

HETEROCIKLIČNA JEDINJENJA

Jedinjenja koja u prstenu pored atoma ugljenika sadrže i jedan ili više drugih atoma

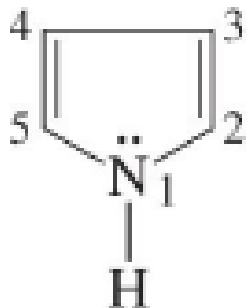
Podela heterocikličnih jedinjenja

- broj i vrsta heteroatoma (O, N i S)
- ukupan broj atoma u prstenu (5 ili 6)
- više prstenova u strukturi jedinjenja sa zajedničkim atomima (kondenzovani prstenovi)

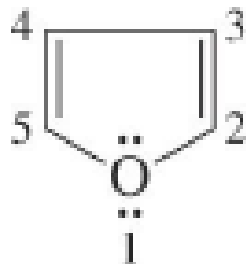
Nomenklatura heterocikličnih jedinjenja

- upotreba trivijalnih imena je veoma raširena.
- IUPAC ov (O)oksa-, (S)tia-, (N)aza- sistem
- -ol za petočlani i -in za šestočlani prsten
- koristićemo trivijalna imena

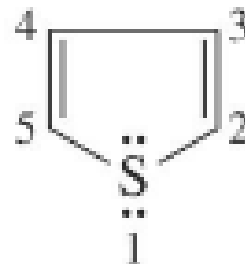
Petočlani heterociklusi sa jednim heteroatomom



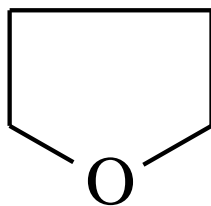
pirol
(azol)



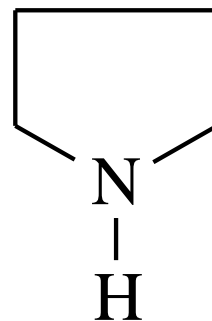
furan
(oksol)



tiofen
(tiol)

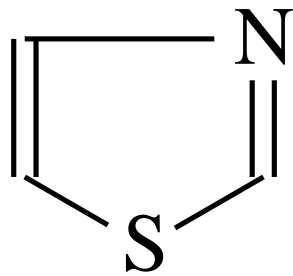


tetrahidrofuran

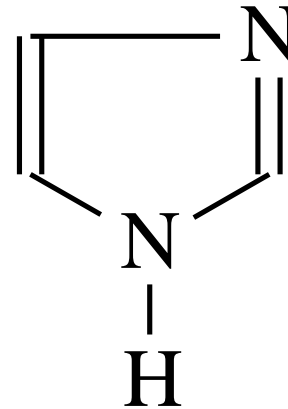


pirolidin

Petočlani heterociklusi sa dva heteroatoma

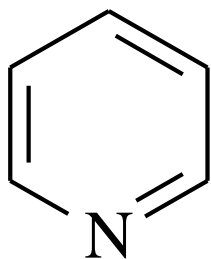


tiazol
(1,3-tiazol)

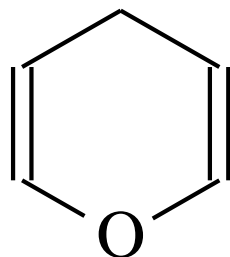


imidazol
(1,3-diazol)

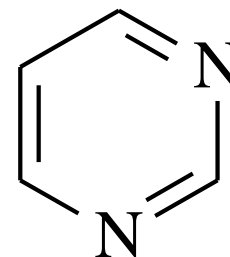
Šestočlani heterociklusi



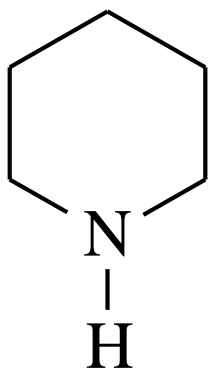
piridin
(azin)



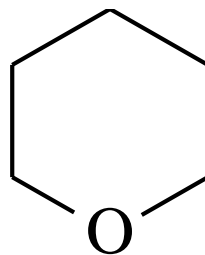
piran



pirimidin
(1,3-diazin)

