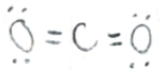
Carbon Dioxide (CO_2)

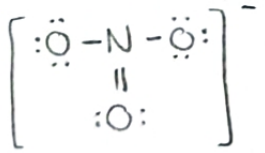
Skeletal structure



Total valence electrons = 16
Distribute electrons (octet and/or duet rules)
Need for double or triple bonds? Yes

Nitrate Ion (NO_3^-)

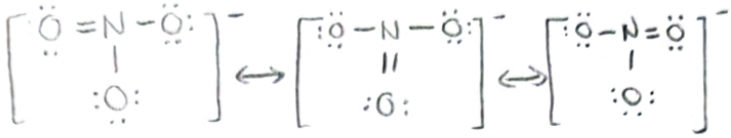
Skeletal structure



Total valence electrons = 24
Distribute electrons (octet and/or duet rules)
Need for double or triple bonds? Yes

Resonance

- NO_3^-



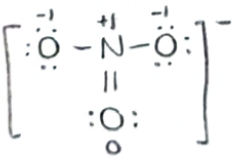
Resonance structures - same skeletal structures, different electron arrangements

The actual structure is a resonance hybrid

Formal Charge

# of valence electrons in free atom - **# of valence electrons assigned to atom in the molecule**

Assigning each atom in a Lewis dot structure a formalized charge



N = 5 - 4 = 1

O = 6 - 6 = 0

= 6 - 7 = -1

1 + 2(-1) + 0 = -1 ✓

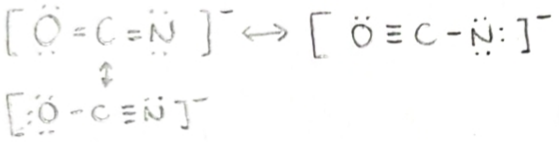
Total formal charge must equal the overall charge on the species

Negative formal charge on the most electronegative atom

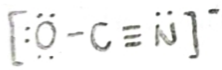
Minimize formal charges

Cyanate Ion (OCN^-)

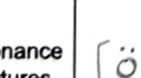
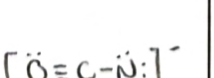
Draw the Lewis structure (including all resonance forms).



Which resonance form is likely to contribute most to the correct structure?



Cyanate Ion (OCN^-)

Resonance Structures			
FC on O	6 - 6 = 0	6 - 5 = 1	6 - 7 = -1
FC on C	4 - 4 = 0	4 - 4 = 0	4 - 4 = 0
FC on N	5 - 6 = -1	5 - 7 = -2	5 - 5 = 0