

Nomenclatura

HETEROCICLOS AROMÁTICOS

Heterociclos

- ▶ Incluyen heteroátomos distintos a C e H.
- ▶ Se utilizan los términos heteroátomo o heteroelemento.
- ▶ Pueden ser
 - ▶ Heteromonociclos
 - ▶ Heteropoliciclos

Heterociclos

Heterociclos

Alifáticos o no aromáticos → Propiedades similares a los compuestos lineales.

Aromáticos → Comportamiento similar a sus análogos carbonados.

Nomenclatura general

Nomenclatura

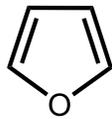
Trivial o común: No indica la estructura, sólo la fuente natural o las propiedades.

Semisistemática: Sigue determinadas reglas, pero toma el nombre trivial.

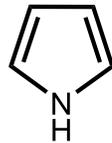
Sistemática (IUPAC): Nombra los compuestos evitando la ambigüedad.

Heterociclos aromáticos

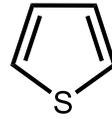
Nombres comunes



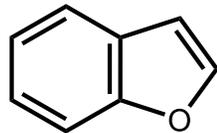
Furano



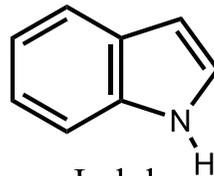
Pirrol



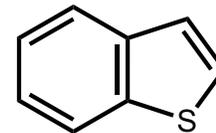
Tiofeno



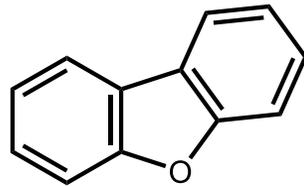
Cumarona



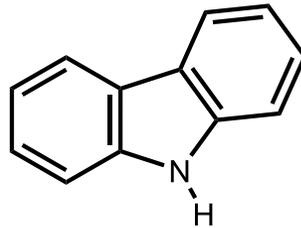
Indol



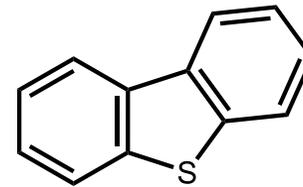
Benzotiofeno



Dibenzofurano



Carbazol

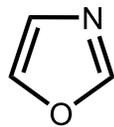


Dibenzotiofeno

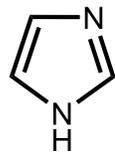
Heterociclos aromáticos

Nombres comunes

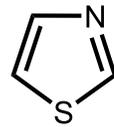
Azoles 1,3 y sus benzoderivados fusionados



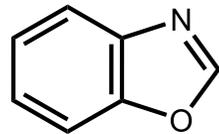
Oxazol



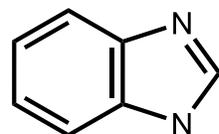
Imidazol



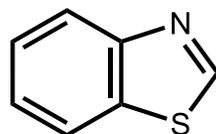
Tiazol



Benzoxazol



Benzimidazol

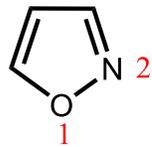


Benzotiazol

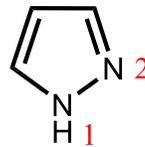
Heterociclos aromáticos

Nombres comunes

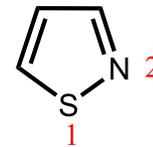
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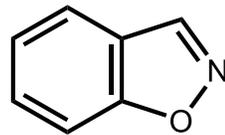
Isoxazol



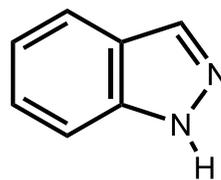
Pirazol



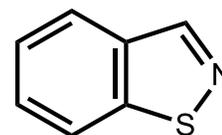
Isotiazol



Benzisoxazol



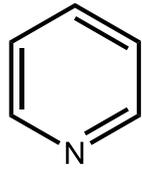
Indazol



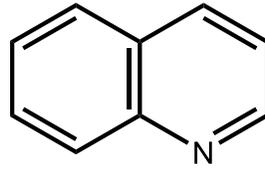
Benzisotiazol

Heterociclos aromáticos

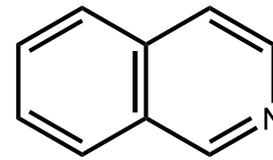
Nombres comunes



Piridina

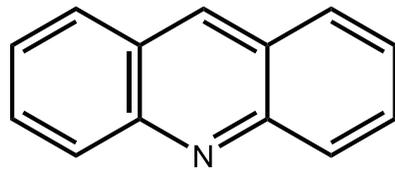


Quinolina

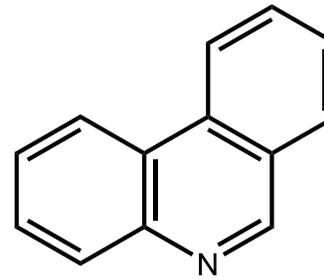


Isoquinolina

Dibenzopiridinas



Acridina

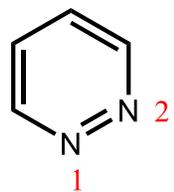


Fenantridina

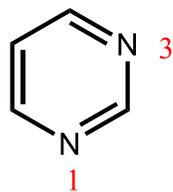
Heterociclos aromáticos

Nombres comunes

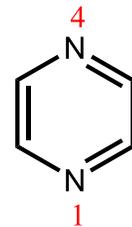
Diazinas y sus derivados benzo-fusionados