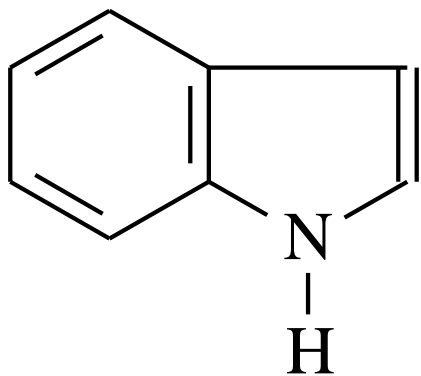


piperidin

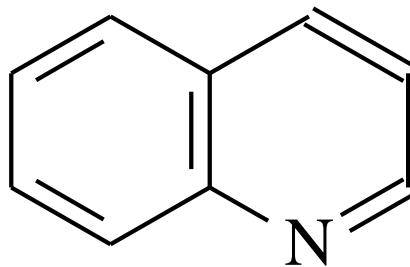


tetrahidropiran

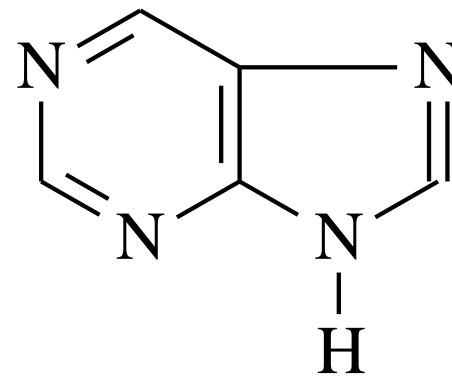
Heterociklusi sa kondenzovanim prstenovima



indol



hinolin



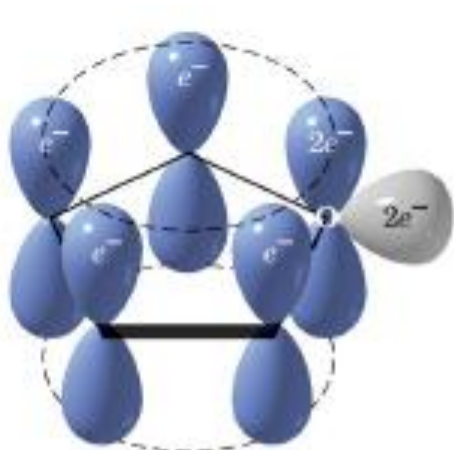
purin

Hemijske osobine heterocikličnih jedinjenja

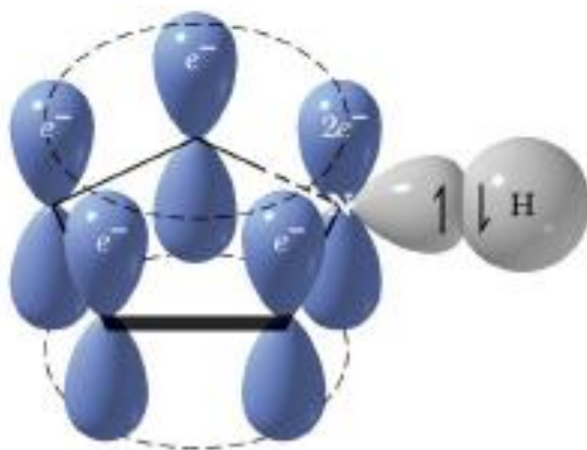
- aromatična heterociklična jedinjenja
- pirol, tiofen, furan, tiazol, imidazol, piridin, pirimidin, indol, hinolin i purin
- nearomatična heterociklična jedinjenja
- piran, tetrahidrofuran, pirolidin, piperidin i tetrahidropiran

Aromatična heterociklična jedinjenja

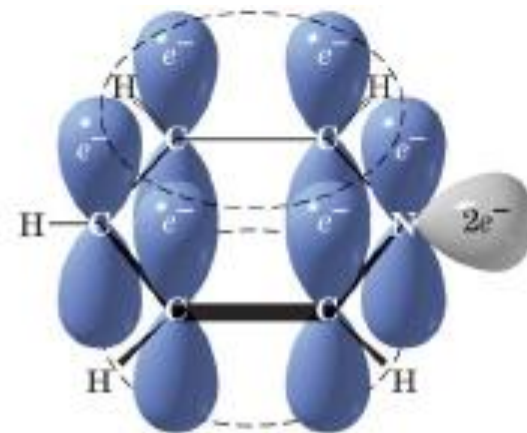
Zadovoljavju pravilo aromatičnosti $4n+2 \pi$ elektrona



