Chemistry 152A Tuesday Quiz (@ end of period)

Quiz # 9 (June 3, 2008) Value: 10 points; Time: 10 minutes

Name KEY

Section _____

See Z13.10

Q9) The electronegativities of the following elements are:

Element	Electronegativity
H	2.2
Be	1.6
O	3.4
S	2.6

H_2S has a dipole moment, of ~1 Debye.

a) Would you expect H_2S to have a larger dipole moment than H_2O? Explain:

No.
Because dipole moments correlate so well with differences of electronegativites the molecule with the large difference will have a larger dipole moment; assuming both have the same geometry. Therefore the dipole moment of H_2O is larger because the absolute vale of the differences in electronegativities is larger. 1.2 vs 0.4 for H_2S.

b) Would you expect BeH_2 to have a larger dipole moment than H_2S? Explain

Yes:
Using the reasoning of part A: the difference in electronegativities of BeH_2 is 0.6 and H_2S is 0.4. Therefore we would expect BeH_2 to have a larger dipole moment if the geometry of the two molecules is the same.

c) It has been found experimentally that BeH_2 does not have a dipole moment. How would you explain this observation?

Then BeH_2 must be a linear molecule. The two components to the dipole moment (each along each of the Be-H bonds) cancel identically.