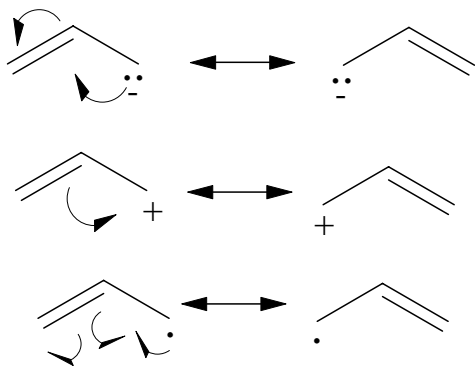
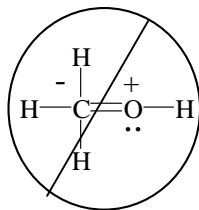


## CHEM 321: SUMMARY OF RULES FOR RESONANCE STRUCTURES

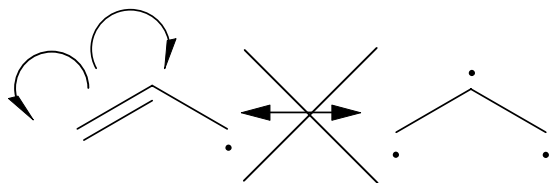
1. Resonance structures only exist on paper and the actual molecule is a hybrid of the resonance structures. (uses  $\leftrightarrow$  to indicate resonance structures)
2. Only move electrons not atoms using  $\rightarrow$  or  $\rightarrow$  to indicate a pair or single electron, respectively.



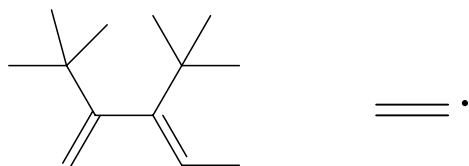
3. All structures must be proper Lewis Structures.



4. All resonance structures must have the same number of unpaired electrons.



5. All atoms that are part of a delocalized system must lie in a plane or be nearly planar. (ie., the examples below are not delocalized systems. Why?)



6. The energy of the actual molecule is lower than the energy of any one resonance structure.
7. Equivalent resonance structures make equal contributions to the hybrid and a system described by them has larger resonance stability than the single contributor.
8. The more stable a structure is (when taken by itself), the greater its contribution to the hybrid.
9. The structures with charge separation contribute much less than neutral structures (or the more covalent a structure, the greater the contribution).

