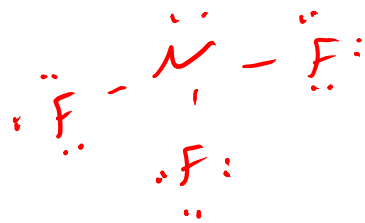




tetrahedral
 109.5
 sp^3
 non polar

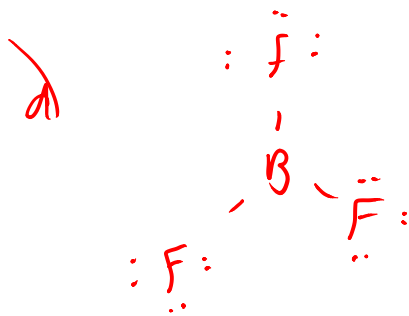


trigonal planar
 < 109.5
 sp^3
 polar

the angles in NF_3 should be slightly smaller than 109.5 because the lone pairs of electrons require more space than the bonding pairs



bent
 < 109.5
 sp^3
 polar



trigonal planar
 120°
 sp^2
 nonpolar

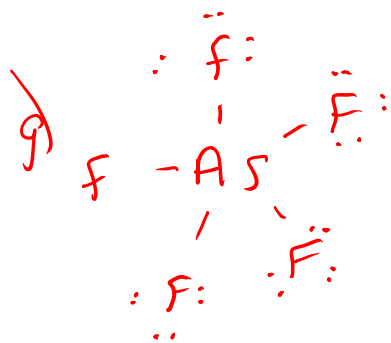


linear

180°

sp

nonpolar

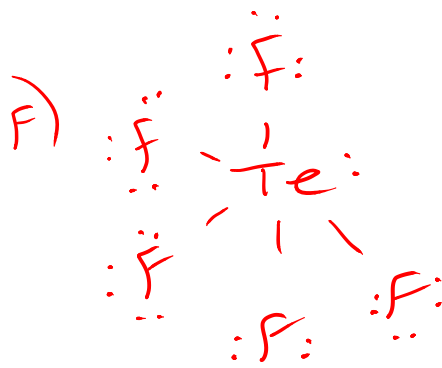


trigonal bipyramidal

$90^\circ + 120^\circ$

dsp^3

nonpolar

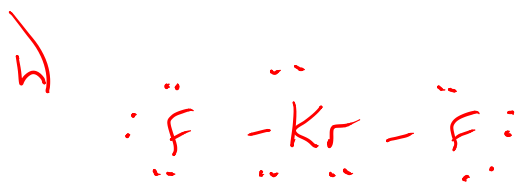


see saw

$120^\circ + 90^\circ$

dsp^3

polar

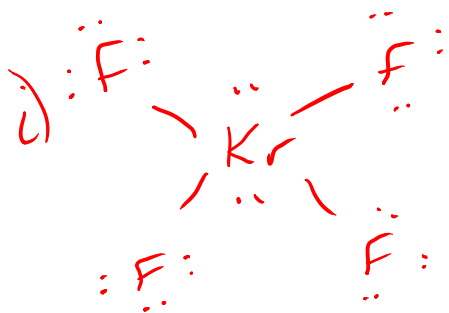


linear

180°

dsp^3

nonpolar

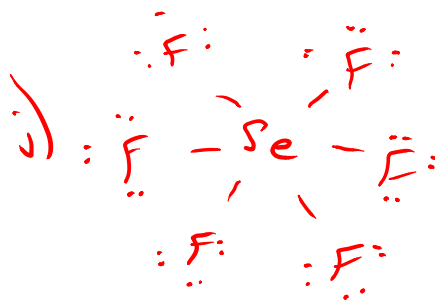


Square planar

90°

d^2sp^3

nonpolar

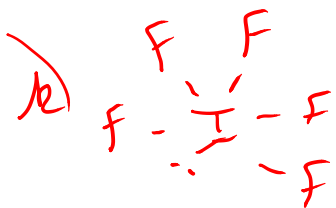


Octahedral

90°

d^2sp^3

nonpolar



Square pyramidal

90°

d^2sp^3

polar



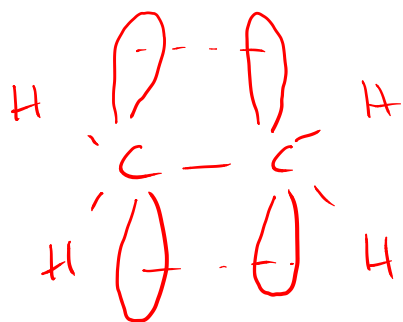
T-shaped

90°

dsp^3

polar

31)

