

You will need a periodic table.

### Exp 12/14 Questions

**1.** In the paper chromatography experiment, one metal is seen to move the least up the paper (smallest  $R_f$  value). We can state that this metal: **(1 pt)**

- a) has the greatest affinity for the mobile phase
- b) has the greatest affinity for the stationary phase**
- c) has the weakest capillary action force
- d) is the least polar ion

**2.** The distance measurements between what three points are needed to determine  $R_f$  in paper chromatography? **(1 pt)**

- a) bottom of paper, center of final migration spot, top of paper
- b) bottom of paper, center of starting spot, center of final migration spot
- c) center of starting spot, solvent front, top of paper
- d) center of starting spot, center of final migration spot, solvent front**

**3.** In which way do the ligands bound to Co in an octahedral complex affect the stability of one oxidation state vs. another: **(1 pt)**

- a) it has no effect
- b) it changes whether ions have ns or (n-1)d electrons
- c) the ligands are the oxidizing agents
- d) it changes the energy of d shell electrons**

**4.** Give the name for the following compound:  $[\text{Co}(\text{NH}_3)_5(\text{Cl})]\text{Cl}_2$  **(1 pt)**

**pentaamminechlorocobalt(III) chloride**

### Transition Metal Questions

**5.** Give the electron configuration for the following species:  $\text{Co}^{2+}$ , Ag **(0.5 pt each)**

Co is d7 column so  $[\text{Ar}]4s^23d^7$  and  $\text{Co}^{2+}$  loses 4s electrons so is  **$[\text{Ar}]3d^7$**

Ag is d9 column - exception to the filling rule - 1 s shell electron moves to fill d shell so is  **$[\text{Kr}]5s^14d^{10}$**

**6.** The maximum oxidation state of Ti is: **(1 pt)**

- a) + 1
  - b) +2
  - c) + 3
  - d) + 4**
  - e) +5
- can lose 2 s shell and 2 d shell electrons

**7.** What is the oxidation state of Co in  $\text{Na}[\text{Co}(\text{CN})_4(\text{NH}_3)_2]$ ? **(1 pt)**

- a) + 1
- b) +2
- c) + 3**
- d) + 4
- e) +5

Na is +1 and CN is -1. To balance the 4- with the 1+, Co must be +3

**8.** If a transition metal is in an octahedral complex with only bidentate ligands (e.g. oxalate). How many ligands are bound to it? **(1 pt)**

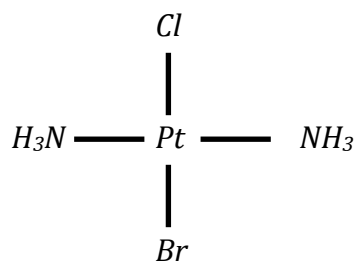
- a) 2 ligands
- b) 3 ligands**
- c) 4 ligands
- d) 6 ligands
- e) 8 ligands

octahedral means 6 metal ligand bonds and bidentate means two bonds per ligand. This gives  $6/2 = 3$  ligands

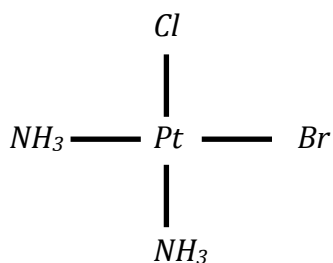
(one more on back)

Chemistry 1B, Fall 2015 Quiz #10A Key

9.  $[\text{Pt}(\text{NH}_3)_2\text{BrCl}]$  is a square planar compound. Sketch two possible structures and label as cis and trans. (2 pts)



*trans*



*cis*

(can also plot on xy plane in 3D space)