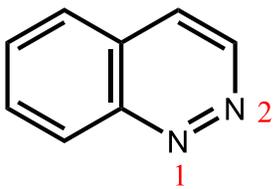
Piridazina



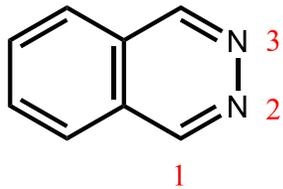
Pirimidina



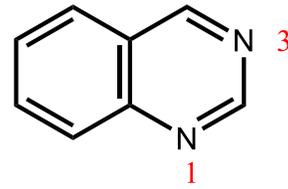
Pirazina



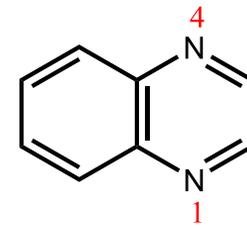
Cinolina



Ftalazina



Quinazolina



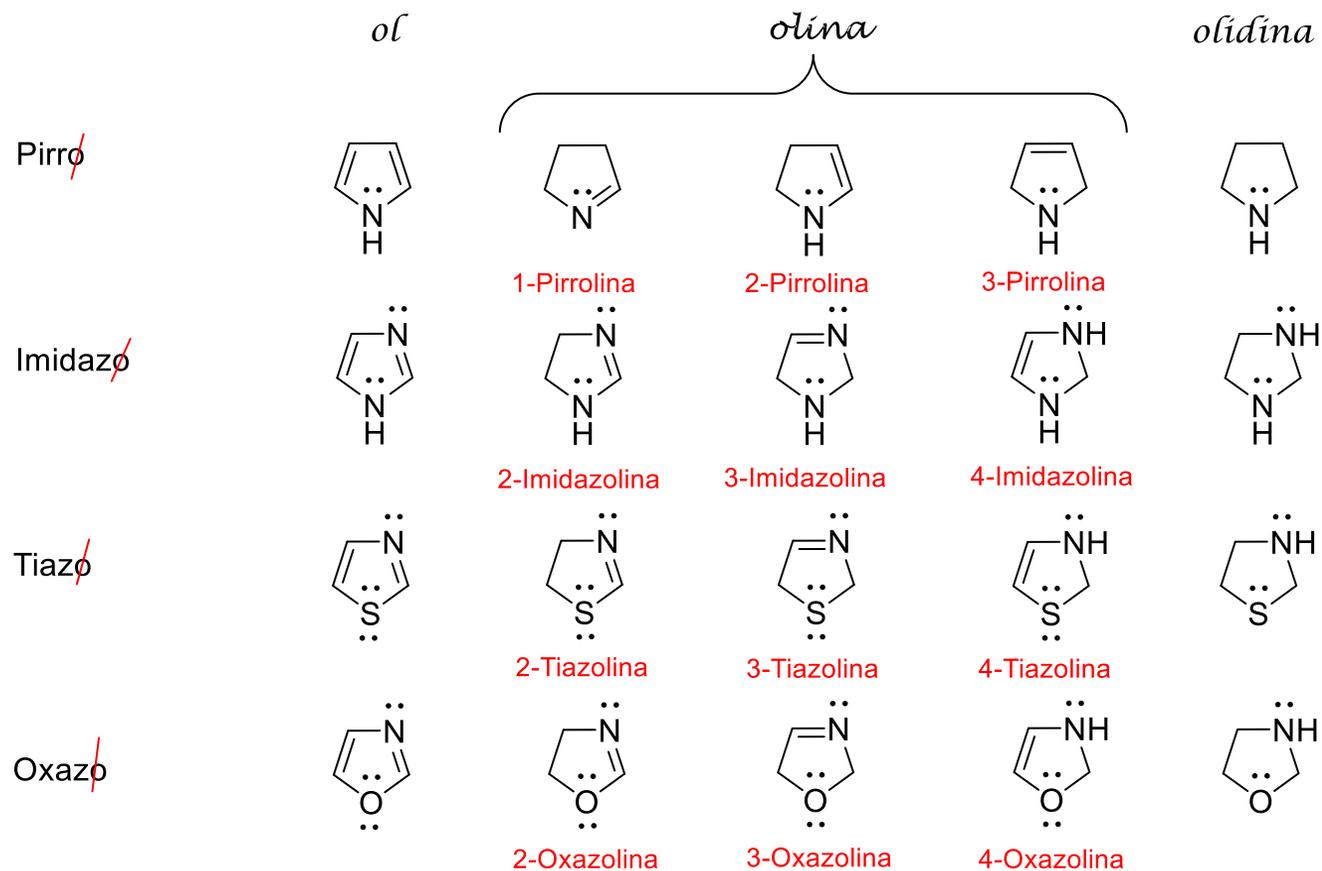
Quinoxalina

Nomenclatura semisistemática

Anillos nitrogenados saturados total y parcialmente

Prefijo

terminación o sufijo



Nomenclatura sistemática de heterociclos

- ▶ **Método Häntzsch-Widman** →Aplicable a heteromonociclos de 10 átomos.
- ▶ Método de fusión → Heteropoliciclos condensados.
- ▶ Sistema de reemplazo → Tiene una aplicación general.

Nota:

Algunos nombres comunes son permitidos en la nomenclatura sistemática.

Método Häntzsch- Widman

- ▶ Señala los prefijos de **prioridad atómica en la numeración.**
- ▶ El tamaño del anillo se indica con sufijos numerales.
- ▶ **El compuesto con más insaturaciones conjugadas se considera el sistema base de un anillo específico.**
- ▶ Los sistemas parcial o totalmente saturados se denotan con sufijos numerales. También se emplea dihidro-, tetrahidro-, hexahidro-...
- ▶ **La numeración de monociclos inicia en el heteroátomo.**
- ▶ Los prefijos di-, tri-, tetra- se usan para dos o más heteroátomos del mismo tipo. Para indicar la posición relativa, la numeración se realiza **asignando a los heteroátomos el localizador más bajo posible.**
- ▶ En sistemas monocíclicos con dos o más heteroátomos distintos, se usan los prefijos de prioridad atómica, **asignando 1 al heteroátomo principal y la numeración más baja posible en dirección a los siguientes heteroátomos.**
- ▶ En isómeros estructurales que difieren en la posición de un *H*, se indica *H* delante del nombre **asignándole el localizador más bajo posible.**
- ▶ Heterociclos que contienen C=O se nombran con ayuda del **H indicado**: (XH)-ona.

Prefijos para monoheterociclos

Elemento	Valencia	Prefijo
F	I	Fluora
Cl	I	Clora
Br	I	Broma
I	I	Yoda
O	II	Oxa
S	II	Tia
Se	II	Selena
Te	II	Telura
N	III	Aza
P	III	Arsa
As	III	Estiba
Bi	III	Bisma

Sufijos para monoheterociclos

Tamaño del anillo	Saturado	Insaturado
3	irano /iridina (N)	ireno/irina (N)
4	etano/etidina (N)	eto(ete)
5	olano/olidina(N)	ol
6	ano	Ina/ inina (P, As, B)
7	epano	epina
8	ocano	ocina
9	onano	onina
10	ecano	ecina

Sistema Häntzsch-Widman
Resumen de nomenclatura
Monociclos **saturados** comunes

Prefijos

Elemento (valencia) partícula

O (II) Oxa
S (II) Tia
Se (II) Selen
Te (II) Telur

→ elisión de
la última ~~vocal~~

Ox
Ti
Selen
Telur

+



-irano



-etano



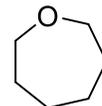
-olano



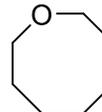
-ano



-epano



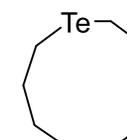
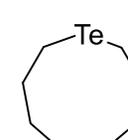
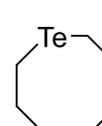
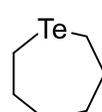
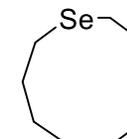
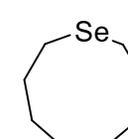
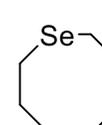
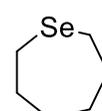
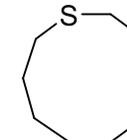
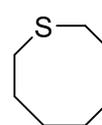
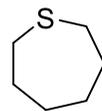
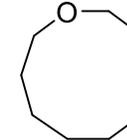
-ocano



-onano



-ecano



Anillos heterocíclicos saturados con O, S, Se, Te.

X = heteroátomo

Sufijos



Sistema Häntzsch-Widman
Resumen-Nomenclatura
Monociclos insaturados comunes

Anillos heterocíclicos insaturados con el máximo número de ligaduras conjugadas

X = heteroátomo O, S, Se, Te.

Prefijos

Elemento (valencia) partícula

O (II) Oxa
S (II) Tia
Se (II) Selen
Te (II) Telur

→ elisión de
última ~~vocal~~
→ en prefijo

Ox
Ti
Selen
Telur

+ $\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-ireno

$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-eto

$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-ol

$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-ina

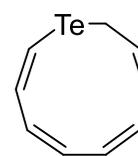
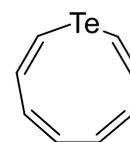
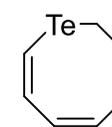
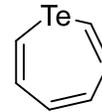
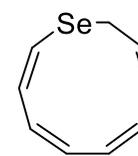
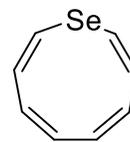
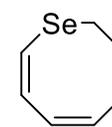
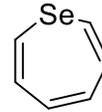
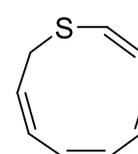
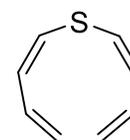
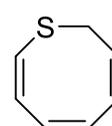
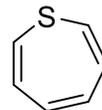
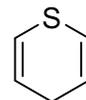
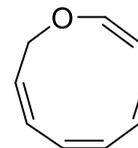
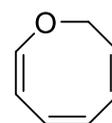
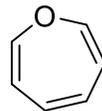
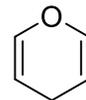
$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-epina

$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-ocina

$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-onina

$\begin{matrix} X \\ | \\ \text{---} \end{matrix}$
-ecina

Sufijos



Sistema Häntzsch-Widman
Resumen-Nomenclatura
Monociclos insaturados comunes

Especificación cuando hay **H**,
y geometría de las insaturaciones conjugadas

X = heteroátomo O, S, Se, Te.

