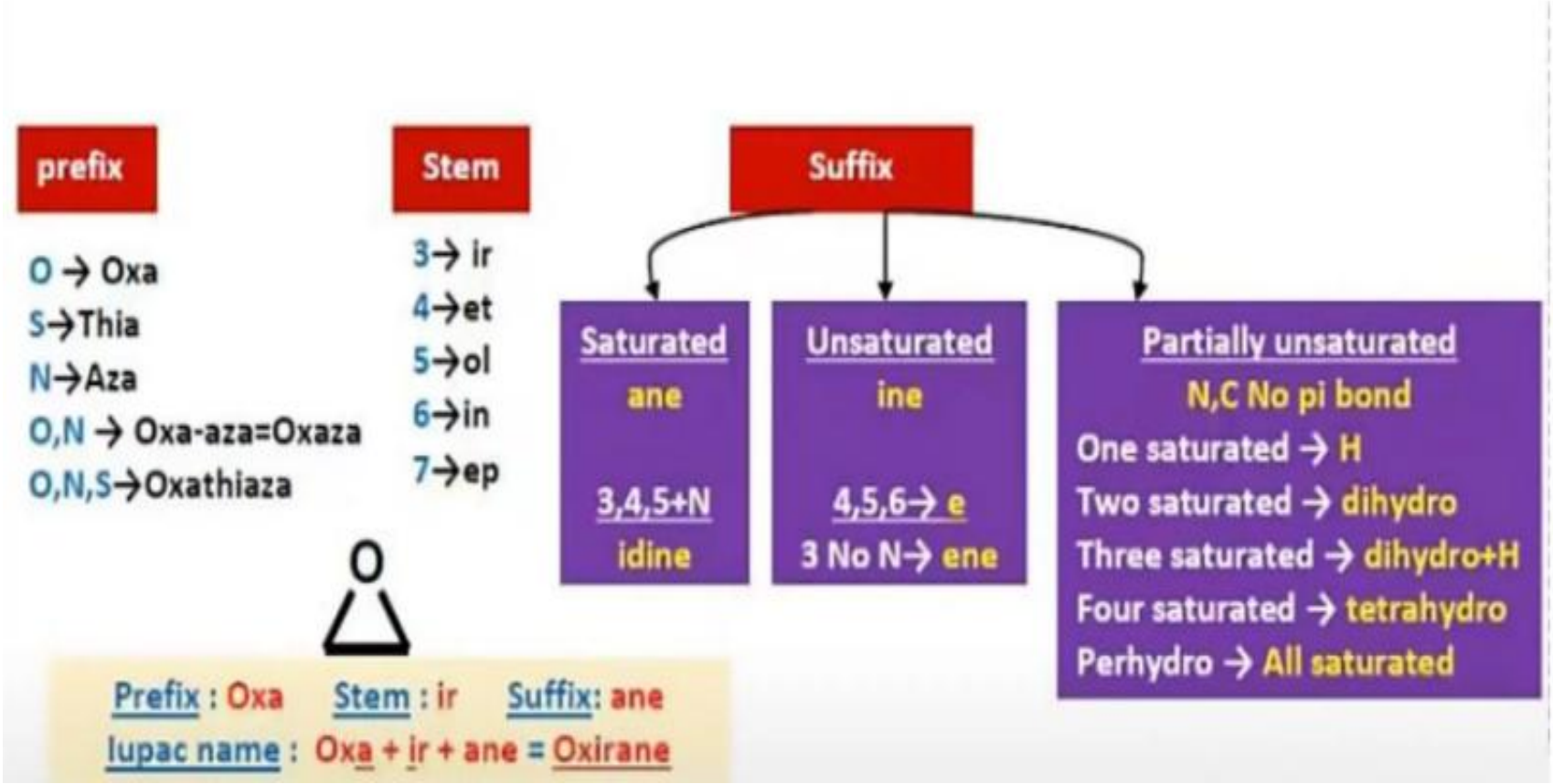

prefix
O → Oxa
S→Thia
N→Aza
O,N → Oxa-aza=Oxaza
O,N,S→Oxathiaza
Stem
3→ ir
4→et
5→ol
6→in
7→ep
Suffix
Saturated
ane
3,4,5+N
idine
Unsaturated
ine
4,5,6→ e
3 No N→ ene
Partially unsaturated
N,C No pi bond
One saturated → H
Two saturated → dihydro
Three saturated → dihydro+H
Four saturated → tetrahydro
Perhydro → All saturated
Prefix : Oxa Stem : ir Suffix: ane
Iupac name : Oxa + ir + ane = Oxirane

Practice Problem:

Explain how can you name the following heterocycles.



