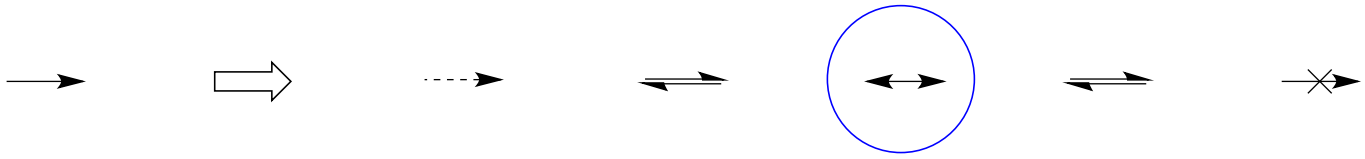
Resonance: Practicing Curly Arrows

from chapter(s) _____ in the recommended text

A. Introduction

B. Resonance

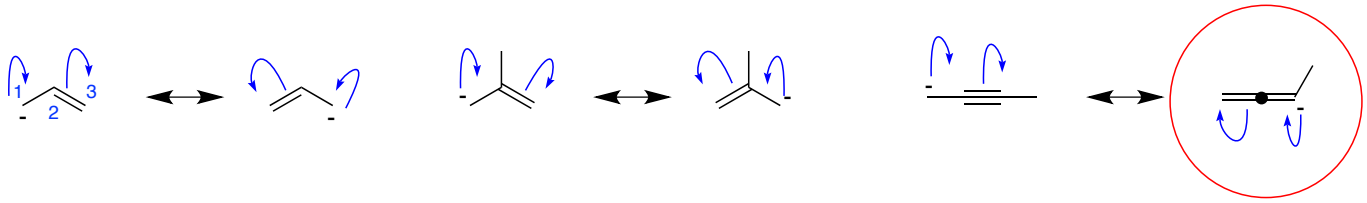
Electrons move *much faster than*



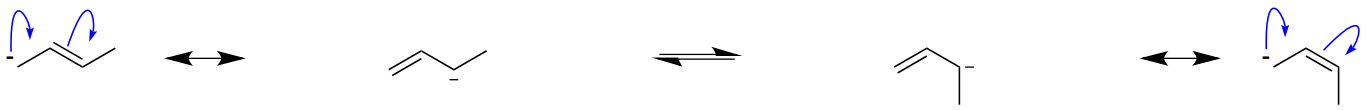
absolutely wrong to use the other descriptors shown above.

movement of *electrons*.

C. Resonance Stabilized Anions



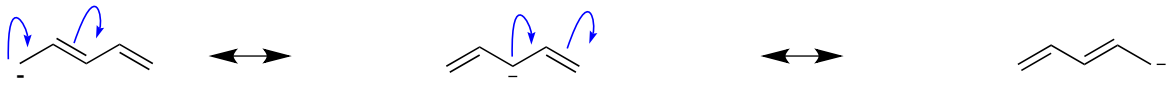
flow *does not* allow
same *is* true

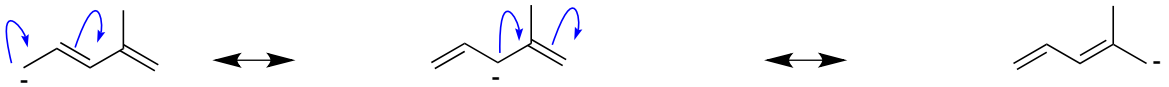


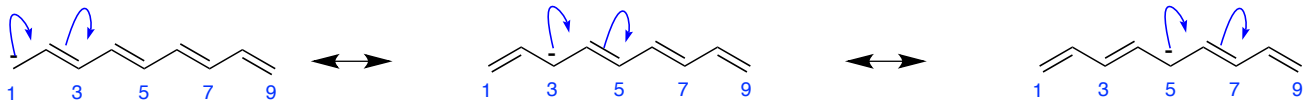
E- *Z*-

is possible for *Z*-butenyl anions to equilibrate to their more stable *E*-isomers via equilibrating conformations.

