Name: _____ period: ____ date: _____

ch. 6, 8, 9 periodic trend, chemical name / formula, chemical bonds **test** 60 points (10 ec) honors chemistry

1. In regards to carbon and nitrogen, what is the relative ___; basis / rationale ? [10 points]

   a. atomic size

   N is smaller b/c ↑ Z, ↑ I_S → ↑ Z_{eff} → ↑ F → e⁻ get closer to nucleus → ↓ size

   helper

   b. first ionization energy

   N is bigger b/c ↑ Z, ↑ I_S → ↑ Z_{eff} → ↑ F → harder to remove e⁻ → more energy to remove e⁻ → ↑ IE

2. In regards to chlorine and bromine, what is the relative ___; basis / rationale ? [10 points]

   a. atomic size

   Br is bigger b/c ↑ e⁻ shell = ↑ size

   b. first ionization energy

   Br is smaller b/c ↑ e⁻ shell → ↑ size → ↓ F_a → easier to remove e⁻ → ↓ energy to remove e⁻ → ↓ IE

3. fill-in the below table; there might be hypothetical molecules. [10 points]

Chemical formula	Chemical name
$Sn(NO_3)_2$	tin (II) nitrate
Cu_2S	Copper (I) sulfide
H_2O_2	Hydrogen peroxide
N_3O_6	trinitrogen hexoxide
Si_2F_8	Di-silicon octafluoride

4. Use valence bond theory to describe the bonds in ammonia, NH_3. If hybrid orbitals are involved, then (i) basis / rationale for the need of hybrid orbitals, (ii) type of hybrid orbital / basis / rationale, (iii) describe the formation of the hybrid orbital. [20 points]

i) 

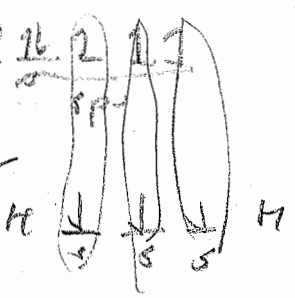
bond ∠ ~109°

N: [ ] 1s 1 1 1 (p) implies bond ∠ = 90°

need HO b/c VSEPR & N's orbital diagram have different bond ∠

ii) sp^3 HO needed b/c VSEPR bond ∠ ≈ 109°

iii) N: [ ] 1s 1 1 1 (p) hybridize, N: [ ] 1s 2 1 1 1 (sp³)



overlap of sp^3 HO in N & sAO in H

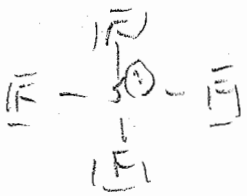
5. Sketch the shape of the below molecules; include the name of its shape and bond angle(s) and if it's a polar versus nonpolar compound / basis ? [20 points]

a. Carbon tetrachloride

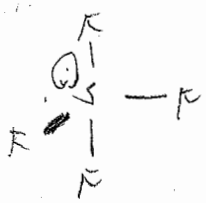
10 pts
2 pt @ pt

tetrahedral 109° NP $\Sigma = 0$

b. Sulfur tetrafluoride



S: 1 · 6 = 6
F: 4 · 7 = 28
34
− 8 bond
26
27



seesaw ~120° ~90° P $\Sigma \neq 0$