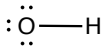
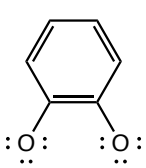
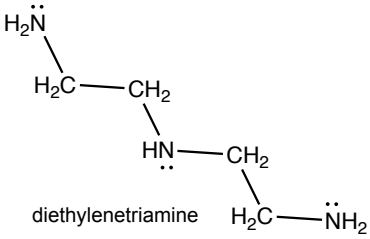
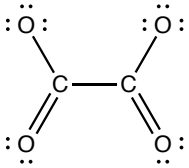
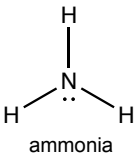
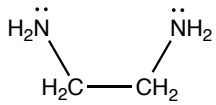
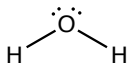
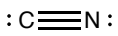
CONCEPT: CLASSIFICATION OF LIGANDS

- **Recall:** Ligands are Lewis bases because they have at least ___ lone pair that can be donated.

Ligand Classification

- Ligands are classified by ____ of **donor atoms** that can donate 1 lone pair to the central metal.

Ligand Classification

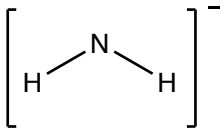
Monodentate	Bidentate	Polydentate
___ donor atom	___ donor atoms	____ donor atoms
 hydroxide	 catecholate	 diethylenetriamine
	 oxalate	EDTA $^{4-}$ ethylenediaminetetraacetate (__ donor atoms)
 ammonia	 ethylenediamine (en)	
		
 cyanide		
 carbon monoxide		

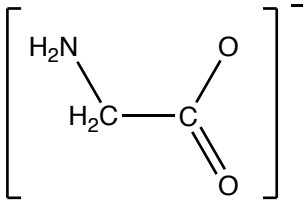
- To find number of **donor atoms**: 2 or more atoms with lone pairs.

  Rule 1: Donor atoms have to be separated by ____ or more other atoms.

  Rule 2: Atoms with ____ charge = donor atoms.

EXAMPLE: Classify the following anionic ligands as monodentate, bidentate or polydentate.



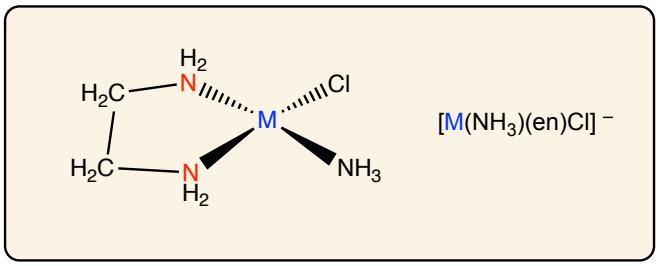


CONCEPT: CLASSIFICATION OF LIGANDS

Chelating Agents

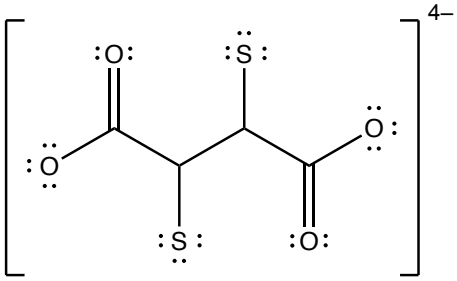
● Bidentate and polydentate ligands are considered *chelating agents.*

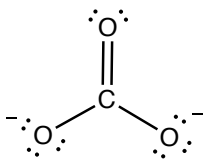
□ **Chelating Agents:** create _____ structures in the complex ion when **donor atoms** bond to central metal (**M**).

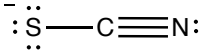


- Complexes formed with chelating agents are more _____ than with monodentate ligands.

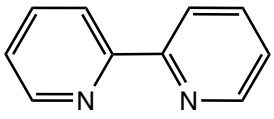
EXAMPLE: Chelating agents can be used to remove toxic heavy metals from the human body by forming stable complex ions with the metal. Identify a ligand that is capable of removing excess lead (Pb).

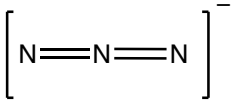
a) 

b) 

c) 

PRACTICE: How many donor atoms are in each ligand?

a) 

b) 

c)