



Cycle 6 Chemistry I Lesson 4

VSEPR and Polarity of Molecules

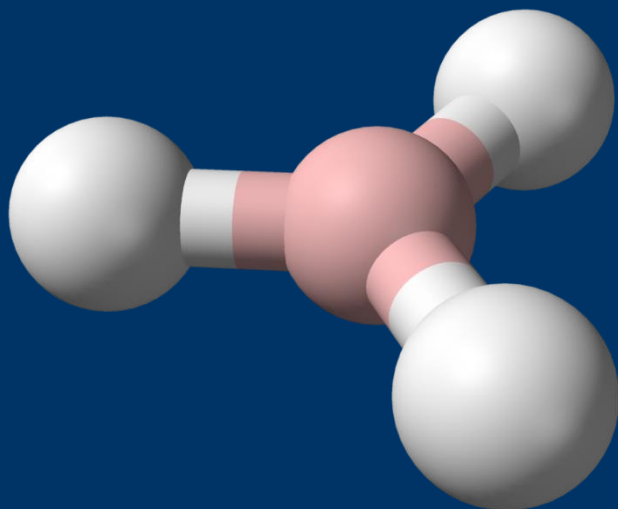
Warmup: Draw Lewis structures of BH_3 and NH_3 . Note that Boron does not have a full octet, but Nitrogen does. Use VSEPR to determine the shape of each molecule.

Homework: VSEPR and Electronegativity WS

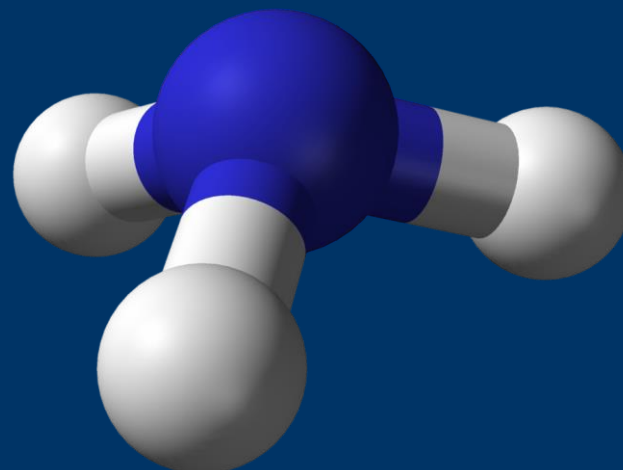
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Shapes of BH_3 and NH_3



BH_3 is Trigonal Planar



NH_3 is Trigonal Pyramidal



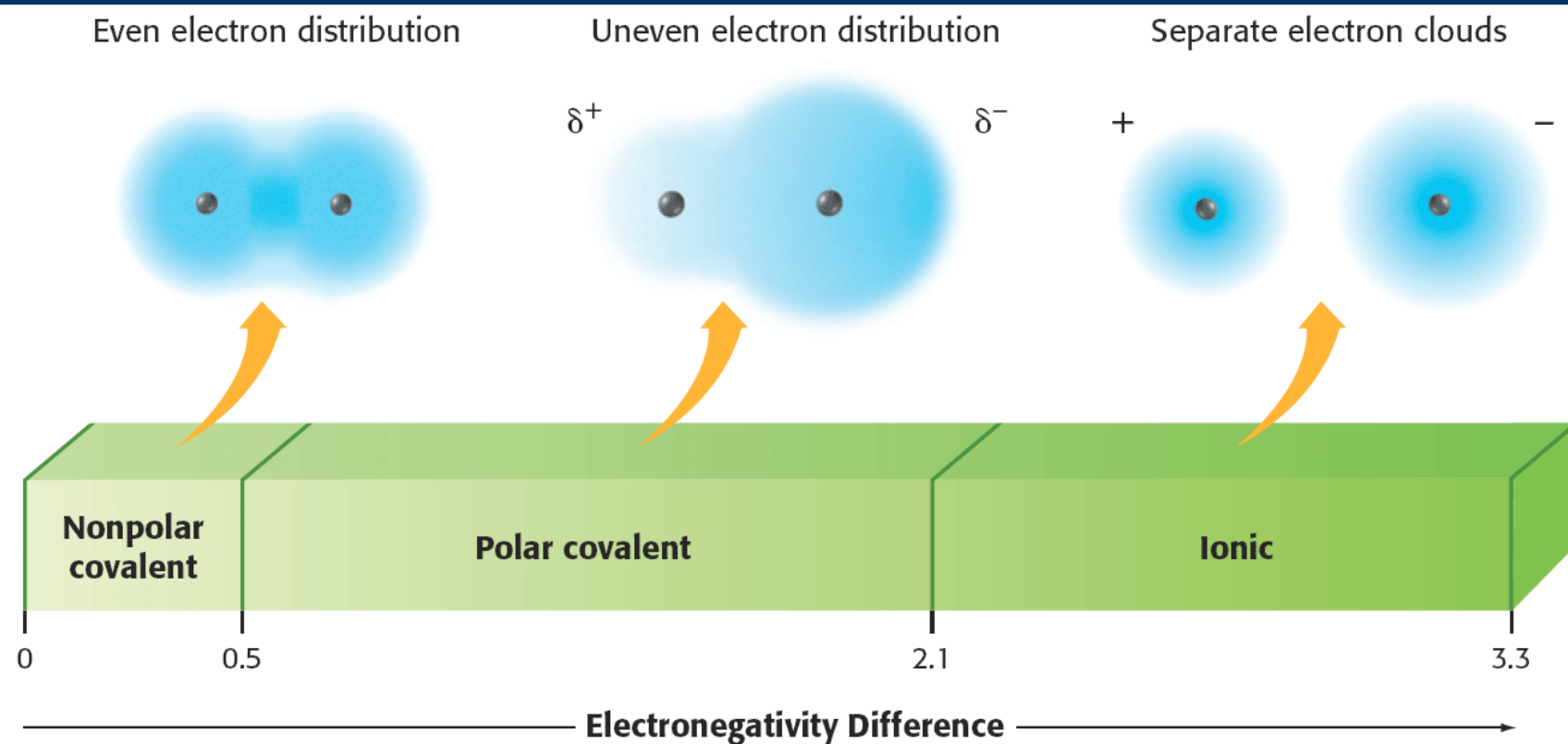
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Predicting Bond Character from Electronegativity Differences (p. 194 Fig 6)