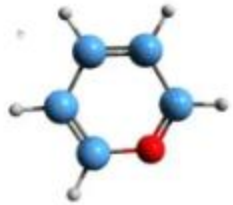








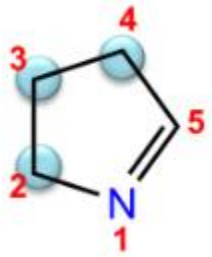




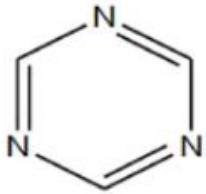
Practice Problem:

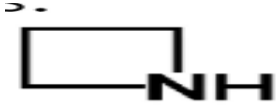
Give IUPAC name for each of the following:

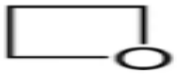


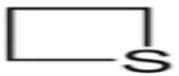




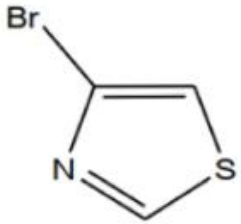


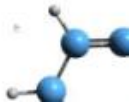






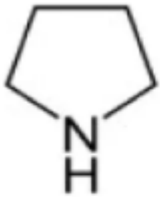


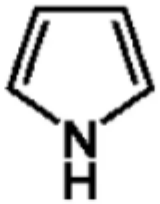


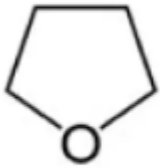


Practice Problem:

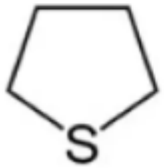
Give IUPAC and common name for each of the following:

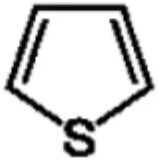


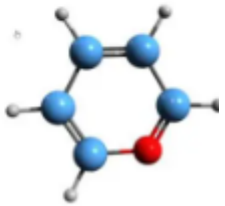










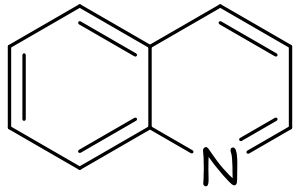


2. Nomenclature of Heterocycles

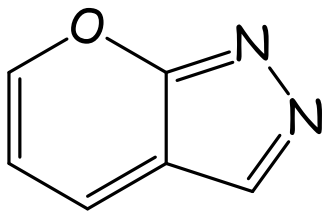
Fused heterocycles

- Fused heterocycles are of 2 types:

A- Heterocycle fused with carbocyclic system.



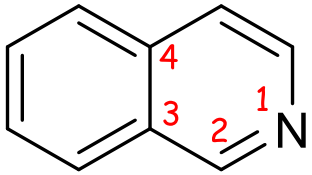
B- Heterocycle fused with another heterocyclic system.



2. Nomenclature of Heterocycles

Nomenclature of Fused Heterocycles

A- Heterocycle fused with carbocyclic system.

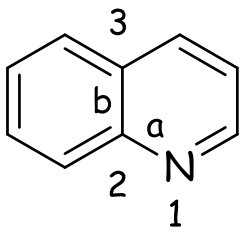


- IUPAC rules:

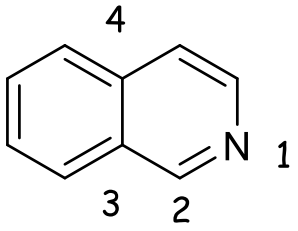
1. The parent ring is the hetero ring as (**suffix**).
2. The carbocyclic ring is the **prefix**, and it is named benzo.
3. Numbering of the complete fused system starts adjacent to the bridgehead atom, then proceeds around the fused ring giving the lowest number for the first heteroatom.
4. Carbon atoms in the fusion are giving the number of the previous position plus letter a.
5. The sides of the parent ring are lettered a,b,c, etc…, starting with the 1-2 bond. These letters are written in brackets between the prefix and the parent ring.

2. Nomenclature of Heterocycles

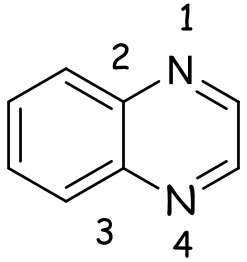
- The most important heterocycles having accepted trivial names are the following:



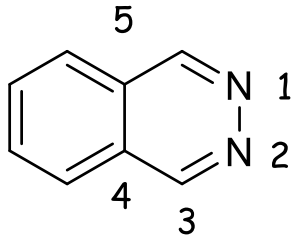
Benzo(b)pyridine
(Quinoline)



