The IUPAC rules allow three nomenclatures.

I. The Hantzsch-Widman Nomenclature.

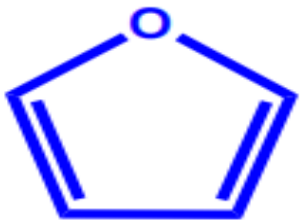
II. Common Names

III. The Replacement Nomenclature

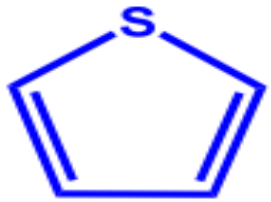
II. Common Names

There are a large number of important ring systems which are named widely known with their non-systematic or common names.

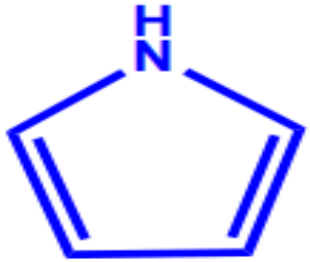
common name ji



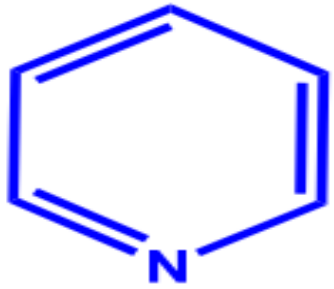
Furan



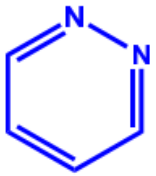
Thiophene



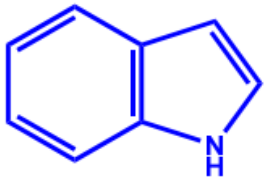
Pyrrole



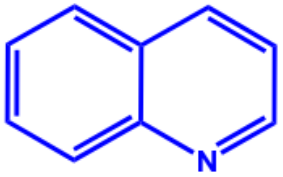
Pyridine



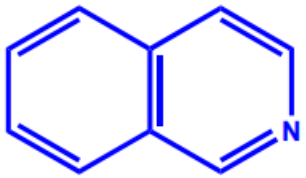
Pyridazine



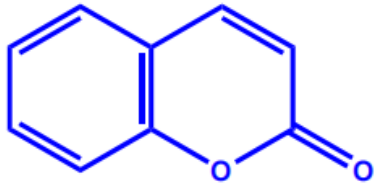
Indole



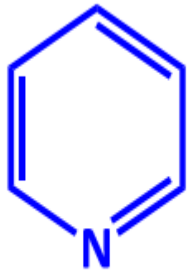
Quinoline



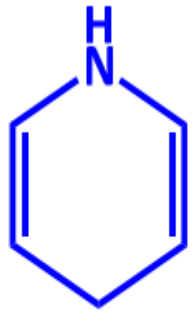
Isoquinoline



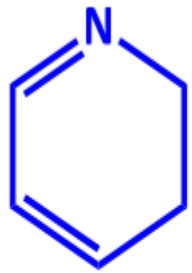
Coumarin



Pyridine



1,4-Dihydropyridine

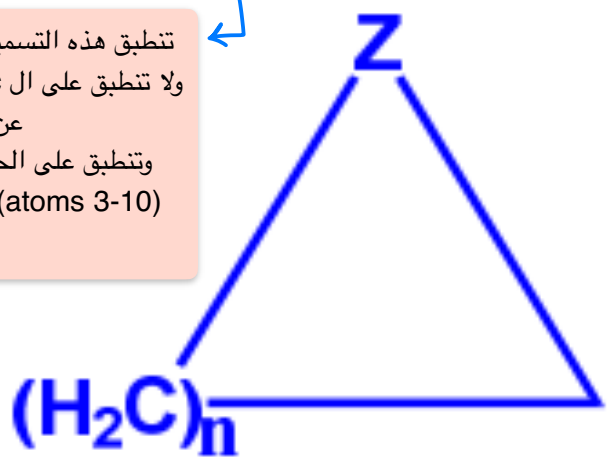


2,3-Dihydropyridine

I. Hantzsch-Widman Nomenclature

تنطبق هذه التسمية على ال monocyclic
ولا تنطبق على ال bicyclic (الي هي عبارة عن حلقتين)
وتنطبق على الحلقات التي تحتوي على member ring size (atoms 3-10)

تعتمد على
1) type of heteroatom الي هم (N,O,S,P..)
2) ring size



n = 1,2,3, ...