It is *possible*



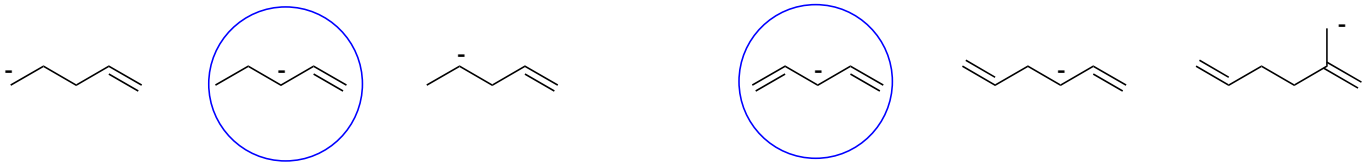




is possible for the negative charge on the nonatetraenyl anion to reside on the 1,3,5,7,9-carbon atoms. The negative charge in that anion *never*

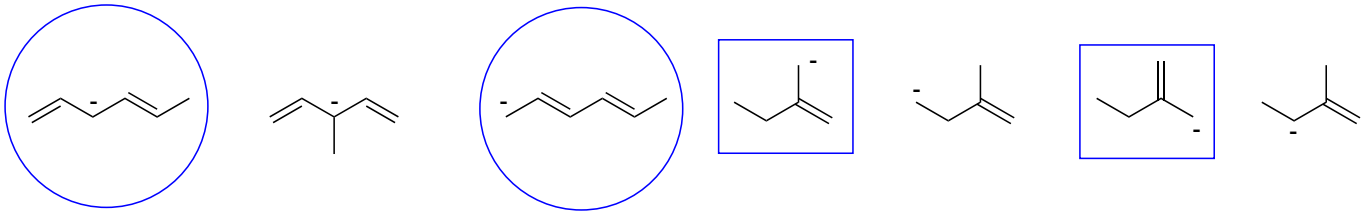
does appear

likely to be *more* stable



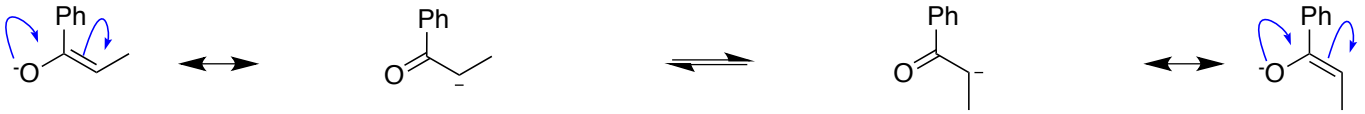
Anions that have several resonance structures are said to be *delocalized*

less stable



It *is* possible

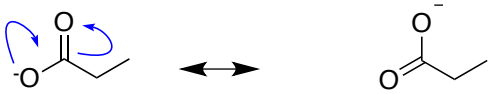
E-enolate *Z-enolate*

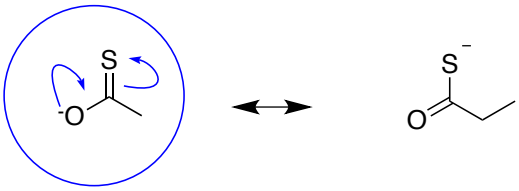


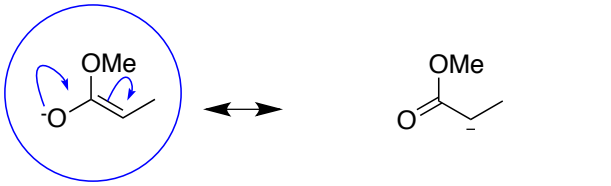
E-enolate *Z-enolate*

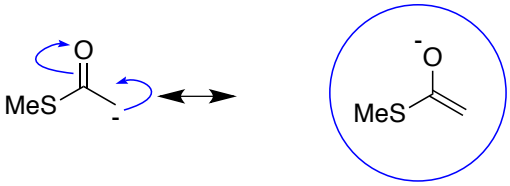
Z-enolate *E-enolate*

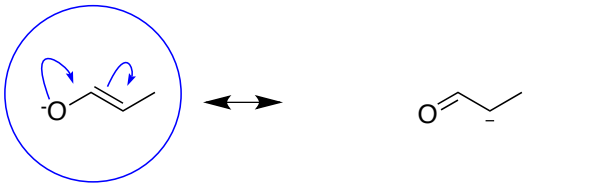
most *electronegative* atom.

