Name(s) _____

Workshop: Ions in Solution II
(Acids, Bases, Neutralization)

1. An environmental chemist collects a 0.4546-gram sample of waste material from an industrial process that releases benzoic acid, $HC_7H_5O_2$, plus additional inert compounds that are harmless to the environment. The solid sample is dissolved in 50.00 mL of water, in which it completely dissolves. The resulting solution required 10.10 mL of 0.1550 M NaOH for complete neutralization.

   a) Write a balanced equation for the molecular reaction. Benzoic acid is monoprotic, releasing one hydrogen ion per molecule.

   b) How many moles of NaOH were needed to neutralize the sample?

   c) How many moles of benzoic acid were present in the dissolved sample?

   d) How many grams of benzoic acid were in the sample?

   e) What is the mass percent of benzoic acid in the sample?

2. Vinegar is a 3.5% acetic acid solution, $CH_3COOH(aq)$, by weight (w/w). What is the molarity of vinegar? You may assume that the density of vinegar is 1.00 g/mL.

3. How many moles of 0.100 M NaOH are required to completely react with 1.00 L of the vinegar in Question 2?