Prefijos

Elemento (valencia) partícula

O (II) Oxa
S (II) Tia
Se (II) Selen
Te (II) Telur

→ elisión de
última ~~vocal~~
en prefijo

Ox
Ti
Selen
Telur

Sufijos

4

8

9

10

+ -eto/
-ete

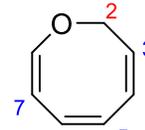
-ocina

-onina

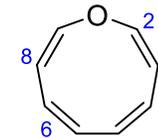
-ecina



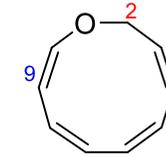
2H-
2H-



(3Z,5Z,7Z)-
2H-



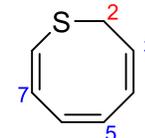
(2Z,4Z,6Z,8Z)-



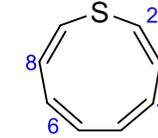
(3Z,5Z,7Z,9Z)-
2H-



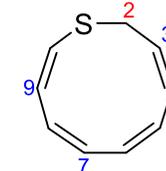
2H-
2H-



(3Z,5Z,7Z)-
2H-



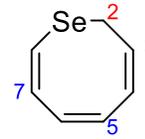
(2Z,4Z,6Z,8Z)-



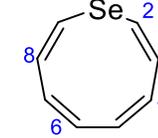
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2H-



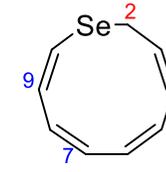
2H-
2H-



(3Z,5Z,7Z)-
2H-



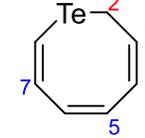
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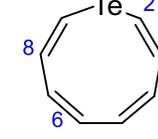
(3Z,5Z,7Z,9Z)-
2H-



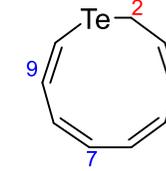
2H-
2H-



(3Z,5Z,7Z)-
2H-



(2Z,4Z,6Z,8Z)-



(3Z,5Z,7Z,9Z)-
2H-

Sistema Hantzsch-Widman
Resumen
Nomenclatura de monociclos comunes

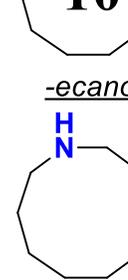
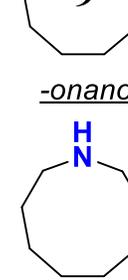
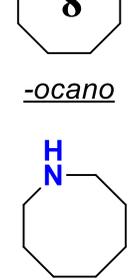
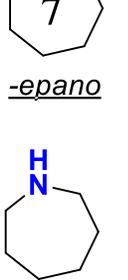
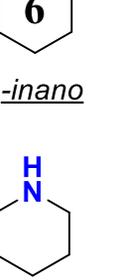
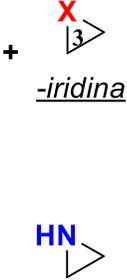
Prefijos

Elemento (valencia) partícula

N (III) Aza
P (III) Fosfa
As (III) Arsa
B (III) Bora

→ elisión de
última ~~vocal~~
en prefijo

Az
Fosf
Ars
Bor



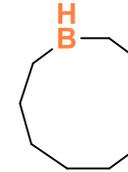
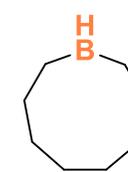
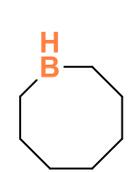
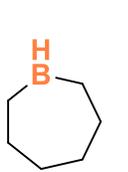
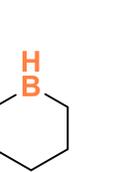
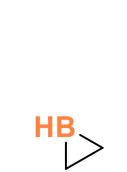
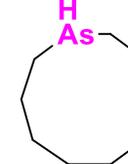
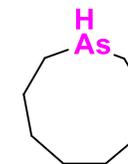
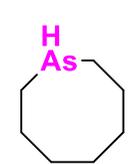
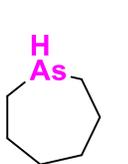
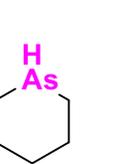
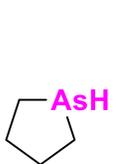
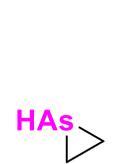
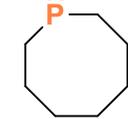
Anillos heterocíclicos nitrogenados, fosforados, arsenicados y borados saturados

X = heteroátomo N, P, Ar, B.

Sufijos

P(III), As(III) y B

-irano: *-etano:* *-olano:*



Sistema Häntzsch-Widman
Resumen
Nomenclatura de monociclos más comunes

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→ elisión de
última ~~vocal~~
en prefijo

Az
Fosf
Ars
Bor



+ *-irina*



-eto



-ol

Sufijos



-ina



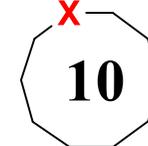
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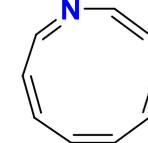
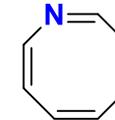
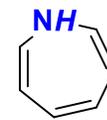
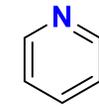
-ocina



-onina



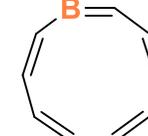
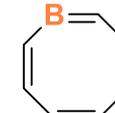
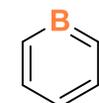
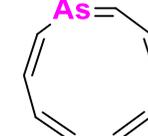
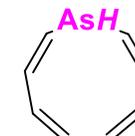
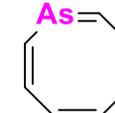
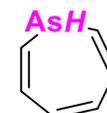
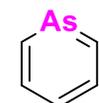
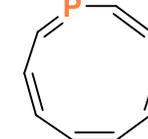
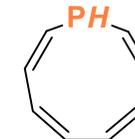
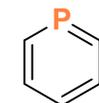
-ecina



-ireno:
P(III), As(III) y B(III)



-inina:
P(III), As(III) y B



Sistema Häntzsch-Widman
Resumen
Nomenclatura de monociclos más comunes

Anillos heterocíclicos nitrogenados, fosforados, arsenicados y borados insaturados con el máximo número de dobles enlaces no acumulados

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N (III) Aza

P (III) Fosfa

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B (III) Bora

→ elisión de
última ~~vocal~~
en prefijo

Aza
Fosfa
Arsa
Bora



+ *-irina*



1H-

-ireno:

P(III), As(III) y B(III)



1H-



1H-



1H-



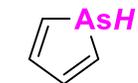
-eto/
-ete



1H-



1H-



1H-



1H-



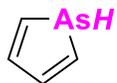
-ol



1H-



1H-



1H-

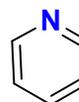


1H-

Sufijos



-ina

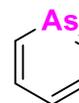


-inina:

P(III), As(III) y B



1H-



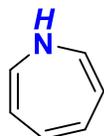
1H-



1H-



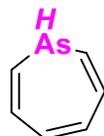
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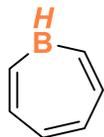
1H-



1H-



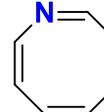
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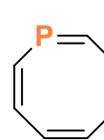
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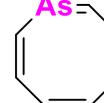
-ocina



(1Z,3Z,5Z,7Z)-



(1Z,3Z,5Z,7Z)-



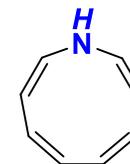
(1Z,3Z,5Z,7Z)-



(1Z,3Z,5Z,7Z)-



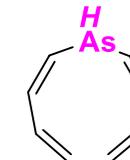
-onina



(2Z,4Z,6Z,8Z)-
1H-



(2Z,4Z,6Z,8Z)-1H-



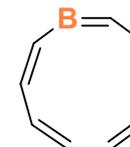
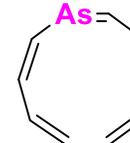
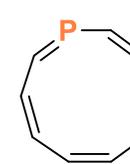
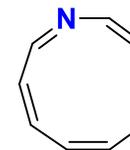
(2Z,4Z,6Z,8Z)-1H-