Furan
slično i
tiofen

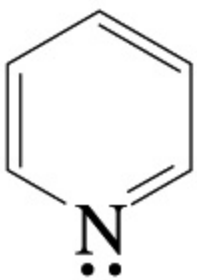


Pirol



Piridin

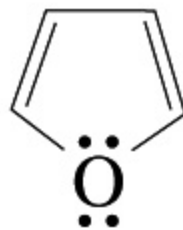
Aromatična heterociklična jedinjenja



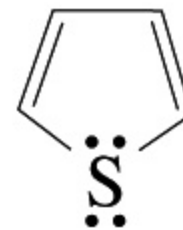
piridin



pirol



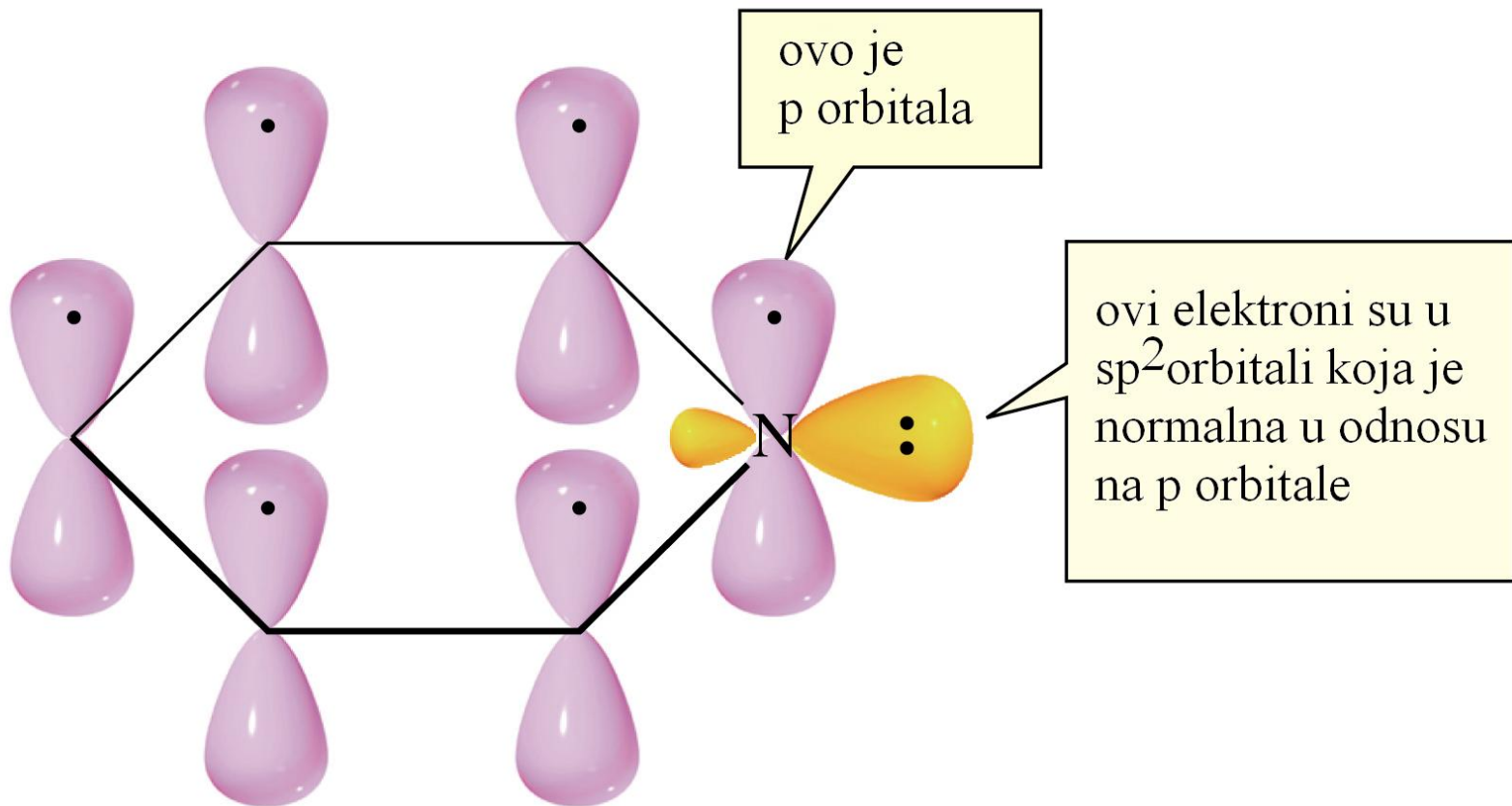
furan



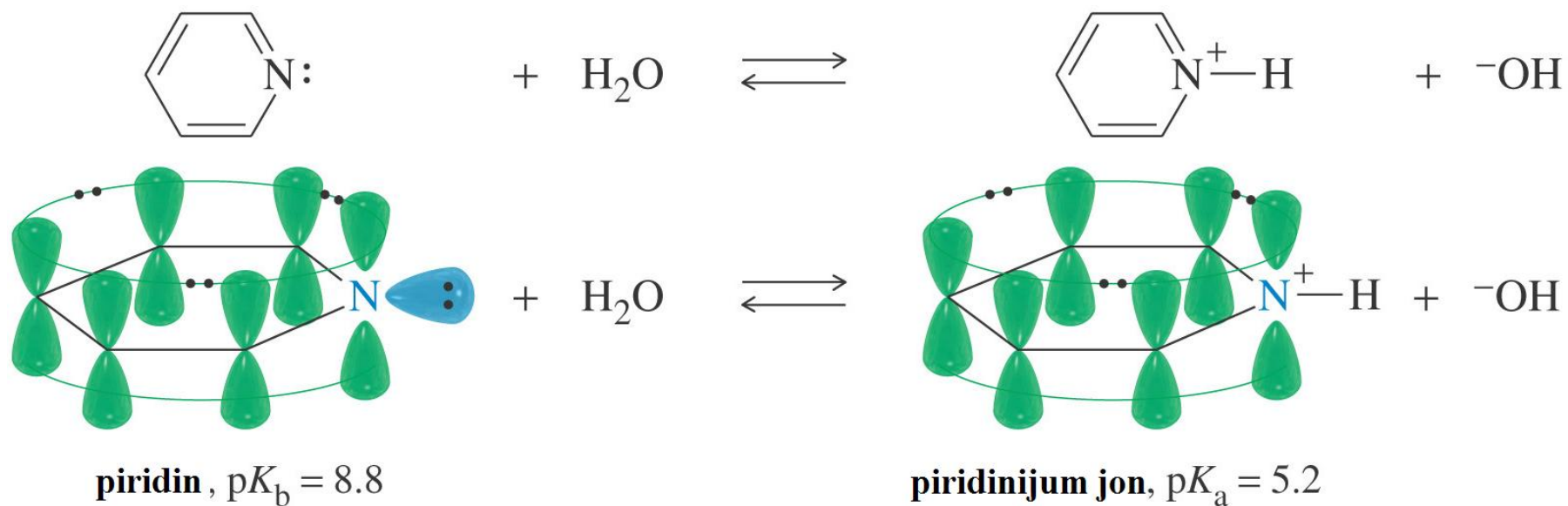
tiofen

Piridin je aromatičan

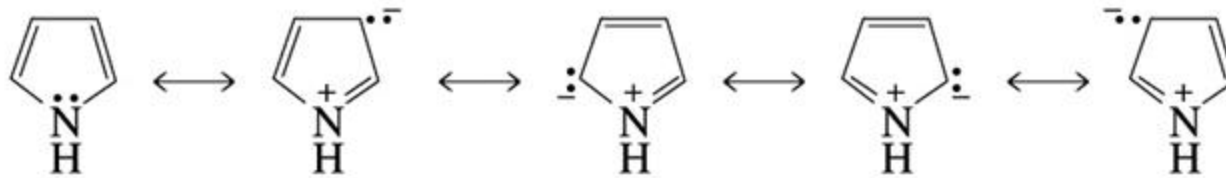
Struktura orbitala kod piridina



