

Chemistry 432
Advanced Inorganic Chemistry

Homework 9 - 30 Points

Due: Friday, December 2nd.

Based on the Reading: Meissler and Tarr (M & T), Chapter 11-13.

1. (2 pts) (a) Determine the wavelength and frequency of $13,000\text{ cm}^{-1}$ light. (b) Determine the energy and frequency of 530 nm light.
2. (3 pts) *M&T*, 11-1
3. (3 pts) *M&T*, 11-3
4. (4 pts) *M&T*, 11-12
5. (2 pts) *M&T*, 11-15
6. (2 pts) *M&T*, 11-18
7. (2 pts) *M&T*, 11-22
8. (2 pts) *from M&T*: The high-spin d^4 complex $[Cr(H_2O)_6]^{2+}$ is labile, but the low spin d^4 complex $[Cr(CN)_6]^{4-}$ is inert. Explain.
9. (3 pts) *from M&T* The table below shows the effect of changing ligands on the dissociation rates of CO *cis* to those ligands. Explain the effect of these ligands on the rates of dissociation. Include the effect of these ligands on Cr-CO bonding and on the transition state (presumed to be square pyramidal) (Atwood, J. D.; Brown, T. T. *J. Am. Chem. Soc.* **1976**, *98*, 3160).

Compound	k (s ⁻¹) for CO dissociation
$Cr(CO)_6$	1×10^{-12}
$Cr(CO)_5(PPh)_3$	3.0×10^{-10}
$Cr(CO)_5I$	$< 10^{-5}$
$Cr(CO)_5Br$	2×10^{-5}
$Cr(CO)_5Cl$	1.5×10^{-4}

10. (2 pts) *from M&T*: Is the reaction $[Co(NH_3)_6]^{3+} + [Cr(H_2O)_6]^{2+}$ likely to proceed by an inner sphere or outer sphere mechanism? Explain your answer.
11. (2 pts) *M&T*: 12-8
12. (3 pts) *M&T*: 12-15