

HW 10
CHEM 362

Due: November 26, 2019

1. Why do all noble gases have very high first ionization energies?
2. Draw the structure of the most stable form of sulfur
3. a) Why are bonds between second row elements shorter than third row elements?
b) Why are Si=Si bonds unfavorable, compared to C=C bonds?
4. What is the octet rule? Why does it apply strictly only to elements of the first short period?
5. 4d and 5d metals have a smaller atomic radius than one might expect.
a) What phenomenon is responsible for this? Describe
b) Of the pairs of elements given, indicate which would have the larger atomic radii
 - i) Eu vs Pr
 - ii) Sm vs Tm
 - iii) Ce vs Dy
6. What are the six properties of transition metals?
7. For each of the following, classify as hard or soft acid or base, and explain why you chose that classification
 - i) Fe^{3+}
 - ii) H^-
 - iii) CO_3^{2-}
 - iv) CO
 - v) Ag^+
 - vi) HO^+
 - vii) OH^-
 - viii) Li^+
8. In terms of the HSAB concept, which end of the SCN^- ion would you expect to coordinate to Cr^{3+} ? To Pt^{2+} ?
9. Would you expect the following reactions to proceed as written? Why or why not?
 - i) $\text{AsF}_3 + \text{PI}_3 \rightarrow \text{AsI}_3 + \text{PF}_3$
 - ii) $\text{CaS} + \text{BaO} \rightarrow \text{CaO} + \text{BaS}$
 - iii) $\text{TiF}_4 + 2\text{TiI}_2 \rightarrow \text{TiI}_4 + 2\text{TiF}_2$
 - iv) $\text{Cu}_2\text{S} + \text{H}_2\text{O} \rightarrow \text{Cu}_2\text{O} + \text{H}_2\text{S}$
10. How is hydrogen prepared? Write a chemical reaction for this process.