

## CH141 Lab 8: Ball-and-stick Molecular Modeling Work Sheet

Your Name: \_\_\_\_\_

Section: \_\_\_\_\_

Date: \_\_\_\_\_

**Note:** (a) Show all bonding pairs and nonbonding electrons in the Lewis structures.

(b) Formal charge on an atom = valence electrons -  $\frac{1}{2}$  bonding electrons - nonbonding electrons

### 1. Water (H<sub>2</sub>O)

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at O	Formal charge on O and H	Hybridization of O	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

### 2. Ammonia (NH<sub>3</sub>)

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at N	Formal charge on N and H	Hybridization of N	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

### 3. Ammonium (NH<sub>4</sub><sup>+</sup>)

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at N	Formal charge on N and H	Hybridization of N	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**4. Methane (CH<sub>4</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C and H	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**5. Ethylene (C<sub>2</sub>H<sub>4</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C and H	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**6. Acetylene (C<sub>2</sub>H<sub>2</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C and H	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**7. Carbon dioxide (CO<sub>2</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C and O	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**8. Hydrogen cyanide (HCN)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C, N, H	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**9. Tetrafluoroborate (BF<sub>4</sub><sup>-</sup>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at B	Formal charge on B and F	Hybridization of B	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**10. Phosphine (PH<sub>3</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at P	Formal charge on P and H	Hybridization of P	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:			(None)	

**11. Hydroxylamine (NH<sub>2</sub>OH)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at N, O	Formal charge on N, O, all H	Hybridization of N and O	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**Week 2 Compounds:****12. Azide (N<sub>3</sub><sup>-</sup>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at middle N	Formal charge on N's	Hybridization of middle N	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**13. Sulfur dioxide (SO<sub>2</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at S	Formal charge on S and O	Hybridization of S	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**14. Nitric oxide (NO)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at N	Formal charge on N and O	Hybridization of N and O	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**15. Cyanate (NCO<sup>-</sup>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C, N, O	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**16. Chlorite ( $\text{ClO}_2^-$ )**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at Cl	Formal charge on Cl and O	Hybridization of Cl	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**17. Ozone ( $\text{O}_3$ ) [Note: this molecule is NOT cyclic.]**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at middle O	Formal charge on all O	Hybridization of middle O	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**18. Carbonate ( $\text{CO}_3^{2-}$ )**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at C	Formal charge on C and O	Hybridization of C	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**19. Arsenic pentafluoride (AsF<sub>5</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at As	Formal charge on As and F	Hybridization of As	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**20. Nitrogen dioxide (NO<sub>2</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at N	Formal charge on N and O	Hybridization of N	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**Optional “Bonus” Questions (good practice!)**

**21. Xenon tetrafluoride (XeF<sub>4</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at Xe	Formal charge on Xe and F	Hybridization of Xe	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**22. Sulfur hexachloride (SCl<sub>6</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at S	Formal charge on S and Cl	Hybridization of S	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				

**23. Sulfur tetrafluoride (SF<sub>4</sub>)**

Total # of valence e-	Lewis structure with dipole (if any)	Molecular shape and e-domain geometry at S	Formal charge on S and F	Hybridization of S	Draw isomer(s), if any	Draw resonance structure(s), if any
		MS:  EDG:				



**24. Triiodide (I<sub>3</sub><sup>-</sup>)**

<b>Total # of valence e-</b>	<b>Lewis structure with dipole (if any)</b>	<b>Molecular shape and e-domain geometry at middle I</b>	<b>Formal charge on all I</b>	<b>Hybridization of middle I</b>	<b>Draw isomer(s), if any</b>	<b>Draw resonance structure(s), if any</b>
		<b>MS:</b>  <b>EDG:</b>				