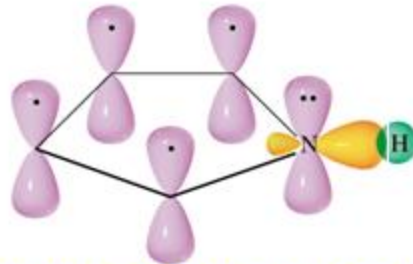
Piridin pokazuje bazne osobine



Pirol je aromatičan

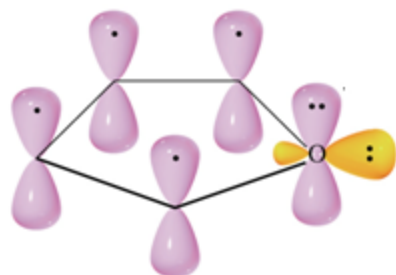


rezonantne strukture pirola

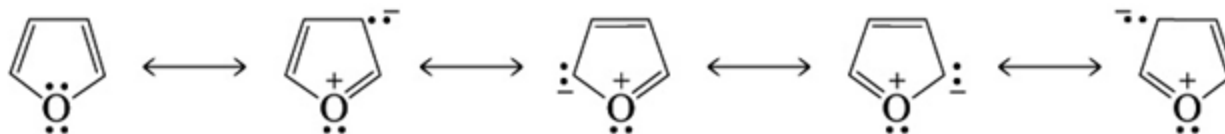


struktura orbitala kod pirola

Furan je aromatičan

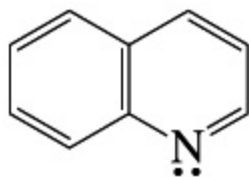


struktura orbitala kod furana

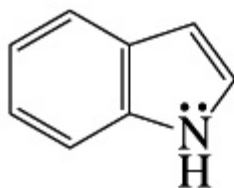


rezonantne strukture kod furana