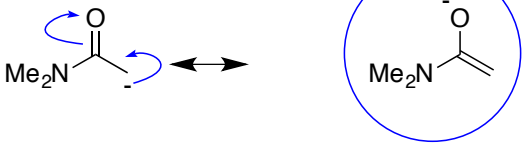


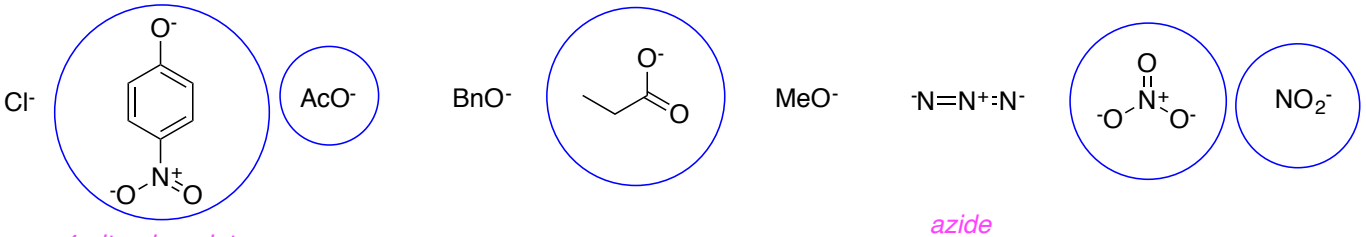












4-nitrophenolate

azide anion

-ve charge localized on electronegative atom

many contributing resonance forms

highly localized charge

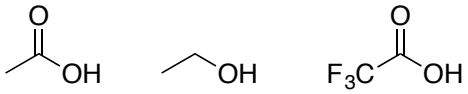
electron delocalization

-ve charge localized on electropositive atom

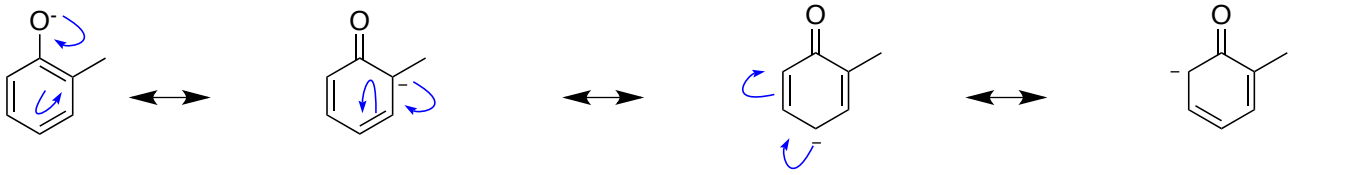
How Resonance Stabilization Of Anions Influences Acidity