(2Z,4Z,6Z,8Z)-
1H-



-ecina



Recapitulación

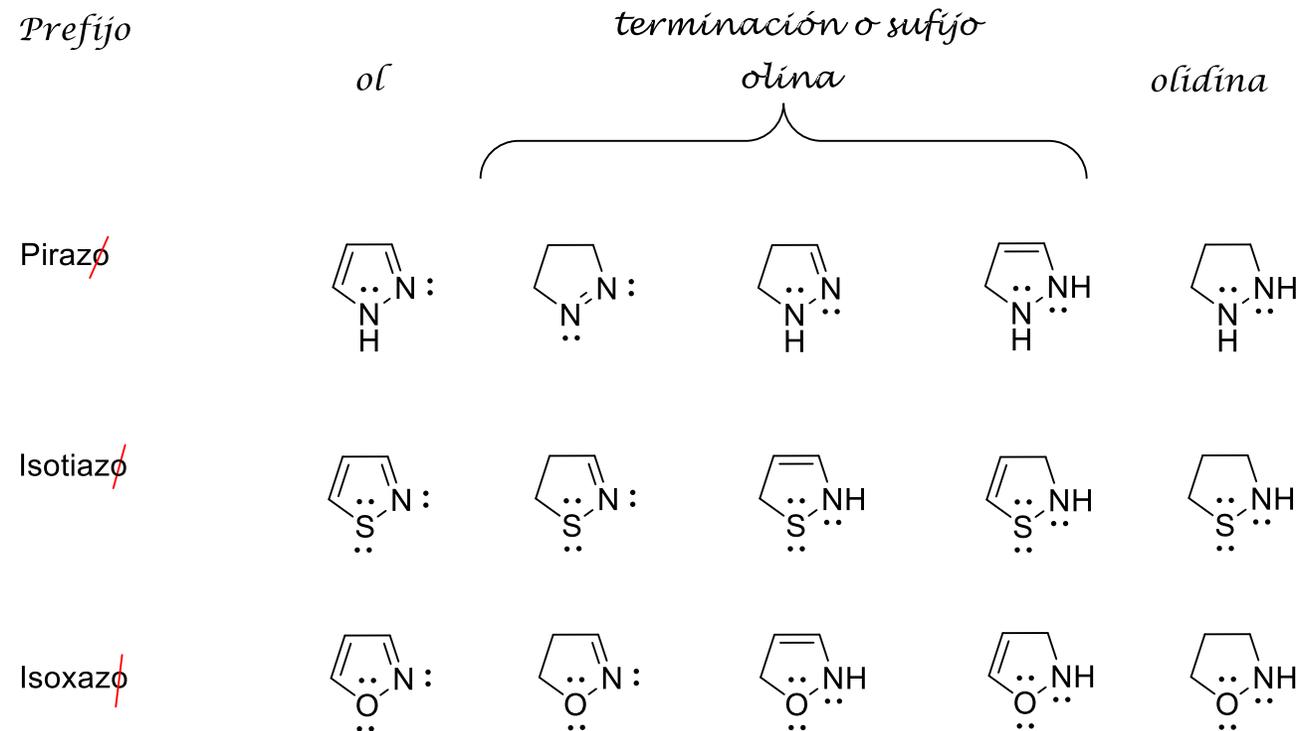
REPASO

EJERCICIOS

1. NOMENCLATURA SEMISISTEMÁTICA
2. NOMENCLATURA SISTEMÁTICA

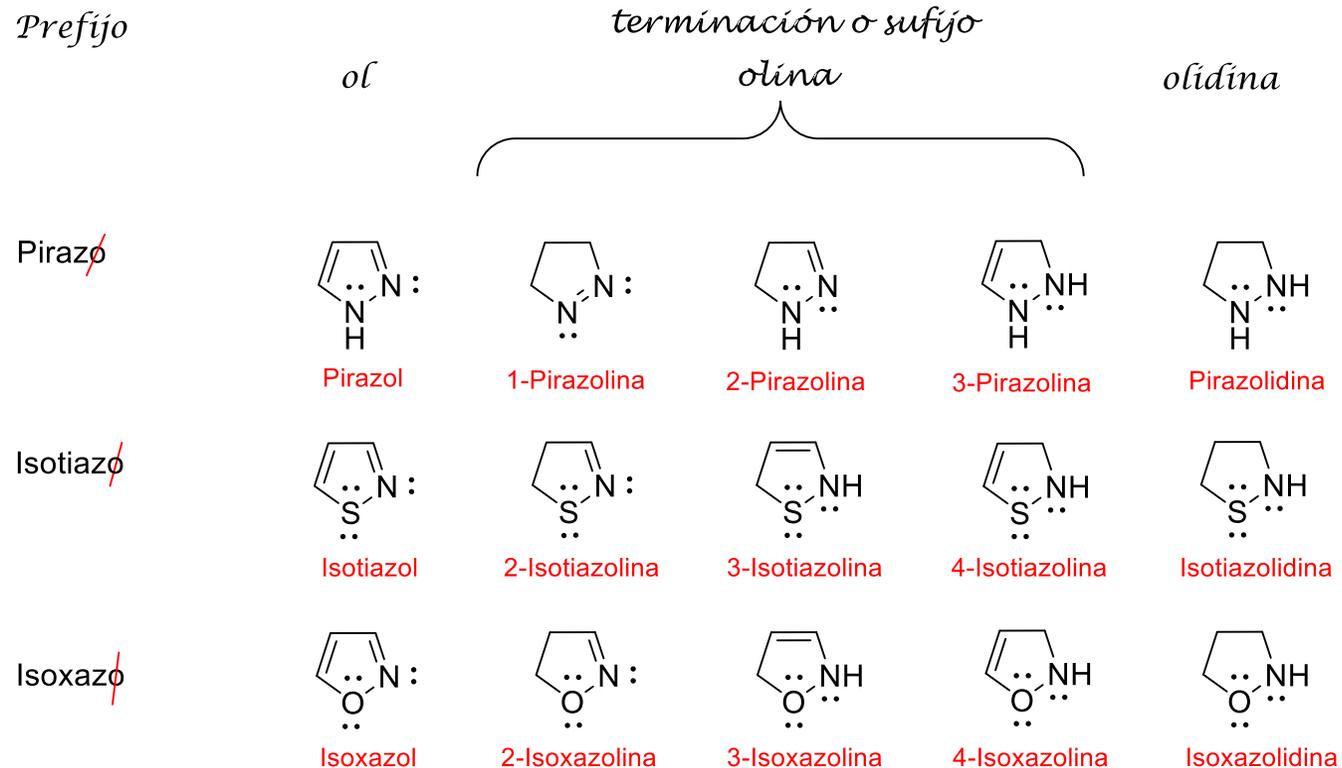
1. Nomenclatura semisistemática

Anillos parcial y totalmente saturados



1. Nomenclatura semisistemática

Anillos parcial y totalmente saturados

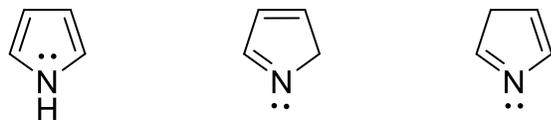


2. Nomenclatura sistemática

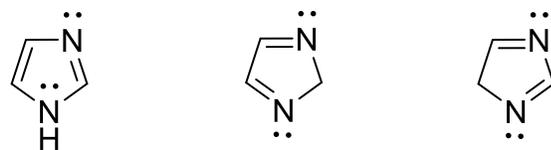
Sistema totalmente insaturado

Isómeros en los que difiere la posición de un *H*: *H* indicado → prioridad en la numeración sobre las insaturaciones

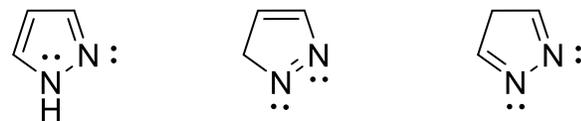
Pirrol



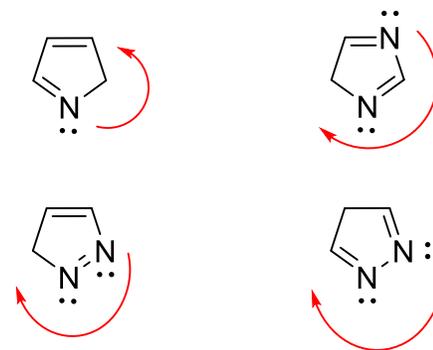
Imidazol



Pirazol



- Recordar que 1) los heteroátomos y 2) el **H** indicado tienen prioridad en la numeración y se les asigna el menor localizador posible.