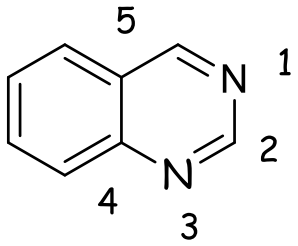
Benzo(c)pyridine
(Isoquinoline)



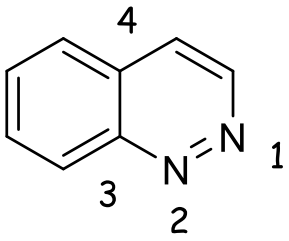
Benzo(b)pyrazine
(Quinoxaline)



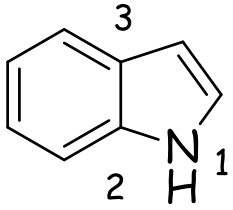
Benzo(d)pyridazine
(Phthalazine)



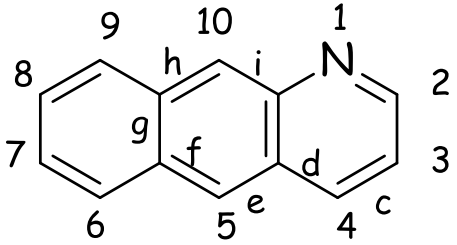
Benzo(d)pyrimidine
(Quinazoline)



Benzo(c)pyridazine
(cinnoline)



Benzo(b)pyrrole
(1*H*-Indole)



Benzo(*g*)quinoline
(not naphthopyridine)

2. Nomenclature of Heterocycles

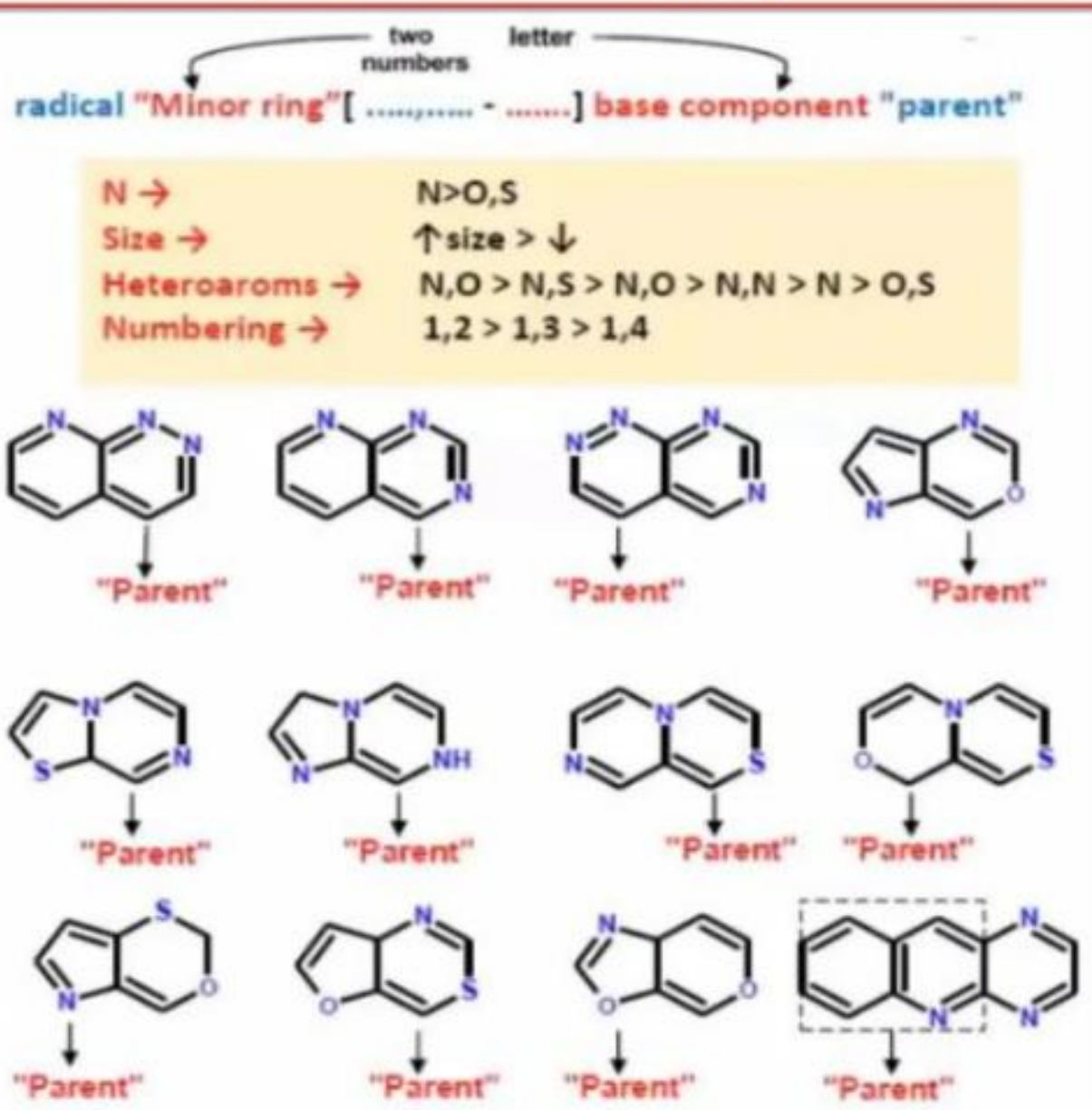
B- Heterocycle fused with another heterocyclic system:

