Chem 115
Practice Exam 3
Answer Key

Part I. Multiple choice

page 2:
1. C
2. D
3. A
4. A
5. B
6. A

page 3:
7. A
8. C
9. B
10. B

page 4:
11. A
12. A
13. B
14. D
15. C
16. B

Part II. Problems

1. worth 12 pts (part a) + 3 pts (part b) = 20 pts
   a) PCl₃ Lewis structure
      P in center: 1 pt
      single bonds between P and each Cl: 1 pt
      each Cl has 3 lone pairs: 1 pt
      justification for # of valence e⁻ is (7×3)+5=26: 2 pts
   b) HSiO₂⁻ Lewis structure
      Si in center: 1 pt
      Si-H is single bond: 1 pt
      one Si-O single bond & one Si-O double bond: 1 pt
      single-bonded O has 3 l.p.’s, double-bonded O has 2: 1 pt
      two resonance structures: 2 pts
      Si-O bond order is 1.5: 1 pt

2. worth 10 pts
   most common ionic charges: K⁺ and Ca²⁺ (2 pts)
   because potassium attains a noble gas electron configuration
   (stable) by losing one electron, while calcium does so by losing two
   electrons (2 pts)
   ionization energy of potassium is lower (1 pt)
   because
   • same number of shells, so same r (separation between + charge
     center and outer shell of electrons): 1 pt
   • Z_{eff} for K is approx. +1 while Z_{eff} for Ca is approx. +2 (2 pts)
   • greater force of attraction between most loosely bound electron
     and core for calcium, so requires more energy to remove the
     most loosely bound electron (2 pts)