2. Nomenclatura semisistemática

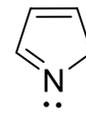
Sistema totalmente insaturado

Isómeros en los que difiere la posición de un *H*:
H indicado → prioridad en la numeración

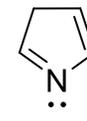
Pirrol



1*H*-Pirrol

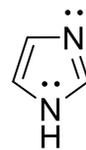


2*H*-Pirrol

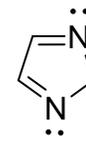


3*H*-Pirrol

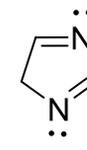
Imidazol



1*H*-Imidazol

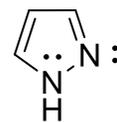


2*H*-Imidazol

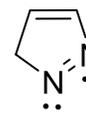


4*H*-Imidazol

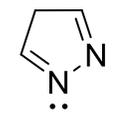
Pirazol



1*H*-Pirazol

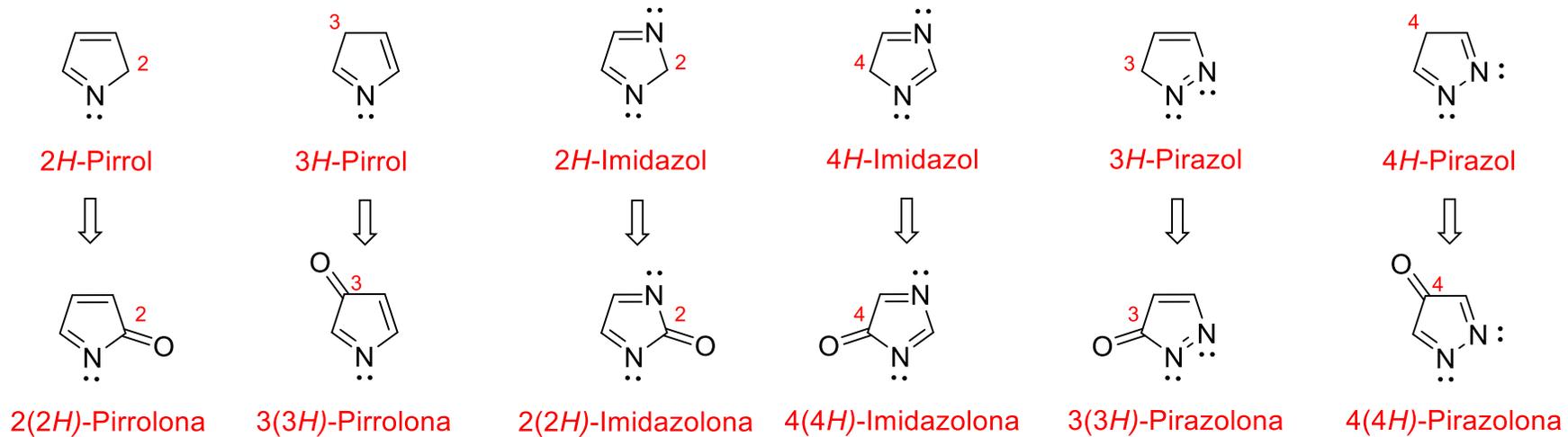


3*H*-Pirazol



4*H*-Pirazol

2. Nomenclatura sistemática Heterociclos que contienen C=O (XH)-ona



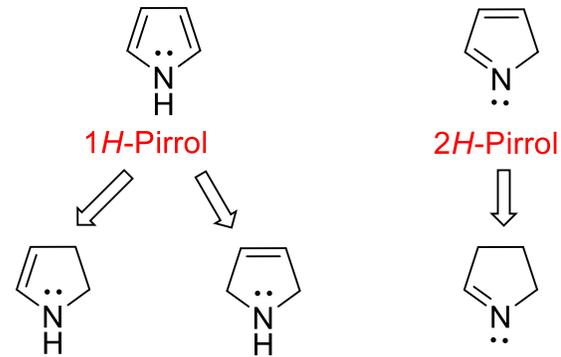
2. Nomenclatura sistemática

Isómeros parcialmente saturados

Para nombrar a los isómeros parcialmente saturados se toma como base el sistema totalmente insaturado y se hace referencia al *H* indicado

Sistema totalmente insaturado

Pirrol



Sistema parcialmente saturado

Sistema totalmente saturado



2. Nomenclatura sistemática

Isómeros parcialmente saturados

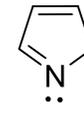
Para nombrar a los isómeros parcialmente saturados se toma como base el sistema totalmente insaturado y se hace referencia al *H* indicado

Sistema totalmente insaturado

Pirrol



1H-Pirrol



2H-Pirrol

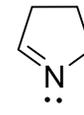
Sistema parcialmente saturado



2,3-Dihidro-1H-pirrol



2,5-Dihidro-1H-pirrol



3,4-Dihidro-2H-pirrol

Sistema totalmente saturado



Pirrolidina

2. Nomenclatura sistemática

Isómeros parcialmente saturados

Para nombrar a los isómeros parcialmente saturados se toma como base el sistema totalmente insaturado y se hace referencia al *H* indicado

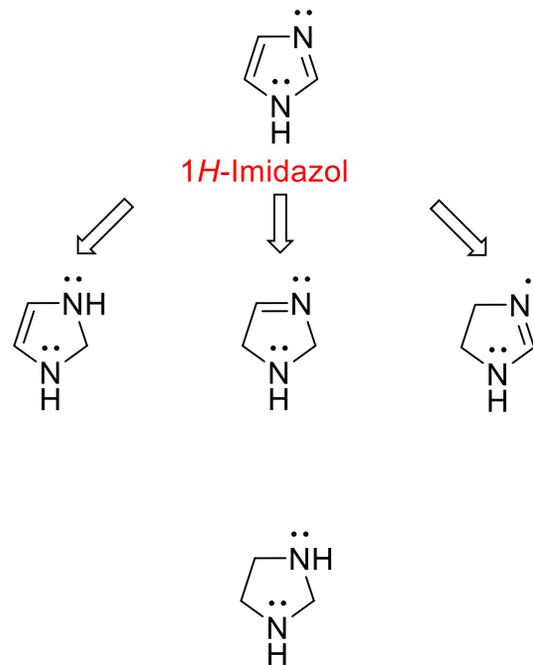
Sistema totalmente insaturado

Imidazol

1*H*-Imidazol

Sistema parcialmente saturado

Sistema totalmente saturado



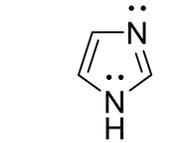
2. Nomenclatura sistemática

Isómeros parcialmente saturados

Para nombrar a los isómeros parcialmente saturados se toma como base el sistema totalmente insaturado y se hace referencia al *H* indicado

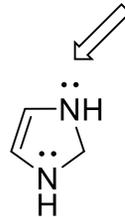
Sistema totalmente insaturado

Imidazol



1*H*-Imidazol

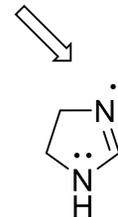
Sistema parcialmente saturado



2,3-Dihidro-1*H*-imidazol

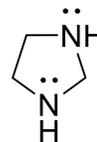


2,5-Dihidro-1*H*-imidazol



4,5-Dihidro-1*H*-imidazol

Sistema totalmente saturado



Imidazolidina

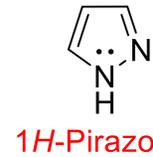
2. Nomenclatura sistemática

Isómeros parcialmente saturados

Para nombrar a los isómeros parcialmente saturados se toma como base el sistema totalmente insaturado y se hace referencia al *H* indicado

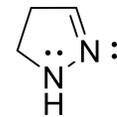
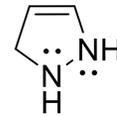
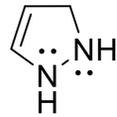
Sistema totalmente insaturado

Pirazol

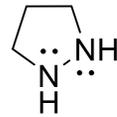


1H-Pirazol

Sistema parcialmente saturado



Sistema totalmente saturado



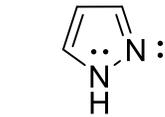
2. Nomenclatura sistemática

Isómeros parcialmente saturados

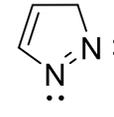
Para nombrar a los isómeros parcialmente saturados se toma como base el sistema totalmente insaturado y se hace referencia al *H indicado*