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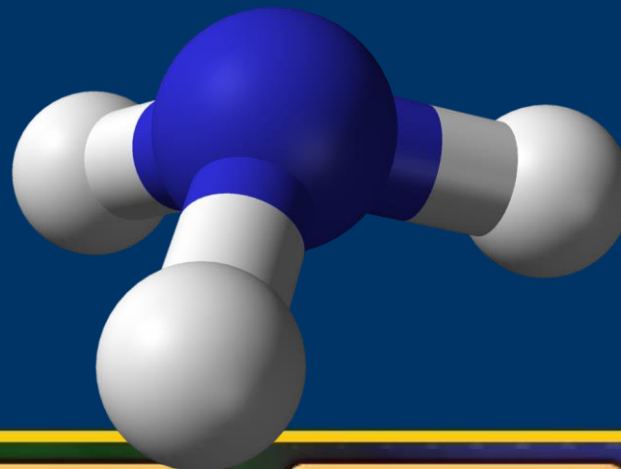
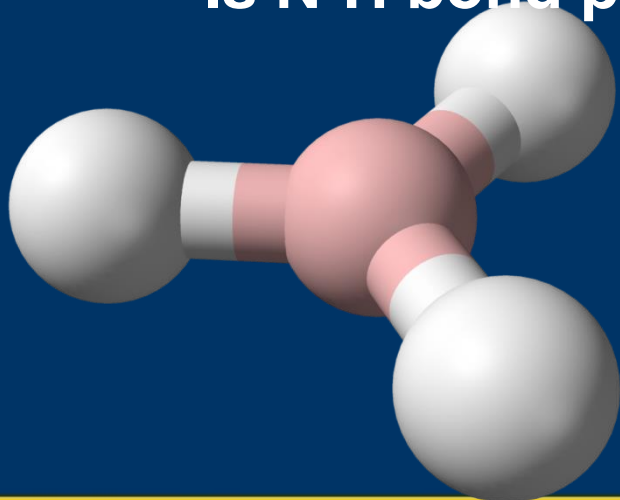
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Bond Dipoles in BH_3 and NH_3
(p. 194) Boron has electroneg of 2.0
Hydrogen has electroneg of 2.2
Nitrogen has electroneg of 3.0

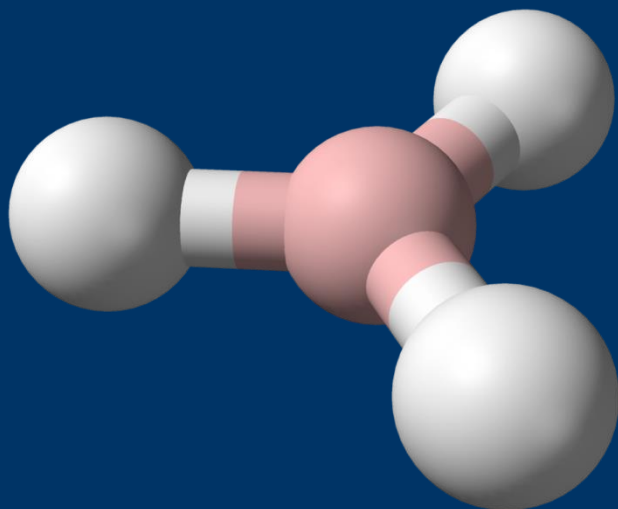
Is B-H bond polar (difference ≥ 0.5) ? **NO**