Još neka aromatična heterociklična jedinjenja



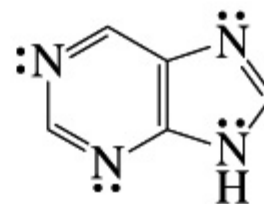
hinolin



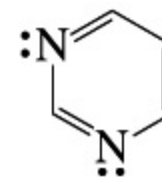
indol



imidazol

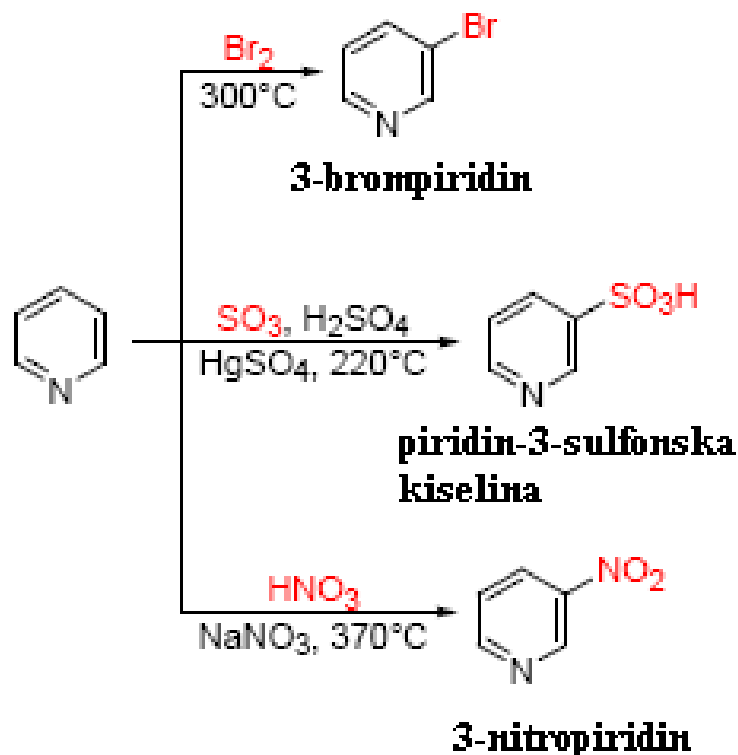
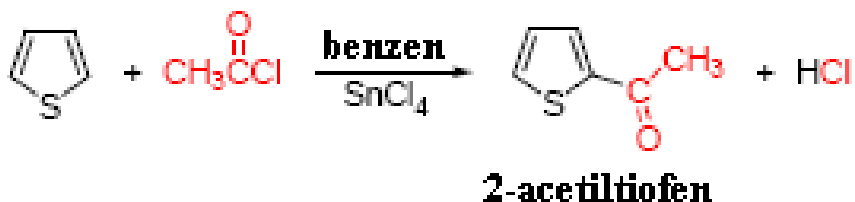


purin



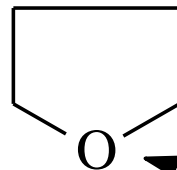
pirimidin

Elektrofilna aromatična supstitucija petočlanih i šestočlanih aromatičnih heterociklusa