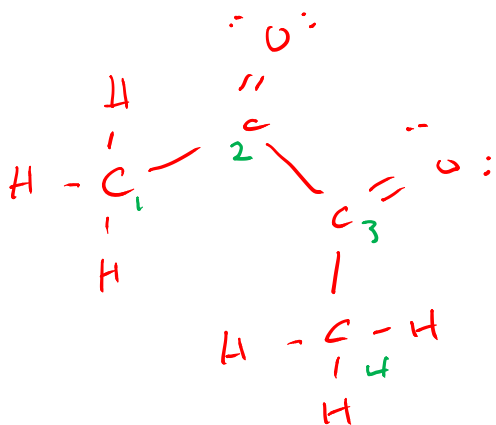


for the p orbitals to be properly aligned to form a π bond, all six atoms must be in the same plane

33 a) 3 σ and 1 π

b) all C atoms are sp^2 hybridized because they are in trigonal planar arrangement

35) biacetyl has 34 valence electrons

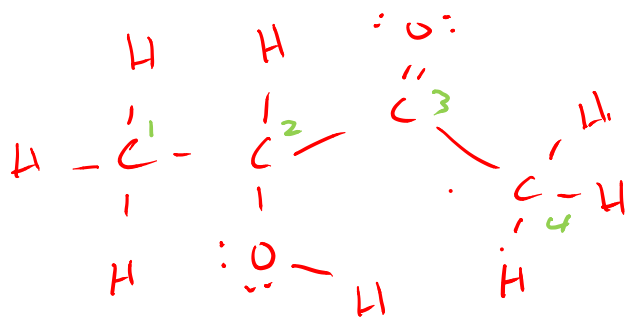


Carbon 1 + 4
sp³ hybridized
109.5°

Carbon 2 + 3
sp² hybridized
120°

11 sigma + 2 pi bonds

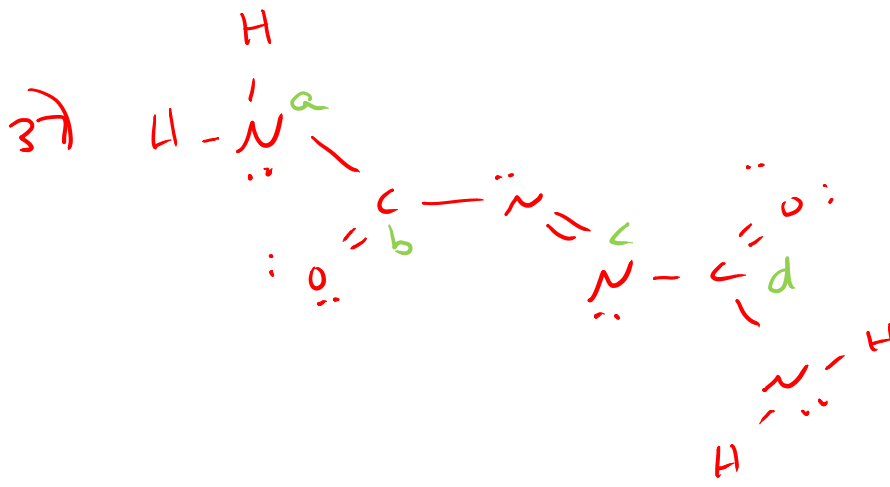
acetoin has 36 valence electrons



Carbon 3
sp² 120°

Carbon 1, 2 + 4
sp³ 109.5°

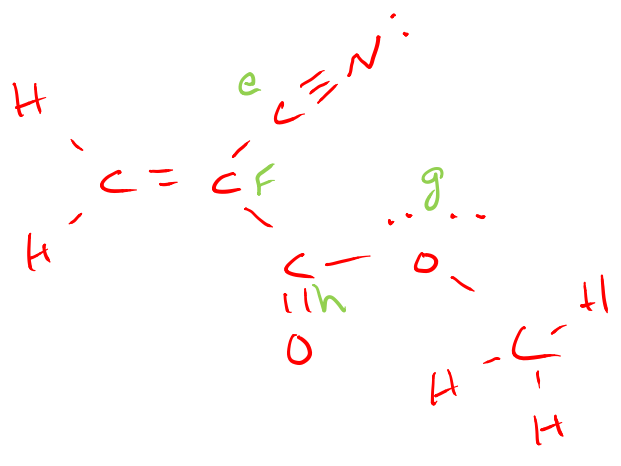
13 sigma + 1 pi



3π bonds

- a) 109.5°
- b) 120°
- c) 120°
- d) 180°

carbons are sp^2 hybridized
 nitrogens bonded to hydrogen
 are sp^3 hybridized
 other nitrogens are sp^2 hybridized



4π bonds

- e) 180°
- f) 120°
- g) 109.5°
- h) 120°

CH_3 carbon is sp^3
 carbon with triple bond is sp
 all other carbons are sp^2