The Hantzsch-Widman nomenclature is based on the type (Z) of the heteroatom; the ring size (n) and nature of the ring, whether it is saturated or unsaturated .

This system of nomenclature applies to monocyclic three-to-ten-membered ring heterocycles.

I. Type of the heteroatom

The type of heteroatom is indicated by a prefix as shown below for common hetreroatoms:

Table 1: Common Prefix for Heteroatoms (arranged in the preferential order)

هاد جدول ال prefixes

High polarity

S. No.	Heteroatom	Symbol	Prefix
1	Oxygen	O	Oxa
2	Sulphur	S	Thia
3	Selenium	Se	Selena
4	Nitrogen	N	Aza
5	Phosphorous	P	Phospha
6	Arsenic	As	Arsa
7	Antimony	Sb	Stiba
8	Bismuth	Bi	Bisma
9	Silicon	Si	Silia
10	Tin	Sn	Stanna
11	Lead	Pb	Plumba
12	Boron	B	Bora
13	Mercury	Hg	Mercura

Low polarity

Most common :
Oxygen- Sulphur - Nitrogen- Phosphorus

ال least common المطلوب منا نعرفهم الي هم
Selenium - Arsenic - Silicon - Boron

II. Ring size (n)

The ring size is indicated by a suffix according to Table I below. Some of the syllables are derived from Latin numerals, namely ir from tri, et from tetra, ep from hepta, oc from octa, on from nona, ec from deca.

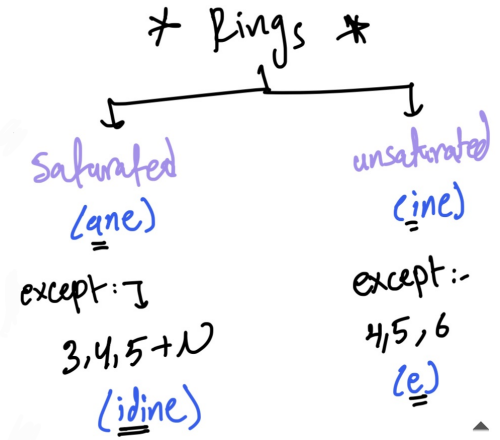
Table I: Stems to indicate the ring size of heterocycles

Ring size	Suffix	Ring size	Suffix
3	ir	7	ep
4	et	8	oc
5	ol	9	on
6	in	10	ec

The endings indicate the size and degree of unsaturation of the ring.

Table II: Stems to indicate the ring size and degree of unsaturation of heterocycles

Ring size	Saturated	Unsaturated	Saturated (With Nitrogen)
3	-irane	-irine	-iridine
4	-etane	-ete	-etidine
5	-olane	-ole	-olidine
6	-inane	-ine	
7	-epane	-epine	
8	-ocane	-ocine	
9	-onane	-onine	
10	-ecane	-ecine	



furan

5

oxa + ole → oxole

X

حرفين متحركين

pyrrole

5

aza + ole → azole

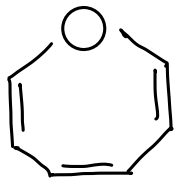
X

pyridine

6

aza + ine → azine

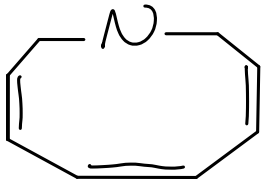
X



unsaturated

6

oxa + in + e ⟶ oxine



7 unsaturated

aza + ep + ine ⟶ azepine

- 10 member ring - fully saturated- contain oxygen

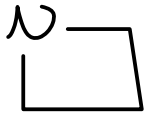
Oxa + ec + ine —> Oxecine

- 3 member ring - unsaturated - contain oxygen

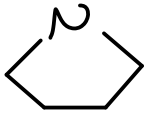
Oxa + ir +ine —> Oxirine

- Exception ➡️ 3,4,5 membered ring - contain nitrogen - fully saturated → + idine