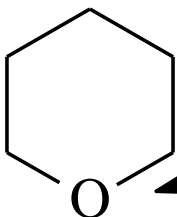


Nearomatični heterociklusi

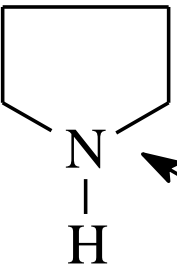
tetrahidrofuran



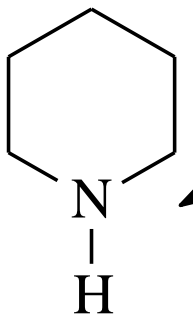
tetrahidropiran



pirolidin



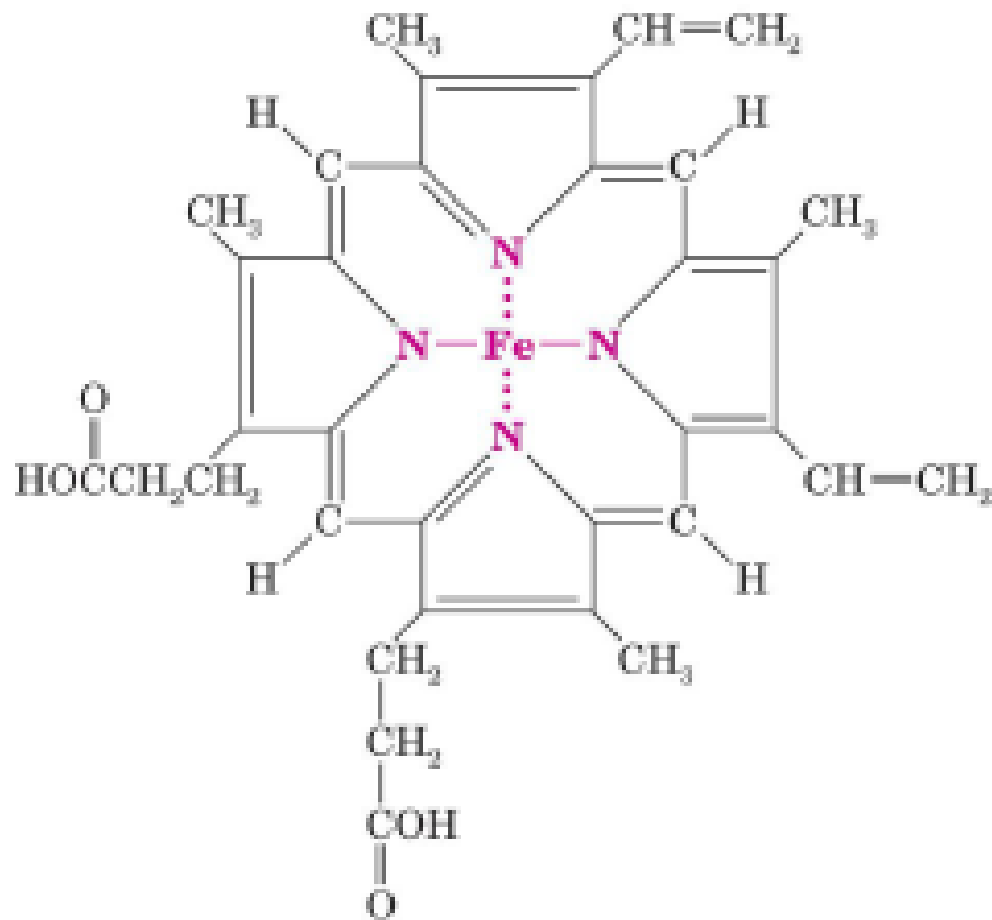
piperidin



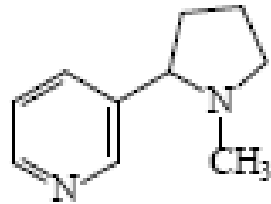
etarska veza

sekundarni amin

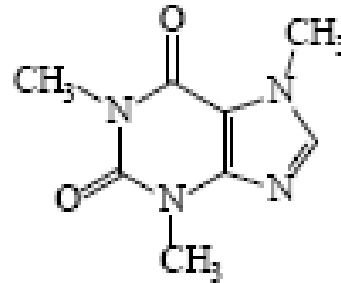
Neki prirodni proizvodi koji sadrže heterocikle HEM