Sistema totalmente insaturado

Pirazol

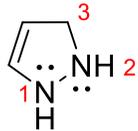


1H-Pirazol

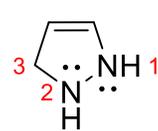


3H-Pirazol

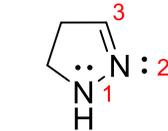
Sistema parcialmente saturado



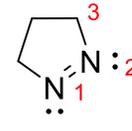
2,3-Dihidro-1H-pirazol



2,3-Dihidro-1H-pirazol

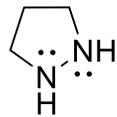


4,5-Dihidro-1H-pirazol



4,5-Dihidro-3H-pirazol

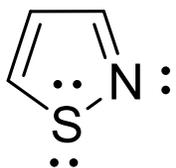
Sistema totalmente saturado



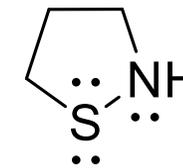
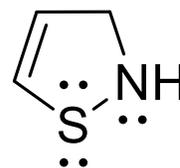
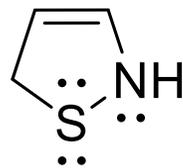
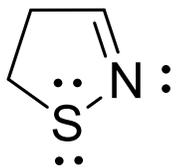
Pirazolidina

2. Nomenclatura sistemática

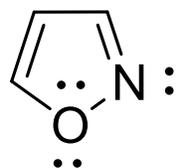
Isómeros parcialmente saturados
donde no se indica *H*



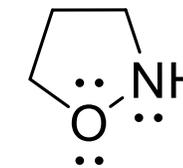
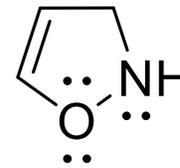
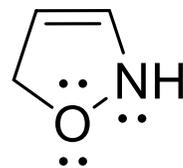
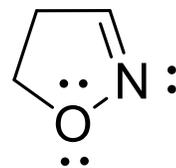
Isotiazol



Isotiazolidina



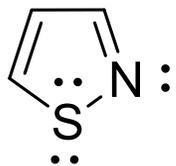
Isoxazol



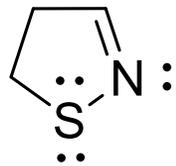
Isoxazolidina

2. Nomenclatura sistemática

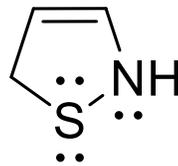
Isómeros parcialmente saturados donde no se indica *H*



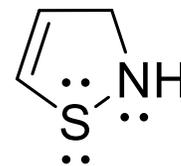
Isotiazol



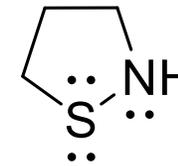
4,5-Dihidro
isotiazolina



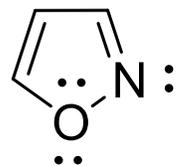
2,5-Dihidro
isotiazolina



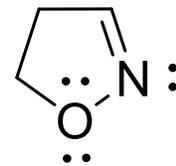
2,3-Dihidro
isotiazolina



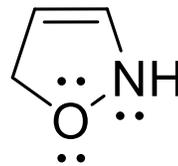
Isotiazolidina



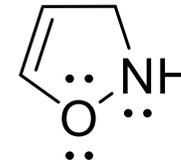
Isoxazol



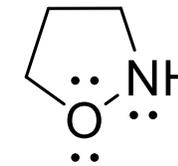
4,5-Dihidro
isoxazolina



2,5-Dihidro
isoxazolina



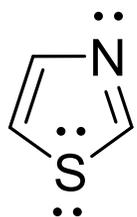
2,3-Dihidro
isoxazolina



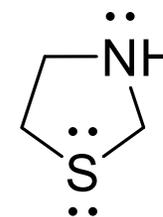
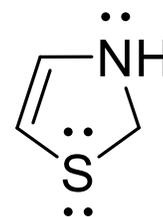
Isoxazolidina

2. Nomenclatura sistemática

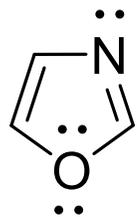
Isómeros parcialmente saturados
donde no se indica *H*



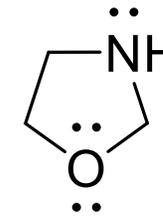
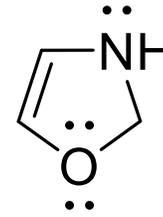
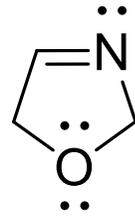
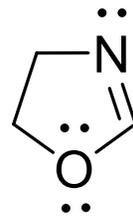
Thiazol



Thiazolidina



Oxazol



Oxazolidina

2. Nomenclatura sistemática

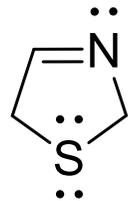
Isómeros parcialmente saturados
donde no se indica *H*



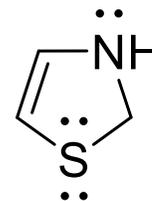
Thiazol



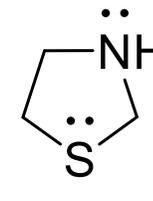
4,5-Dihidro
tiazolina



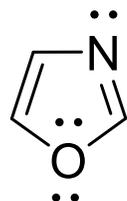
2,5-Dihidro
tiazolina



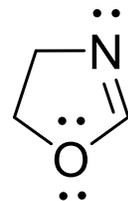
2,3-Dihidro
tiazolina



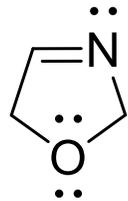
Thiazolidina



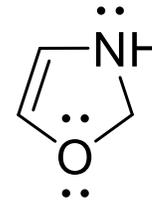
Oxazol



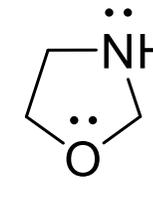
4,5-Dihidro
oxazolina



2,5-Dihidro
oxazolina



2,3-Dihidro
oxazolina



Oxazolidina

2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O
(*XH*)-ona; se cambia *ina* por *ona*

Prefijo

terminación o sufijo

~~Pirro~~

~~Pirazo~~

~~Imidazo~~

~~Isotiazol~~

~~Tiazol~~

~~Isoxazol~~

~~Oxazol~~

Compuesto
base

Derivado
ceto

Compuesto
base

Derivado
ceto

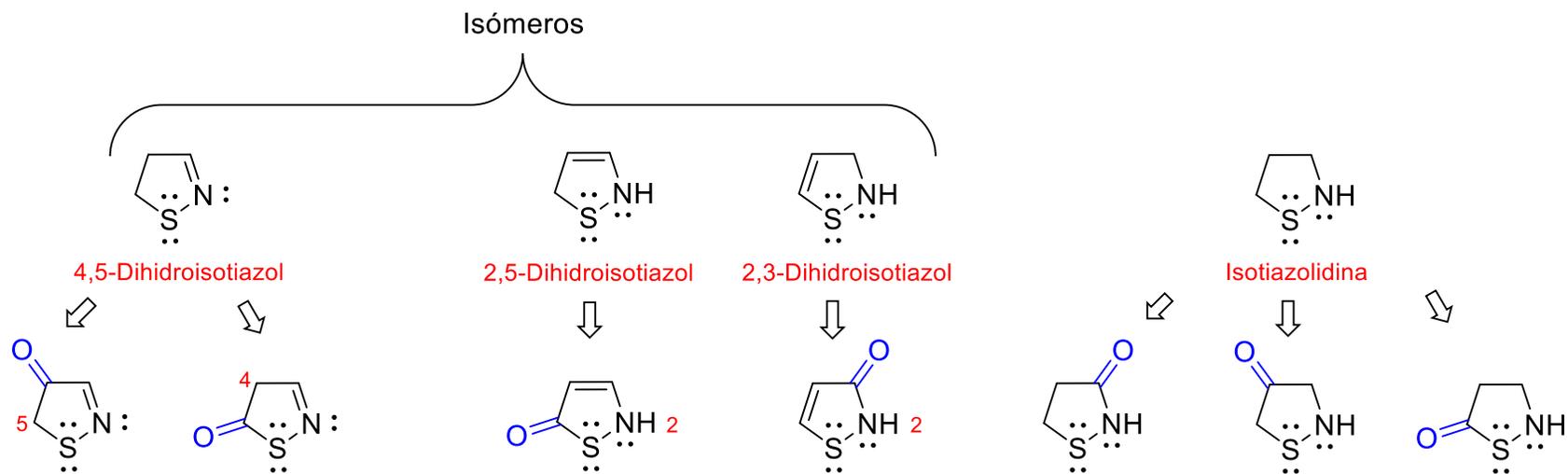
olina → *olona*

olidina → *olidona*

Cuando hay isómeros, como en los compuestos parcialmente insaturados, se emplea el *H* indicado; **primero** se escribe la numeración del grupo **ceto** **y enseguida**, sin guion y entre paréntesis, el sitio del *H* (*XH*)

