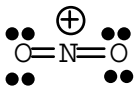
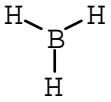
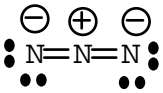
**Answers**

**1a** 

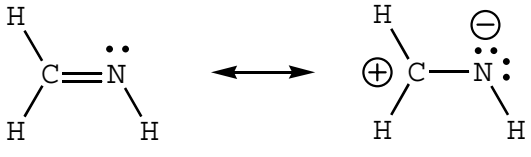
N is sp; Os are $sp^2$; linear

**1b** 

B is $sp^2$**;** trigonal planar

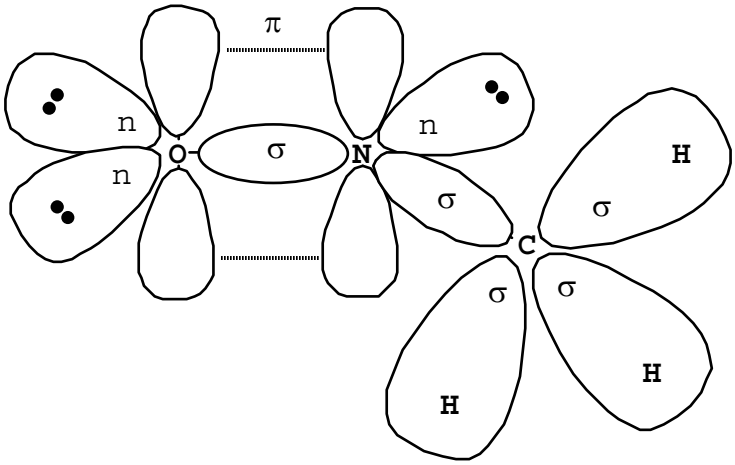
**1c** 

central N is sp; flanking Ns are $sp^2$**;** linear

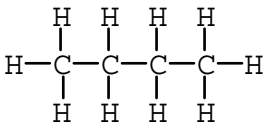
**1d** 

C and N are $sp^2$; planar

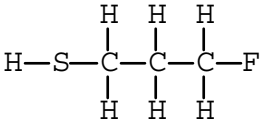
**2**



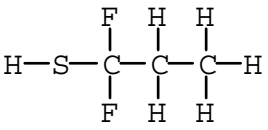
**3**



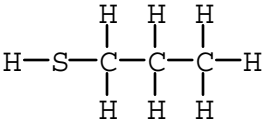
6



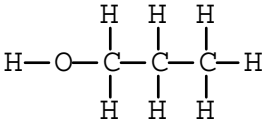
3



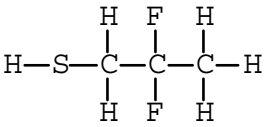
1



4



5



2

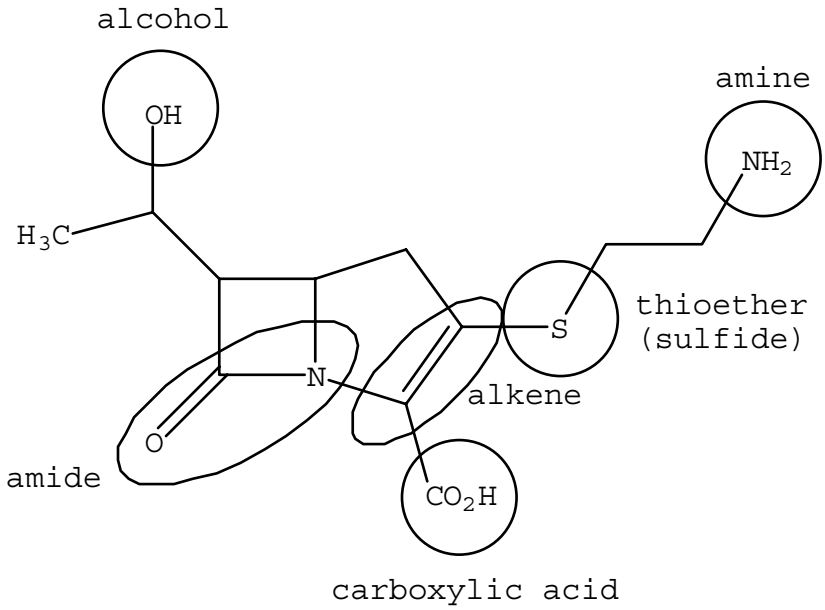
**4a** $CH_3S^- + H_2O$ eq. to the right