- IUPAC rules:

I. The following is a list of some heterocycles used as prefixes

Ring	Abbrev.	Ring	Abbrev.
Furan =	*Furo*	*Pyrimidine =*	*pyrimido*
Pyridine =	*pyrido*	*Isoquinline =*	*isoquino*
Quinoline =	*quino*	*Pyrrole =*	*pyrrolo*
Thiophen=	*thieno*	*Imidazole =*	*imidazo*

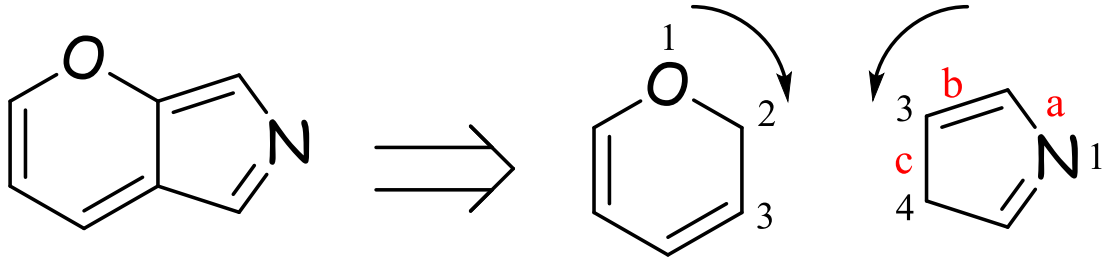
Nomenclature (Fused rings)



2. Nomenclature of Heterocycles

II. The parent ring should be selected by order of preferences:

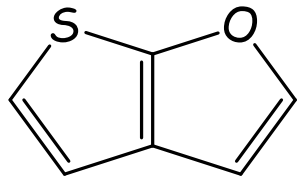
1) N-Containing ring should be taken as the parent ring.



pyrano[2,3-c]pyrrole

N> O> S

2) If no N, the ring containing the more prior heteroatom (O>S) is the parent ring.

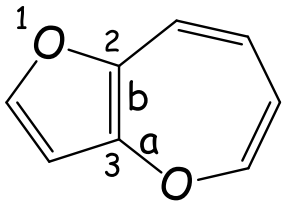


thieno[2,3-*b*]furan

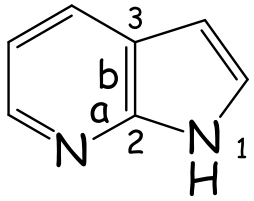
O> S

2. Nomenclature of Heterocycles

3) If the two rings contain N or do not contain N, The largest ring size is the parent ring.



Furo(3,2-*b*)oxepin



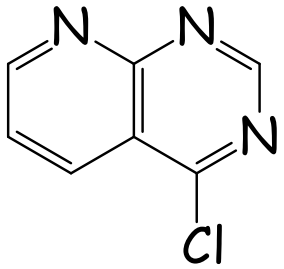
Pyrrolo(2,3-*b*)pyridine

Large size> Small size

2. Nomenclature of Heterocycles

4) The hetero ring that contains the greatest number of heteroatom's.

