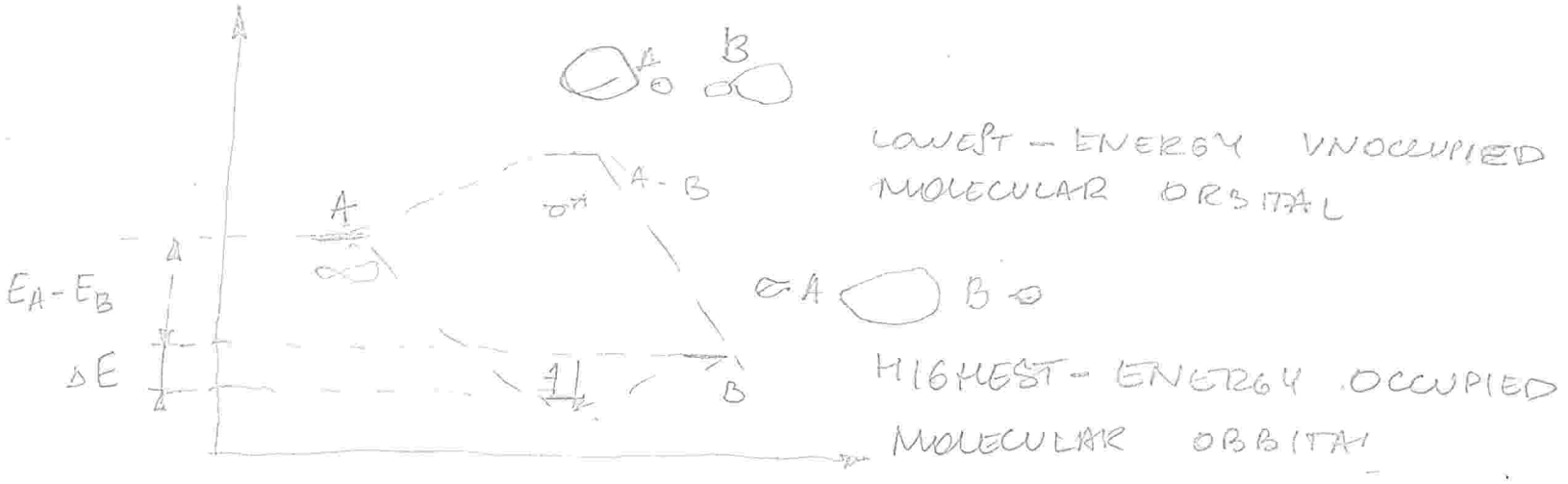
CHM151: FORMAL CHARGES 20161005

- MO DESCRIPTION OF A POLAR COVALENT BOND



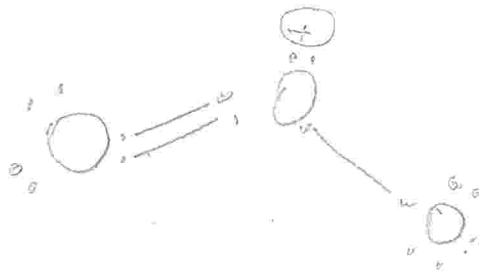
- ASSIGNMENT OF FORMAL CHARGES:

COUNT THE NUMBER OF VALENCE ELECTRONS FOR A GIVEN ATOM. LONE PAIRS ARE COUNTED AS TWO VALENCE ELECTRONS; EACH COVALENT BOND IS COUNTED AS ONE VALENCE ELECTRONS.

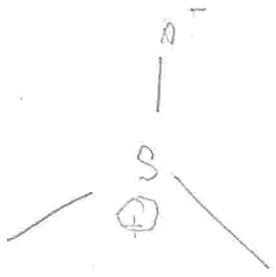
FORMAL CHARGE = # (OF VALENCE ELECTRONS FREE ATOM)
− # (OF VALENCE ELECTRONS BONDED ATOM)

EXAMPLE

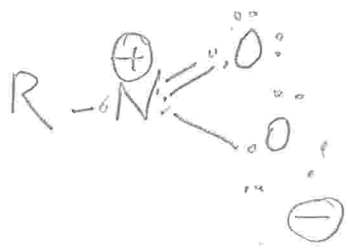
OZONE O_3



DMSO



NITRO FUNCTIONAL GROUP

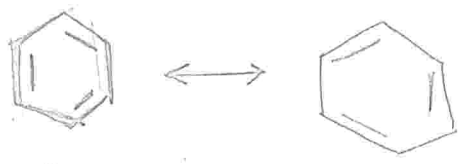


6 - 6 = 0

6 - 7 = -1

5 - 4 = +1

RESONANCE AND THE ARROW-PUSHING CONVENTION



BENZENE

① DOUBLE-HEADED ARROW INDICATES THAT THE COMPOUNDS ARE RESONANCE FORMS

CARBOXYLATE

NITRO

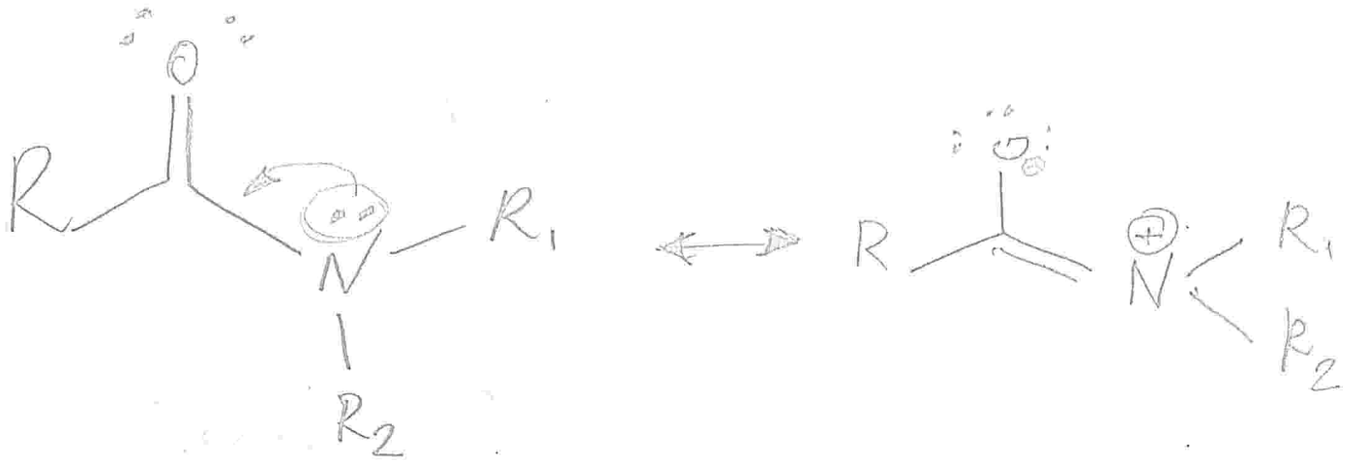
RULES FOR RESONANCE STRUCTURE

① EACH INDIVIDUAL FORM IS A (FLAWED) REPRESENTATION OF THE TRUE STRUCTURE.

② RESONANCE FORMS ONLY IN THE POSITION OF π OR NONBONDING ELECTRONS, NOT POSITIONS OR HYBRIDIZATION OF ATOMS.

③ DIFFERENT RESONANCE FORMS NEED NOT BE EQUIVALENT.

④ RESONANCE FORMS OBEY NORMAL RULES OF VALENCY

⑤ THE RESONANCE HYBRID IS MORE STABLE THAN ANY INDIVIDUAL RESONANCE STRUCTURE.

RESONANCE AND HYBRIDISATION IN AMIDES