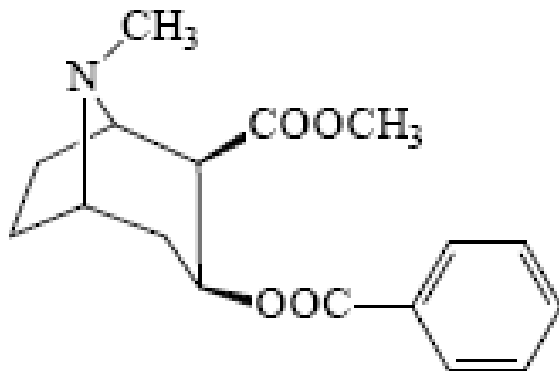
Psihoaktivna jedinjenja alkaloidi



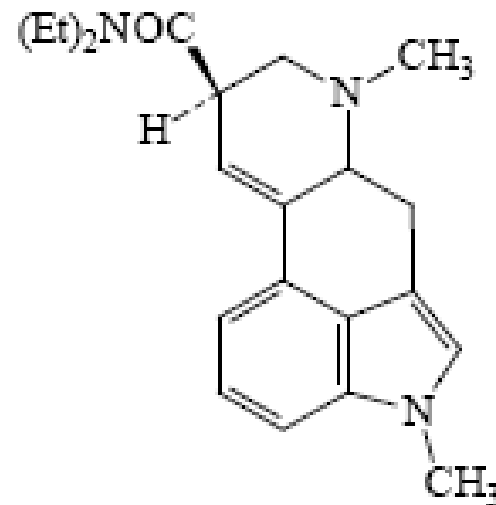
nikotin



kofein

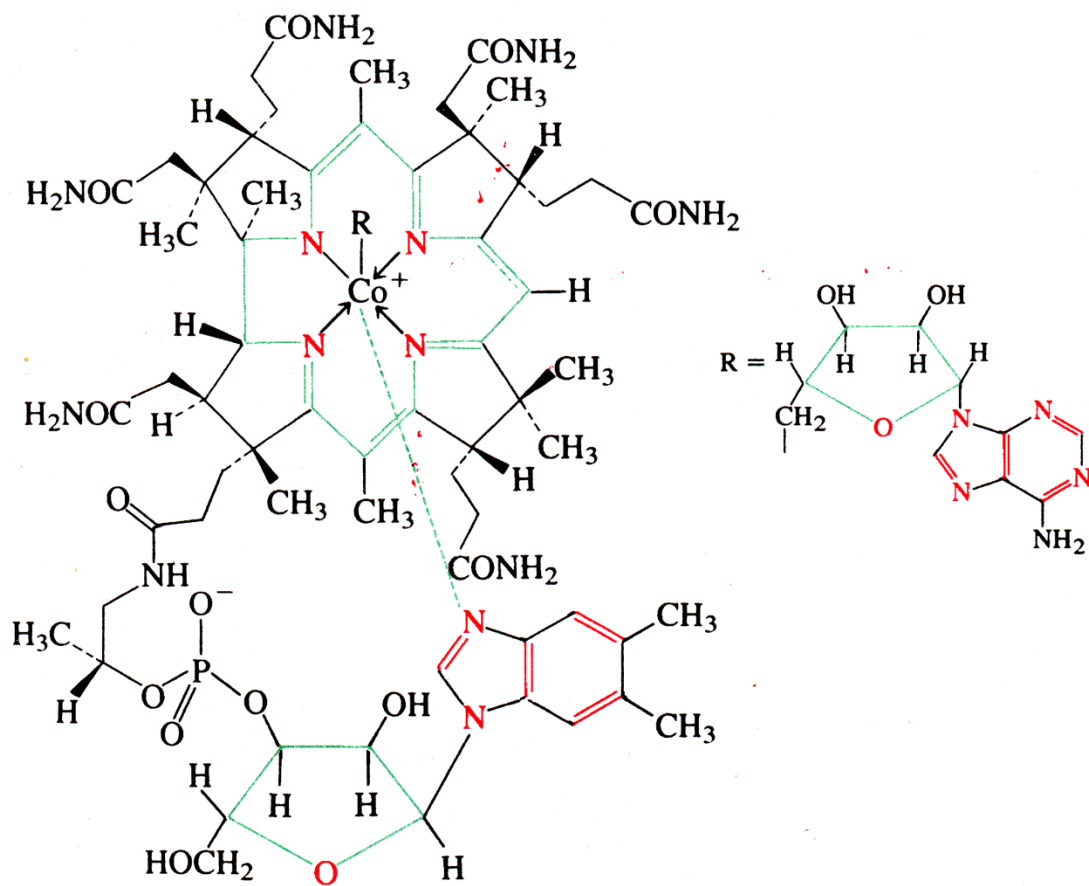


kokain

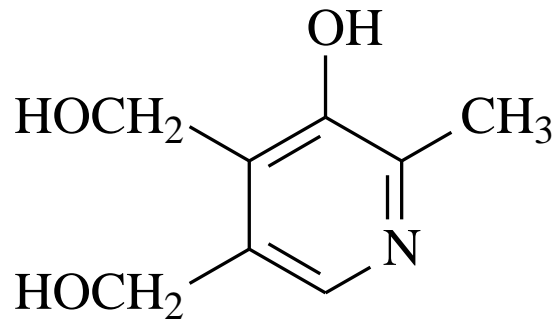


LSD

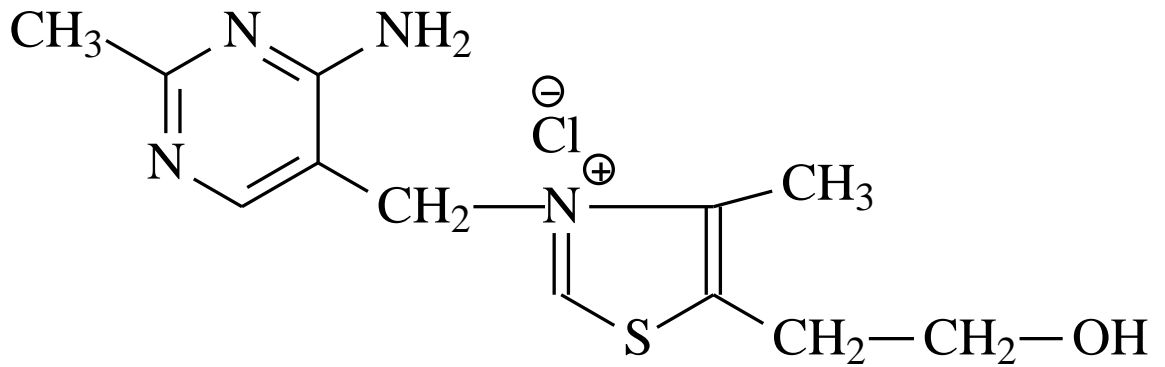
Vitamin B₁₂



B vitamini

