

## Problem Set 7: Bonding

1) Define the following: ionic bond, covalent bond, polar covalent bond.

An ionic bond is the electrostatic attraction between a cation and an anion following a complete electron transfer from a metal to a nonmetal.

A covalent bond is equal electron sharing between two bonded atoms.

A polar covalent bond is unequal electron sharing between two bonded atoms.

2) Use the electronegativity difference to determine the type of bond that would form between each pair of atoms listed.

Cobalt and bromine,  $\Delta EN = 0.9$ , polar covalent.

Nickel and oxygen,  $\Delta EN = 1.6$ , polar covalent.

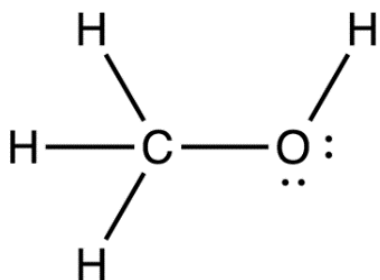
Sodium and fluoride,  $\Delta EN = 3.1$ , ionic.

Hydrogen and oxygen,  $\Delta EN = 1.4$ , polar covalent.

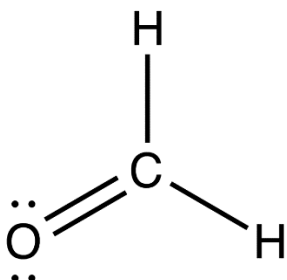
Carbon and hydrogen,  $\Delta EN = 0.4$ , covalent.

3) Draw the following Lewis structures.

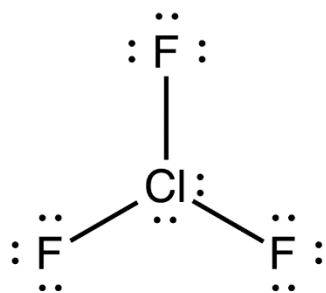
a)  $\text{CH}_3\text{OH}$ , 14 valence electrons



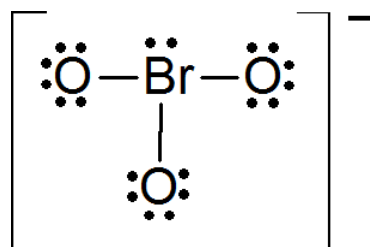
b)  $\text{CH}_2\text{O}$ , 12 valence electrons



c)  $\text{ClF}_3$ , 28 valence electrons

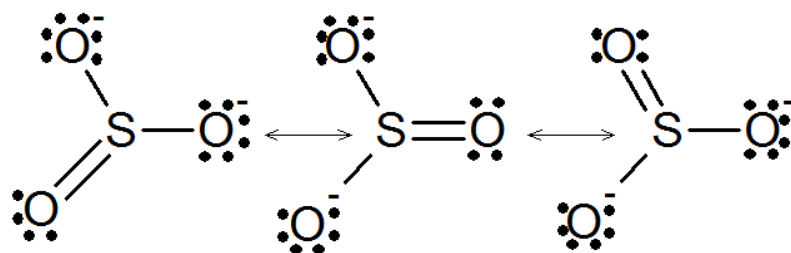


d)  $\text{BrO}_3^-$ , 26 valence electrons

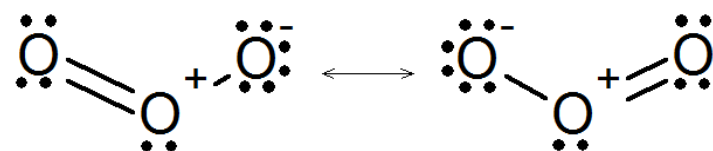


4) Draw the equivalent resonance structures for the following compounds.

a)  $\text{SO}_3$ , 24 valence electrons

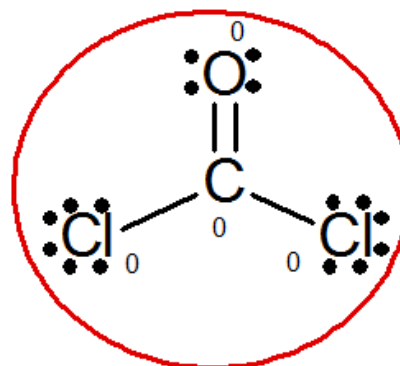
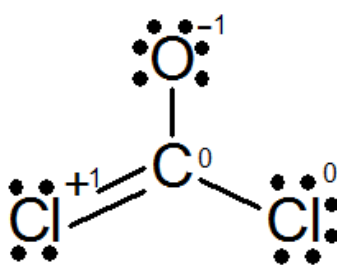
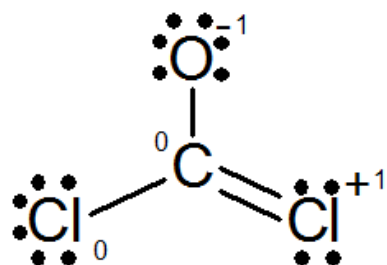


b)  $\text{O}_3$ , 18 valence electrons



5) Draw the three possible Lewis structures for carbonyl dichloride ( $\text{CCl}_2\text{O}$ ), assign formal charge and select the preferred structure.

$\text{CCl}_2\text{O}$ , 24 valance electrons



Correct Lewis Structure