**4b** $(CH_3)_3CC{\equiv}C^- + (CH_3)_2NH$ eq. to the right

**4c** $(CH_3)_3CC{\equiv}C^- + (CH_3)_3COH$ eq. to the left

**4d** $Cl^- + CH_4$ eq. to the right

**5**



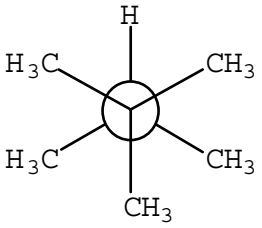
**6a** 1,1,1-trifluoro-2-methylbutane

**6b** 4-ethyl-1,2-dimethyl-6-(2-methylpropyl)cycloheptane
or 4-ethyl-6-isobutyl-1,2-dimethylcycloheptane

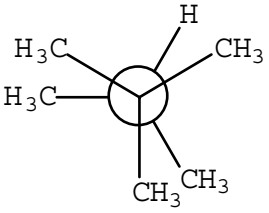
**6c** 1-bromo-2,3,5-trimethylheptane

**6d** *cis*-1-methyl-4-(1-methylethyl)cyclohexane
or *cis*-1-isopropyl-4-methylcyclohexane

**7**

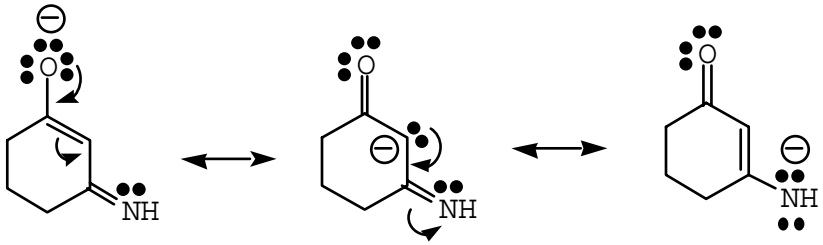


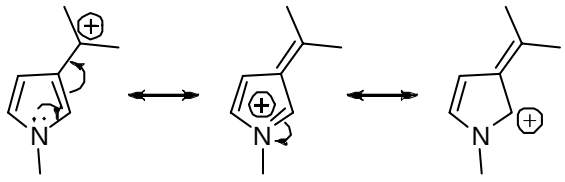

most stable
$E_{strain}$ = 3.6 kcal/mol

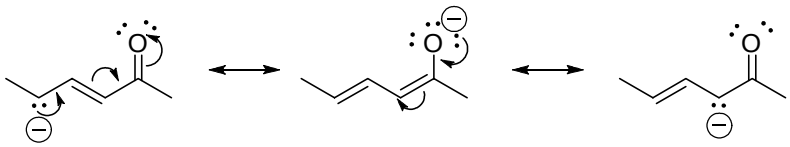



least stable
$E_{strain}$ = 6.6 kcal/mol

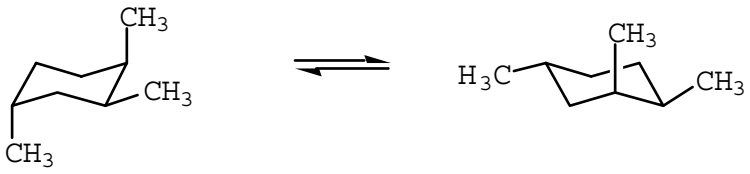
**8**



**9**




$E_{strain}$ = 4.5 kcal/mol

$E_{strain}$ = 2.7 kcal/mol