Is N-H bond polar (difference ≥ 0.5) ? **YES**

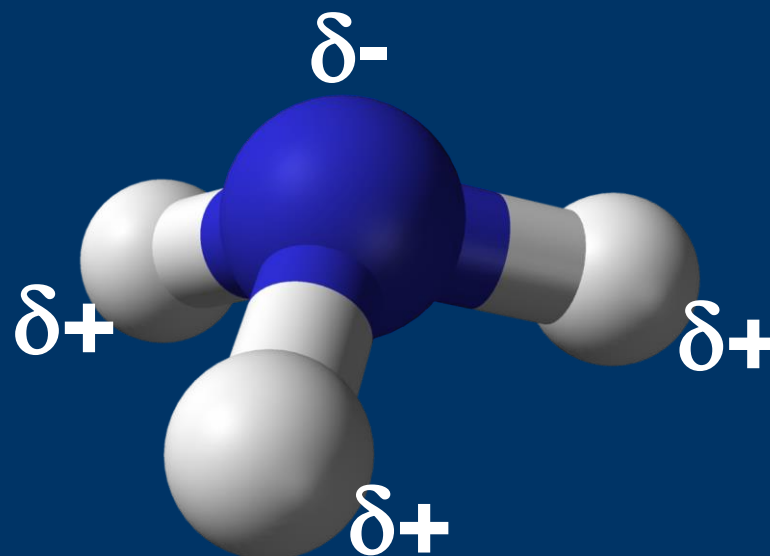




Partial Negative and Partial Positive



B-H Bond is Nonpolar



N-H Bond is polar. N has greater electronegativity so partial negative, H has partial positive.

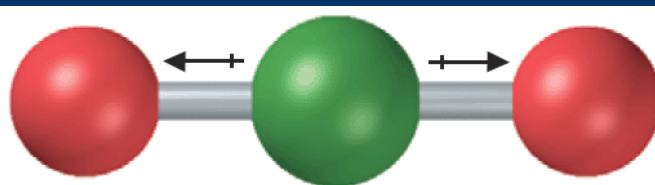
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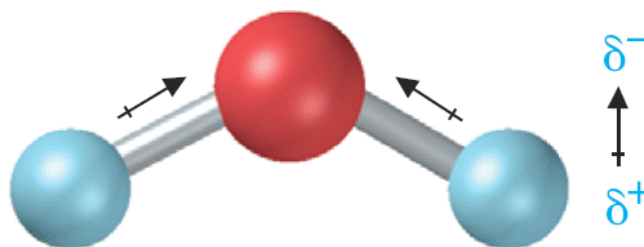
Molecular Shape Affects Polarity

Is NH_3 polar?

YES, because it is pyramidal. If it was flat, dipoles would cancel.



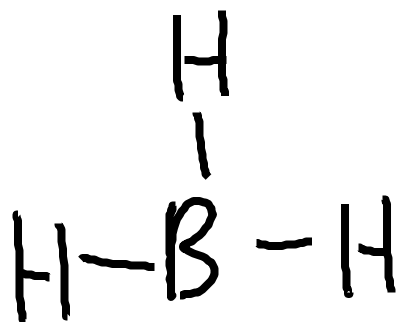
Carbon dioxide, CO_2
(no molecular dipole)



Water, H_2O
(overall molecular dipole)



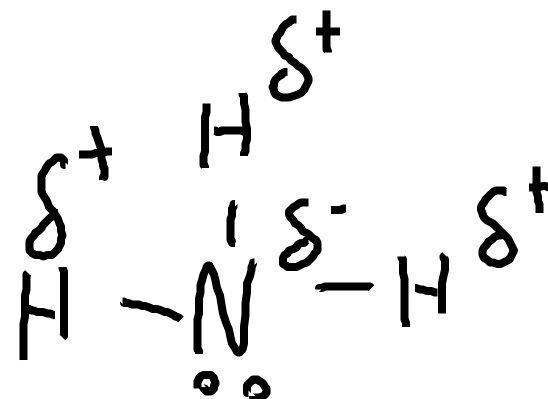
Example for Homework



Trig Planar

B-H nonpolar

BH₃ nonpolar



Trig Pyramid

δ^- N-H δ^+

NH₃ is polar