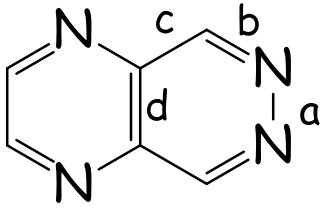
N,N >N,O >N,S >N >O > S



4-chloropyrido[2,3-*d*]pyrimidine

5) Numbering

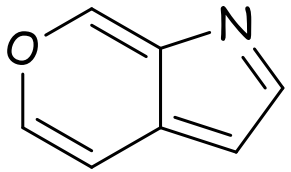
1,2 > 1,3 > 1,4

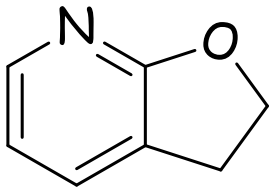


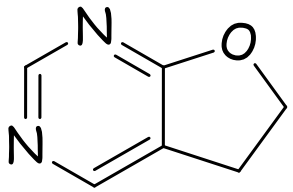
Pyrazino(2,3-*d*)pyridazine

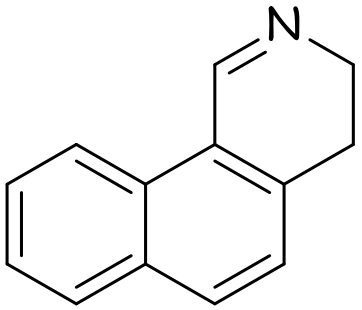
2. Nomenclature of Heterocycles

Q. Name the following compounds

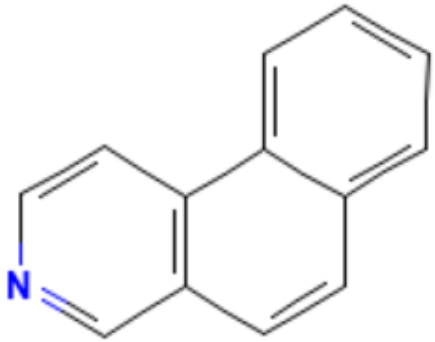




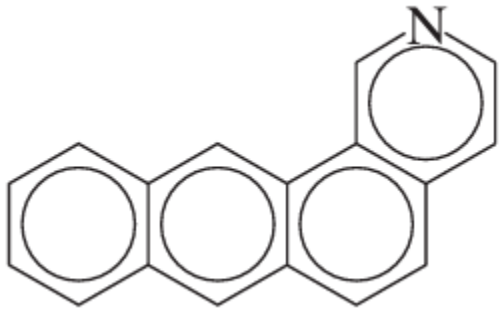




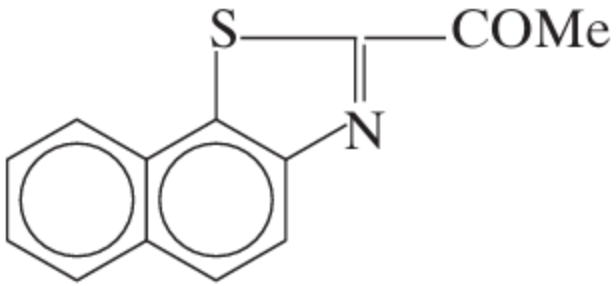
Benzo (h) pyridine



Benzo (f) pyridine

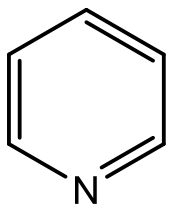


Naphtho (3,2- h) isoquinoline



2-ethanoyl-Naphtho(2.1- d) thiazol

I- Give IUPAC and common name for each of the following:



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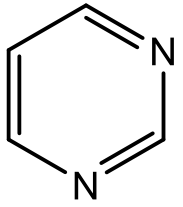

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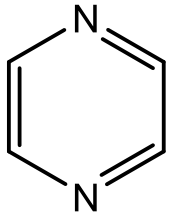

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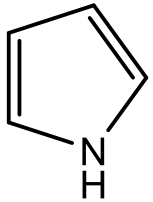

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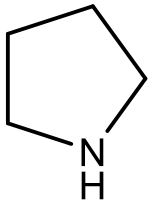

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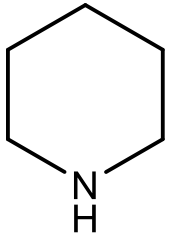

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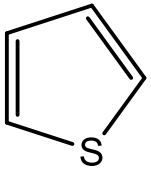

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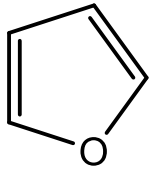

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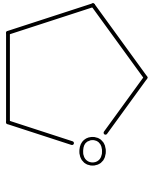

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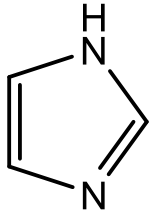

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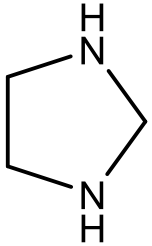

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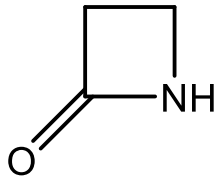

12

II- Draw the structure of:

- Aziridine
- Oxirane
- 1,3- thiazole
- 1,2- diazine
- Azepine
- Oxathiete
- Oxazitidine
- Pyrane
- morpholine