Vsepr - lab report example

VSEPR

3 Lewis structures: Compound VSEPR formula Predicted bond angle (º) Polar? (yes/no) H2O MX2L2 104. 5 yes BeH2 MX2 180 no H2S MX2L2 91. 5 yes SO2 MX2L 120 yes BF3 MX3 120 no NF3 MX3 120 yes IF3 MX3L2 120 yes CH4 MX4 109. 5 no SF4 MX4L 120

yes

XeF4

MX4L2

90

no

PF5

MX5

120 and 90

no

SF6

MX6

90

no

3. 2. Equilibrium geometry:

Compound

Bond angle (º)

Dipole moment (debye)

Polar? (yes/no)

H2O

103. 98

1. 86

yes

BeH2

180

0. 0

no

H2S

93. 38

0. 97

yes

SO2

97. 90

1. 62

yes

BF3

120

0. 0

no

NF3

120

0. 2

yes

IF3

120

1. 19

yes

CH4

109. 47

0. 0

no

SF4

86. 36

0. 632

yes

XeF4

90

0. 0

no

PF5

90

0. 0

no

SF6

90

0. 0

no

4. Analysis:

In some compounds (BeH2, BF3, NF3, IF3, XeF4, PF5 and SF6) the bond angles were the same between the predictions made by inspecting their Lewis structures and analysing the results of their equilibrium structures. In SF4 and SO2 the bond angles between the two measurements differed by a big margin (22. 1^{o} for SO2 and 33. 64^{o} for SF4). In H2O, H2S and CH4 the difference was small (0. 52^{o} for H2O, 1. 88^{o} for H2S and 0. 03^{o} for CH4). Because of these differences between the bond angles observed using Lewis structures and equilibrium geometry calculations, it is not possible to use only the direct inspection of Lewis structures to determine the bond angles of compounds. Polarities on the other hand can be determined by observing the Lewis structures. There are no changes in the polarities observed

between the Lewis structures’ inspection and equilibrium geometry analysis.

REFERENCE

Kumar De, Anil. Textbook of Inorganic Chemistry. New Delhi: New Age International, 2003. Print.