Aza + ir + idine —> Aziridine



Aza + et + idine —> Azetidine



Aza + ol + idine —> Azolidine

Hetero-atom

تعتمد على → Degree of saturation / Ring size

Degree of saturation → Saturated (يعني لا تحتوي على double bond) / Unsaturated (يعني تحتوي على double bond)

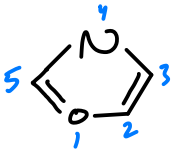
Name: Prefix + Stem + Suffix

Ending of name

في الاغلب يعبر عن ال degree of saturation

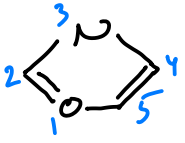
- 1. the nomenclature of heterocyclic compounds are assigned by combining ‘prefix’ (that indicate the heteroatom present) with ‘stem’ (that indicate the ring size as well as the saturation and unsaturation in the ring) and ‘suffixes’. common prefixes are shown in Table 1. It should be noted that **final ‘a’ is** dropped when prefix is followed by vowel.
- 2. Nomenclature of heterocyclic compound starts with the heteroatom appears first in the table 1.
- 3. If more than two different heteroatoms are present in any heterocyclic compound the prefixes are listed in order in which they are appear in above table (Table 1).

الاولوية بالترقيم عند التسمية هي لل Heteroatom واذا كان عنا اكتر من وحدة heteroatom رح تكون الاولوية للاعلى polarity ورح تآخذ رقم 1
بالتسمية و ال heteroatom التانيه الموجودة بال ring رح تآخذ الرقم الاقل عند الترقيم

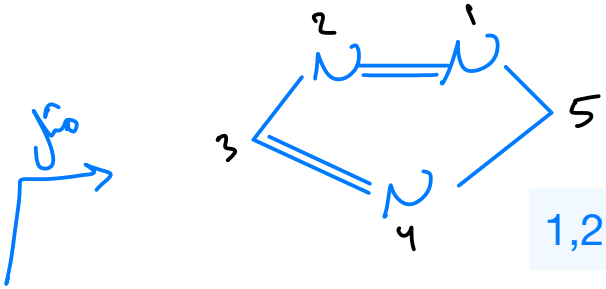


أما الترقيم هيك غلط

مثل:



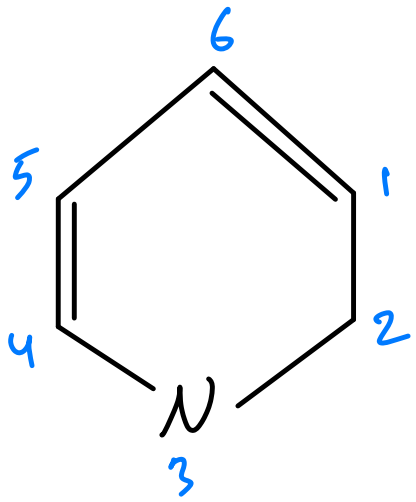
1,3- oxazole



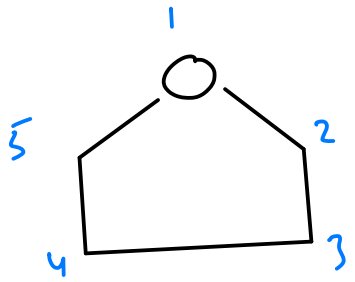
1,2,4- triazole

- 4. If there are two or more than two hetero atoms of same types are present in a heterocyclic compound they are indicated by di-, tri- etc.
- 5. The position of saturated atom is numerically indicated with prefix ‘H-’ as a part of the name of the ring system. It should be noted that where, there is a choice of numbering, the indicated position is given the lowest possible number.
- 6. The size of a monocyclic ring (three to ten membered rings) is indicated by stem. The common ‘stem’ nomenclature is given in Table 2

اذا كان بال ring في hydrogenation ف رح تكون الاولوية اله وبعدها لل heteroatom ، مثل :

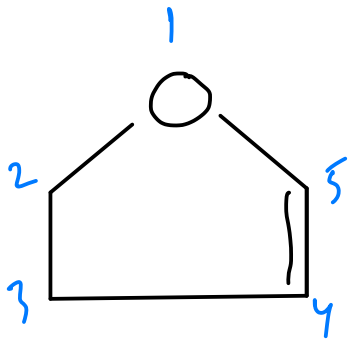


1,2- dihydropyridine



tetrahydrofuran
Or
tetrahydroxolane

كلها روابط احادية يعني saturated



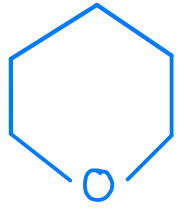
2,3-dihydrofuran
Or
2,3-dihydroxole

Systems having a lesser degree of unsaturation require an appropriate prefix, such as "dihydro"or "tetrahydro".