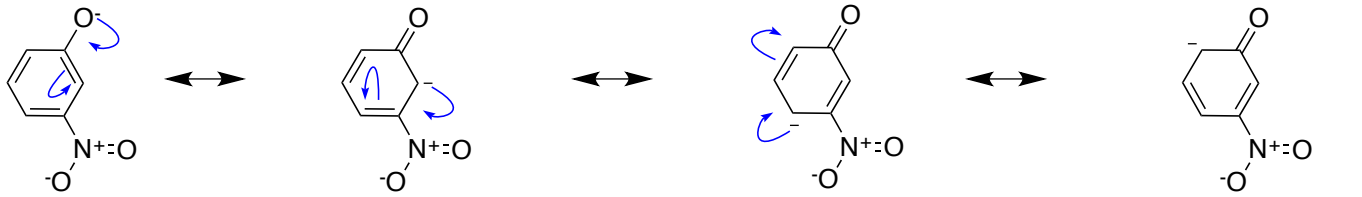
product

low pK_a and pH

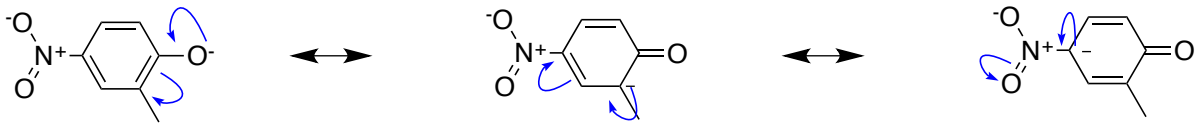


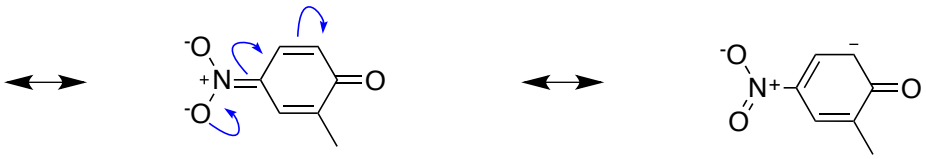
3 1 3 1



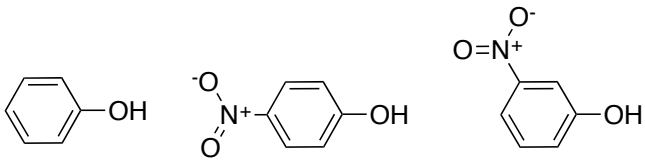


is not possible for both the *O*-atoms

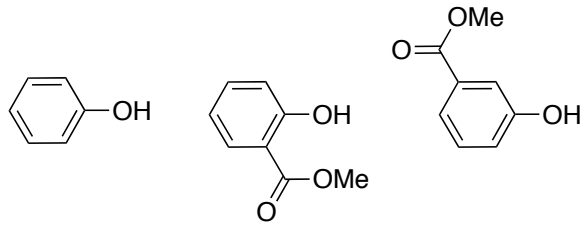




is possible for both the *O*-atoms
is possible for both the *O*-atoms of the nitro group
more stable than their 3-isomers.

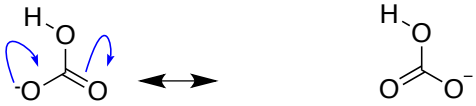


3 1 ____

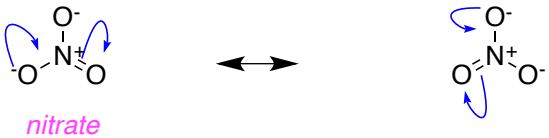


3 1 ____

nitrite



hydrogen carbonate

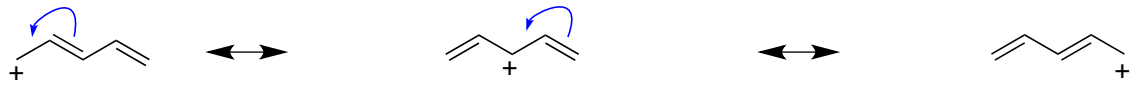


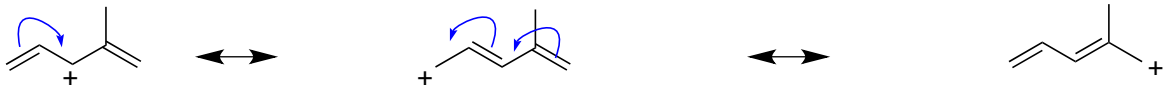
nitrate

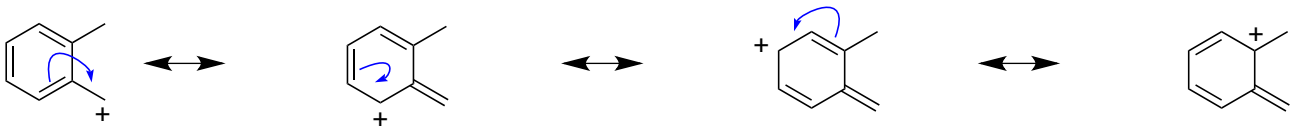
stronger acid than nitrous and carbonic acid.
in fact, HNO_3.

