Answer the following questions (10 points/each question):

1. In order to prepare a solution of a drug ($C_{15}H_{12}N_2O_2$) at a concentration of 1 pmole/ml, describe a dilution shceme to make the solution from a vial containing 10 mg of the drug.

2. Make a liquid-liquid extraction sheme to separate the mixture of p-nitrophenol, p-nitrotoluene, and p-aminotoluene.

3. A membrane is only allowed for the permeation of neutral compound only. If the membrane is used to separate two fluids of pH's 2.0 and 5.0, what is the concentration ratio of a basic compound of pKa of 8.0?

4. A simultaneous determination for cobalt and nickel can be based upon absorption by their respective 8-hydroxyquinolinol complexes. Molar absorptivities corresponding to their absorption maximum are:

	365 nm	700 nm
Co	3529	428.9
Ni	3228	10.2

Calculate the molar concentration of nickel and cobalt in the following solution based upon the accompanying data:

365 nm 0.796 700 nm 0.027

5. Compare the use of HPLC and GC in quantitation of organic compounds.

6. In a HPLC assay of phenobarbital, a fixed amount of allylphenylbarbital was added to the unknown sample, and peak ratio of phenobarbital and allylphenylbarbital was used for quantitation. What is the purpose of adding allylphenylbarbital to the sample?

7. Explain the difference of accuracy and precision.

8. An amino acid analyzer is generally an ion-exchange column separating amino acids followed by ninhydrin reaction with amino acid. What is purpose of using ninhydrin?

9. From the standard potentials

$Ag_2SeO_{4(s)} + 2e^- = 2\ Ag_{(s)} + SeO_4^{2-}$ E_0=0.355 V

$Ag^+ + e^- = Ag_{(s)}$ E_0=0.799 V

Calculate the solubility product constant for Ag_2SeO_4.

10. Explain the difference of fluorescence, phosphorescence, and chemiluminescence.