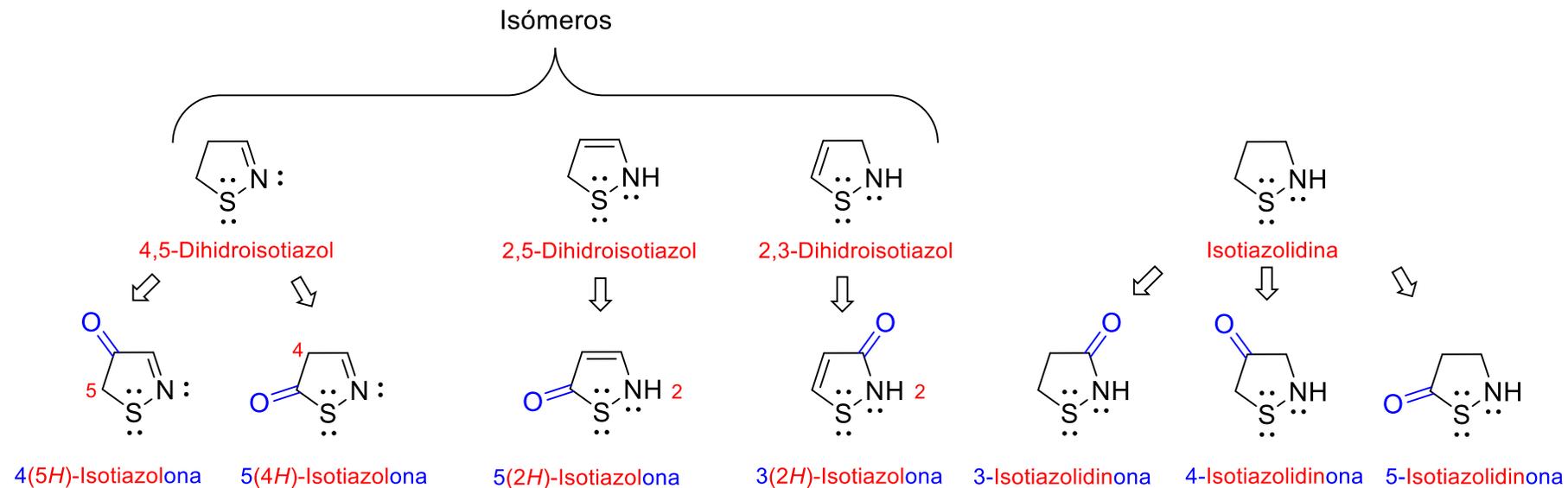
2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (*XH*)-ona



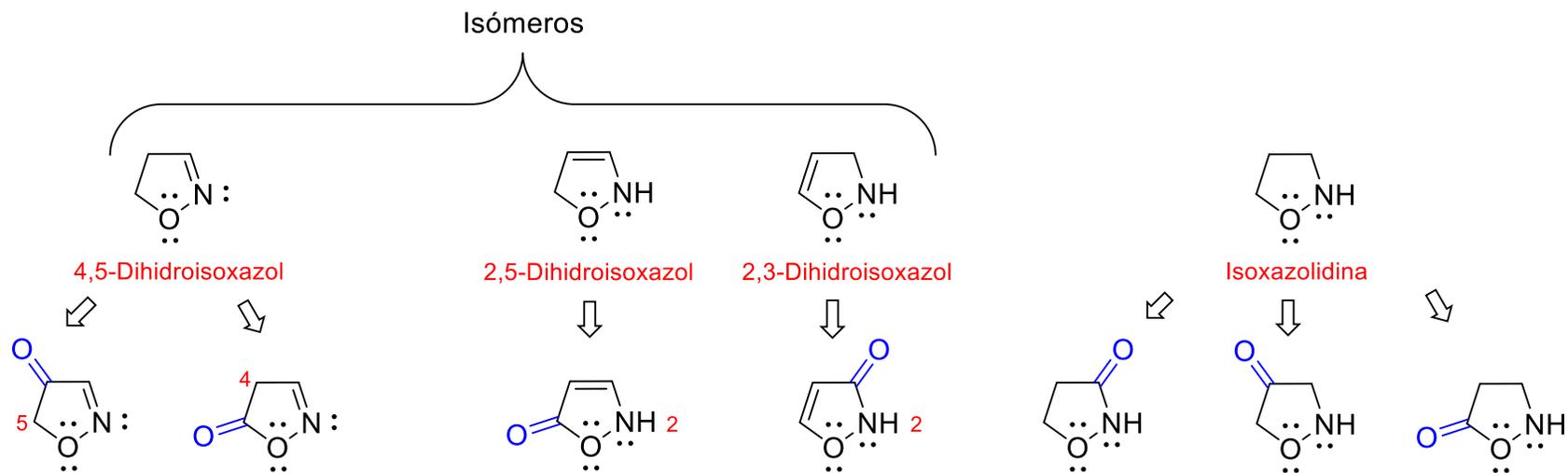
2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (XH)-ona



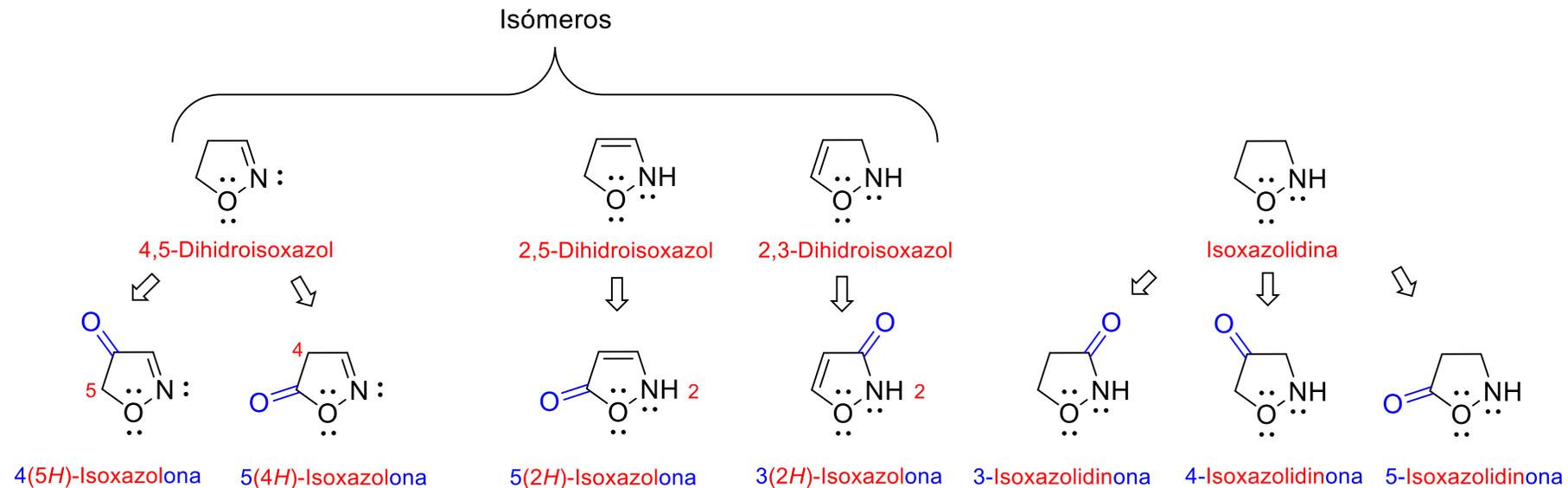
2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (*XH*)-ona