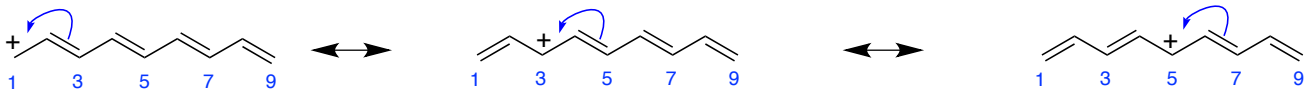
D. Resonance Stabilized Cations

towards positive charges and rarely the reverse.

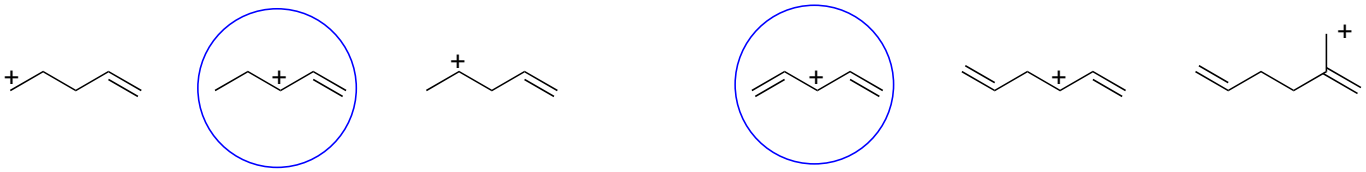




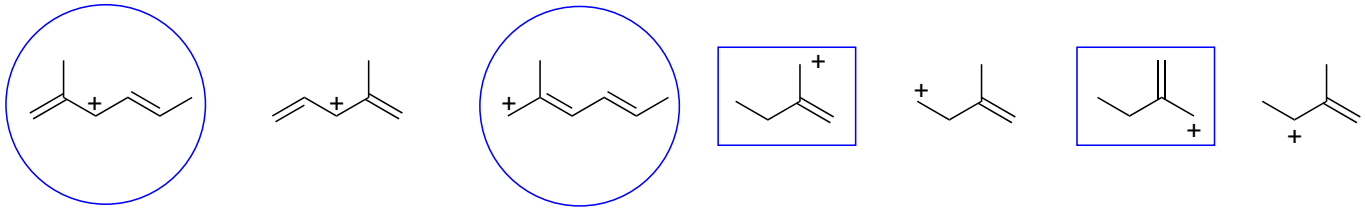




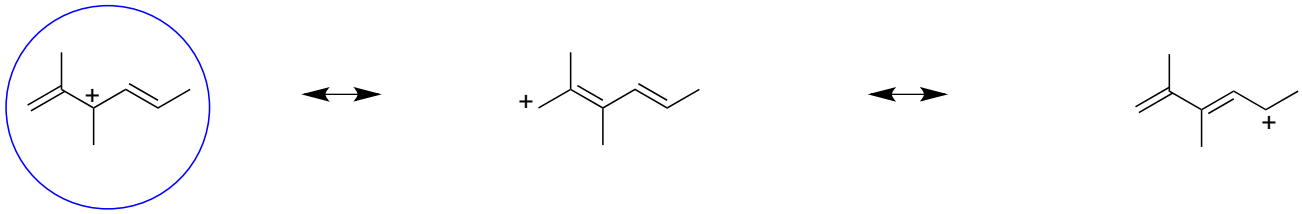
can reside on the 1,3,5,7,9-carbon atoms and it is *never does* appear

