Resonance

Draw the Lewis structure of \([\text{CH}_2=\text{CHCH}_2]^+\)
Resonance

Draw the Lewis structure for nitromethane, CH₃NO₂
Common structural classes where resonance is observed

Compounds with *allylic lone pairs*
Common structural classes where resonance is observed

Compounds with *allylic positive charge*
Common structural classes where resonance is observed

Compounds with *lone pairs next to positive charge*

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\[ \text{\smaller+} \quad \text{\smaller Br} : \quad \leftrightarrow \quad \text{\smaller \text{\smaller Br}.} + \]
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Nitromethane, CH₃NO₂, combines two structural classes where resonance is observed.

It is a compound with *lone pairs next to positive charge*

and

*allylic lone pairs*
Common structural classes where resonance is observed

Compounds with *pi* bonds between atoms of different electronegativities
Common structural classes where resonance is observed

Compounds with *aromatic rings*
The concepts of resonance

1. Resonance is not something that is happening to a molecule. It is a way to describe the electronic distribution of a molecule.

2. Individual resonance isomers are imaginary, not real.
   a. They are representations of a hybrid structure
   b. The resonance hybrid is more stable than any individual resonance isomer contributing to it

3. Resonance isomers must be valid Lewis structures.

4. Resonance isomers differ only by the relative placement of their pi and nonbonding electrons in $p$ orbitals.

5. Resonance isomers must have identical constitutions. Therefore, the hybridization states of the constituent atoms cannot change.

6. Resonance isomers must have the same number valence electrons and the same number of paired and unpaired electrons.

7. Different resonance isomers don’t have to be equivalent. Resonance isomers that describe the electronic configuration of a molecule most realistically have
   a. all octets full
   b. minimal formal charge
   c. minimal formal charge separation
   d. formal charge assignment according to relative electronegativities
Heterocyclic aromatic compounds: pyridine
Consider resonance isomers of spinacine