
Worksheet 8: Bonding and Lewis Structures and Molecular Geometries

Concept Questions: 10.33, 10.43, 10.47

Lewis structures (and formal charges): 9.51, 9.53, 9.55, 9.59, 9.61, 9.63, 9.65, 9.67, 9.69, 9.71, 9.73

VSEPR and shape: 10.35, 10.37, 10.39, 10.41, 10.45

Polarity: 10.49, 10.51

1. For each molecule, (a) determine the number of valence electrons, (b) draw the best Lewis structure (if there are resonance forms, draw those as well), (c) determine the total number of electron groups around the central atom (d) determine the electron-pair geometry (e) determine the number of lone pairs around the central atom (f) determine the correct molecular geometry (g) determine any non-zero formal charges on any of the atoms and include those in the drawing (h) draw your best 3-D representation of the molecule with atoms and lone pairs occupying the proper locations around the central atom and (i) decide if the molecule is polar or not.

a) CS₂

Total # of valence electrons: _____ Lewis Structure: VSEPR Sketch that shows 3-D shape of molecule	Total # of electron groups around the central atom: _____ Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges? Polar or not? _____
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b) NO₃⁻

Total # of valence electrons: _____ Lewis Structure: VSEPR Sketch that shows 3-D shape of molecule	Total # of electron groups around the central atom: _____ Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges?
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	Polar or not? _____
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c) CF₄

Total # of valence electrons: _____ Lewis Structure: VSEPR Sketch that shows 3-D shape of molecule	Total # of electron groups around the central atom: _____ Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges? Polar or not? _____
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d) ClF₂⁺

Total # of valence electrons: _____ Lewis Structure: VSEPR Sketch that shows 3-D shape of molecule	Total # of electron groups around the central atom: _____ Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges? Polar or not? _____
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e) AsF₃

Total # of valence electrons: _____ Lewis Structure:	Total # of electron groups around the central atom: _____
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Sketch that shows 3-D shape of molecule	Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges? Polar or not? _____
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f) XeOF₄

Total # of valence electrons: _____ Lewis Structure: Sketch that shows 3-D shape of molecule	Total # of electron groups around the central atom: _____ Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges? Polar or not? _____
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g) SeF₄

Total # of valence electrons: _____ Lewis Structure: Sketch that shows 3-D shape of molecule	Total # of electron groups around the central atom: _____ Electron Group Geometry: _____ # of lone pairs around the central atom: _____ Molecular Geometry: _____ Any non-zero formal charges? Polar or not? _____
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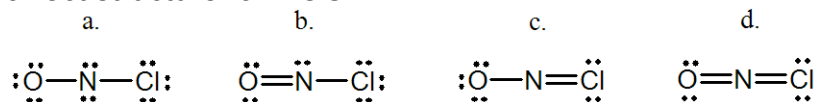
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h) ICl_4^-

<p>Total # of valence electrons: _____</p> <p>Lewis Structure:</p> <p>Sketch that shows 3-D shape of molecule</p>	<p>Total # of electron groups around the central atom: _____</p> <p>Electron Group Geometry: _____</p> <p># of lone pairs around the central atom: _____</p> <p>Molecular Geometry: _____</p> <p>Any non-zero formal charges?</p> <p>Polar or not? _____</p>
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2. Draw the three resonance structures of thiocyanate ion, SCN^{1-} and choose the best structure (C is in the middle).

3. Select the correct structure for NOCl .



Key:

1. a. linear, nonpolar (NP) b. trigonal planar, NP c. tetrahedral, NP d. bent, polar (P) e. trigonal pyramidal, P f. square pyramidal, P g. seesaw, P h. square planar, NP

3. b