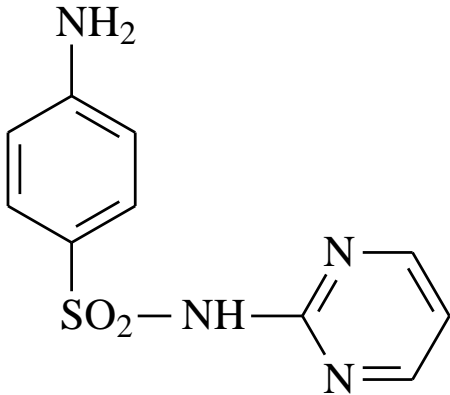


piridoksin, vitamin B₆

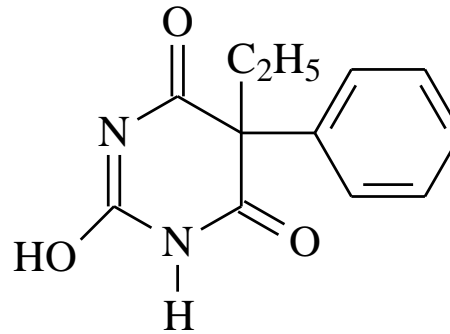


tiamin, vitamin B₁

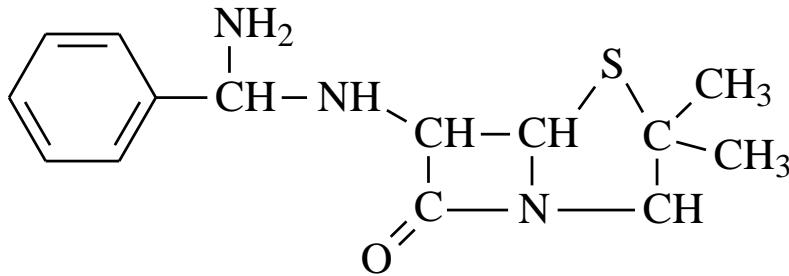
Lekovi



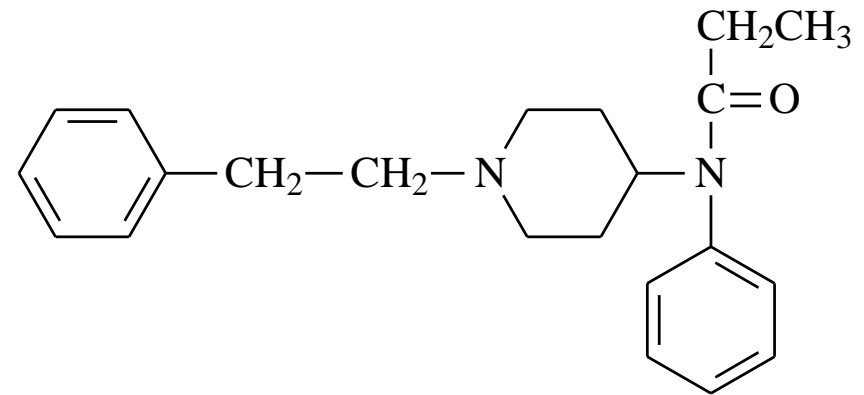
sulfadiazin



fenobarbital



penicilin (ampicilin)



narkoticki analgetik - fentanil