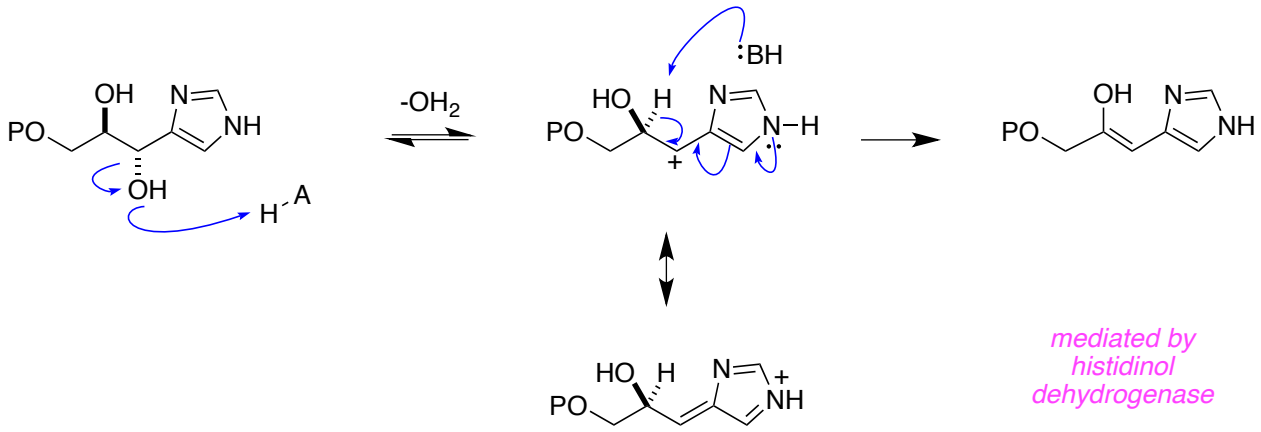


be *more delocalized* than ones that do not.
The allyl cation is *less*



is possible for the positive charge to hop between atoms other than carbon.
most *electropositive* atom.
, *ie* *carbocations*, tend to be *more*
primary (1°).
It *is not* possible

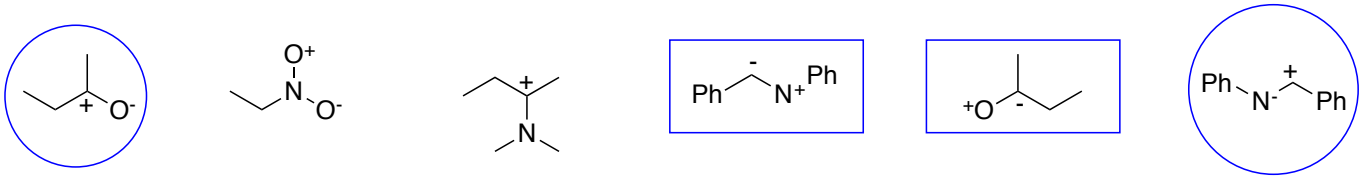




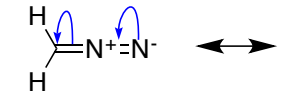
mediated by histidinol dehydrogenase

E. Resonance In Neutral Molecules

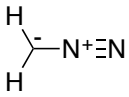
less stable

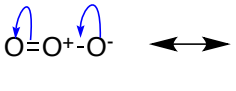


zwitterions

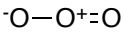


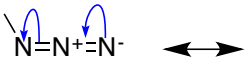
diazomethane



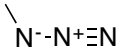


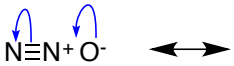
ozone





methyl azide





nitrous oxide

F. Resonance Stabilizes Some Conformations

charge separated form
less stable

charge separated form
more stable

write numbers to indicate approximate maximum energy barriers

choices are: 260, 80, 20, 14, 12 kJ•mol^{-1}