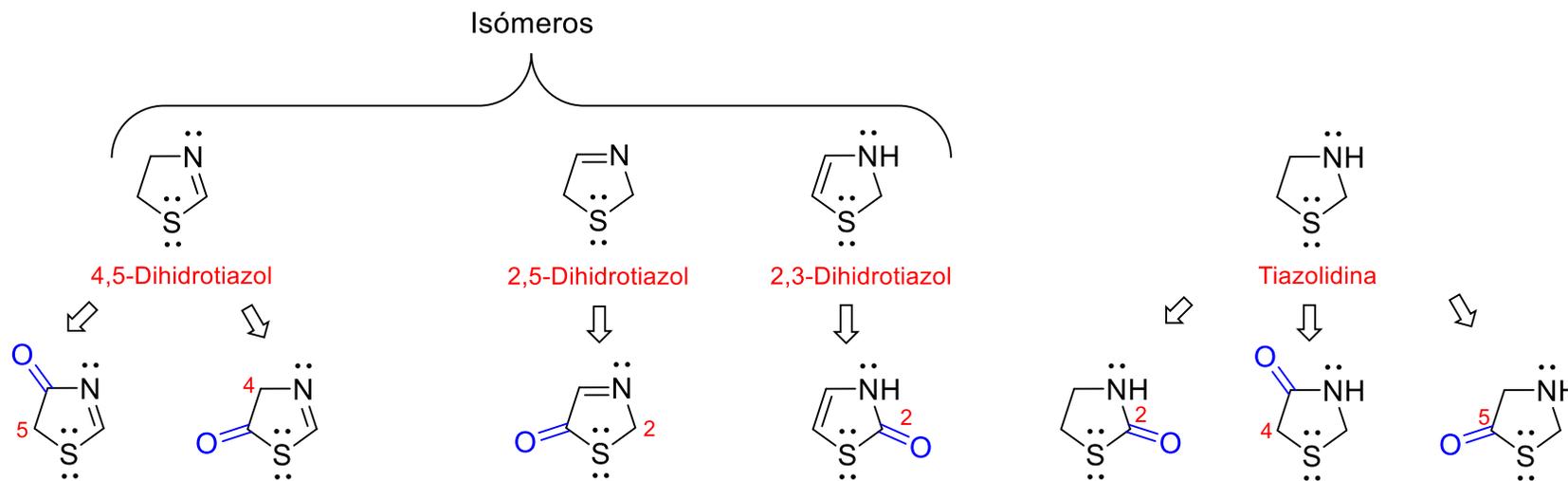
2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (*XH*)-ona



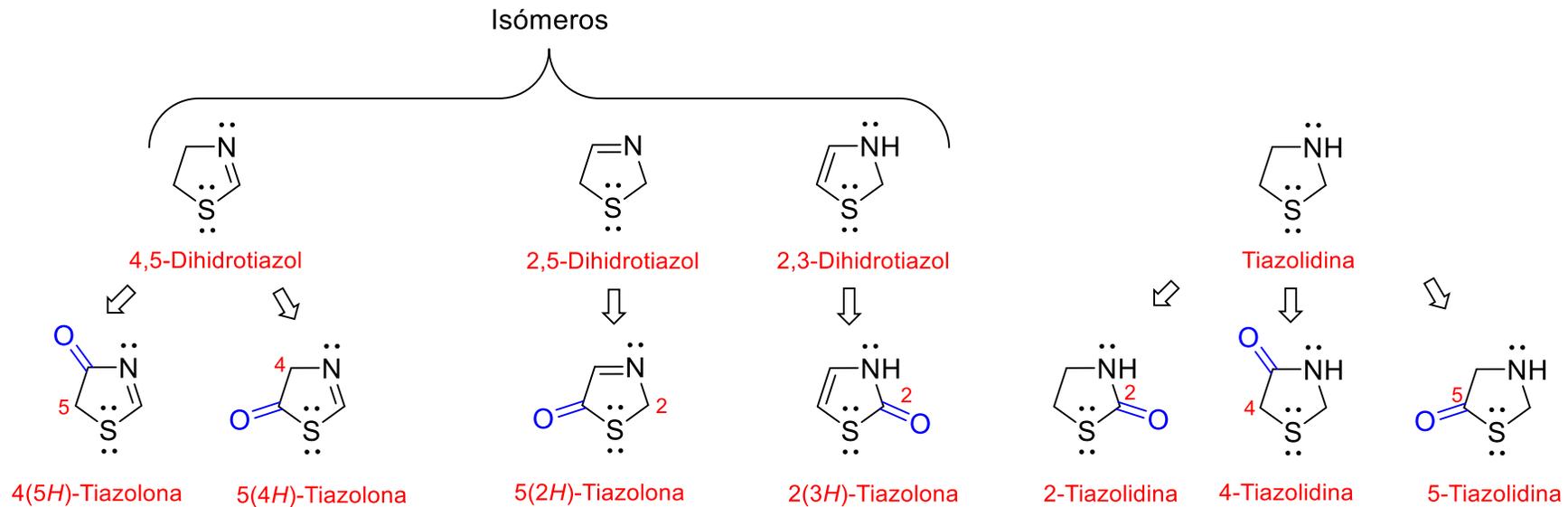
2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (**XH**)-ona



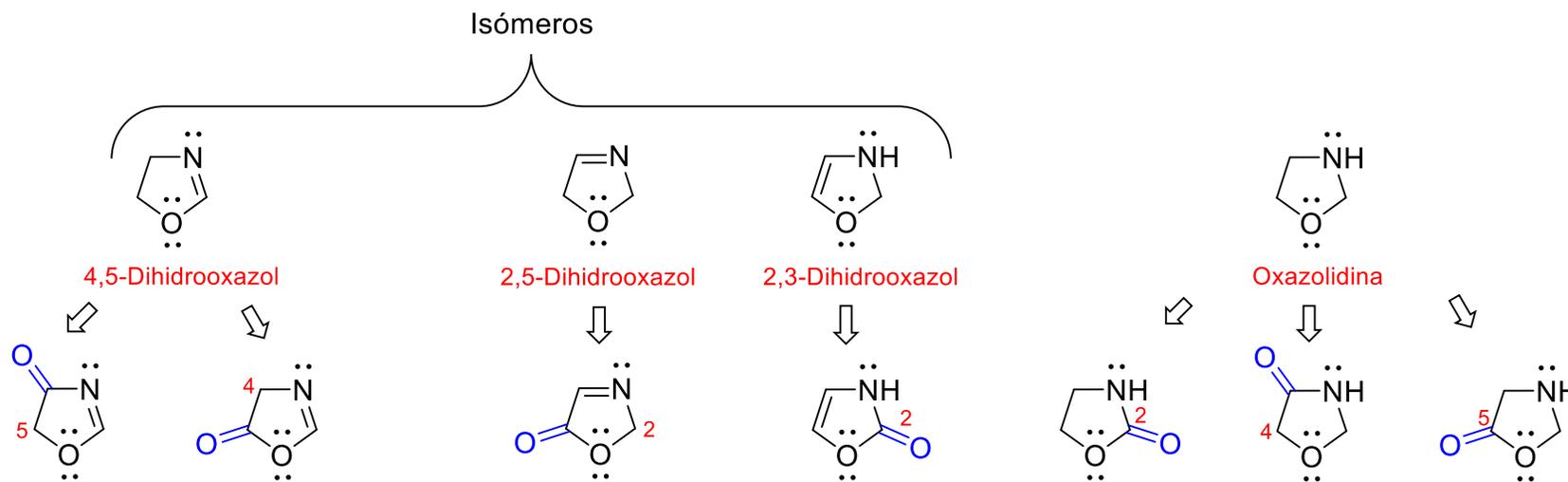
2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (**XH**)-ona



2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (**XH**)-ona



2. Nomenclatura sistemática

Isómeros parcialmente saturados que contienen C=O (*XH*)-ona