Exception➡️ Saturated 3, 4 & 5-membered nitrogen heterocycles should use respectively the traditional "iridine", "etidine" & "olidine" suffix.

- If fully unsaturated, the name is concluded with a suffix for ring
- size: 3-atoms, -ene (except -ine- for N);
- 4-, 5-, and 6-atoms, -e;
- 7-, 8-, and 9- atoms, -ine.

- If fully saturated, the suffix is -**ane** for all ring sizes,
- except for N, which uses -idine for rings of 3-, 4-, or 5-atoms,
- and for 6-atoms, a prefix of hexahydro- is used.
- Also, the name **oxane, not oxinane**, is used for the 6-membered ring with O present. Other exceptions exist for P, As, and B rings, but they will not be given here.



Oxa+in+ane —> oxinane ❌
—> Oxane ✅

Fully saturated ring

Examples

Oxa+irane= Oxirane

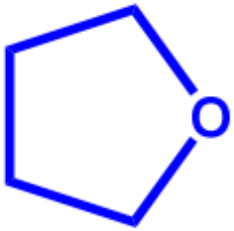
Thia+irane= Thiirane

Aza+iridine= Aziridine

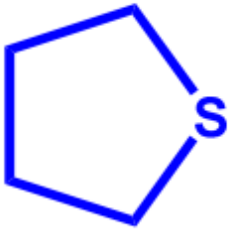
Oxa+etane=Oxetane

Thia+etane=Thietane

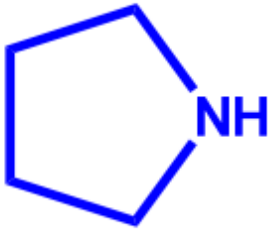
Aza+etidine=Azetidine



Oxa+olane= Oxolane

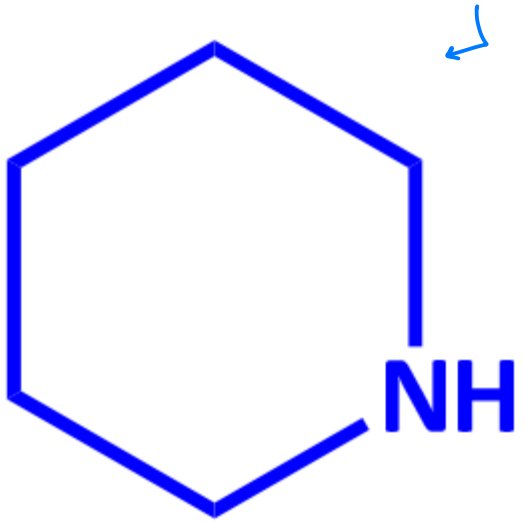


Thia+olane= Thiolane



Aza+olidine= Azolidine

common name —> Pyrrolidine

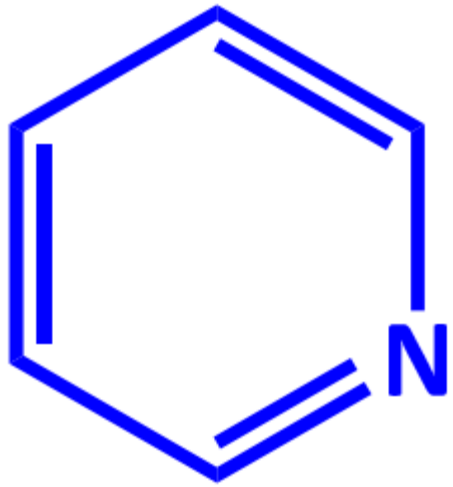


Azinane

saturated

2

6



Azine

Pyridine