Quiz #4 - A Titration Problem

Description: This Assignment will be used as Quiz #4 in the Fall of 2010.

This exercise provides you with an opportunity to show me that you really do understand the chemical concepts and calculational aspects behind acid-base titrations. All questions refer to the titration of 40.00 mL of 0.1150 M HClO in a flask (K_a=3.0x10^-8) with 0.2000 M NaOH in the buret. All pH questions refer to the contents of the flask.

Please note that you only get one attempt on each question (it is a quiz) and there are no hints. You also will not be informed at each step as to whether your answer is correct or not and will not find out your score until after the due date and time.

Certainly feel free to use your textbook (Section 17.3) as necessary for help.

Part A

The starting solution in the flask is a:

Please select one (only one attempt):

**ANSWER:**
- salt of a strong acid and weak base
- weak acid
- salt of a weak acid and strong base
- weak base
  - Answer not displayed
- strong base
- strong acid
- salt of a strong acid and strong base

Part B

The reaction representing the equilibrium in the flask initially is best represented by:

Please select one - you have one chance.

**ANSWER:**
- ClO^- (aq) + H_2O(l) ⇌ HClO(aq) + OH^- (aq)
- H^+(aq) + OH^- (aq) ⇌ HOH(l)
- HClO(aq) + OH^- (aq) ⇌ ClO^- (aq) + H_2O(l)
- HClO(aq) ⇌ H^+(aq) + ClO^- (aq)
  - Answer not displayed

Part C

What is the pH of the initial contents of the flask?

**Report your answer to two decimal places.**
Part D

How many mmol of acid are in the flask initially?

**Remember this is mmol. Report your answer to three significant figures.**

**ANSWER:** [Answer not displayed]

Part E

How many mL of base are required to reach the equivalence point?

**Report your answer in mL to three significant figures.**

**ANSWER:** [Answer not displayed]

Part F

Consider the point where 6.100 mL of the base have been added. Which of the following best describes the contents of the flask at this point?

**Select the best answer - you only get one chance.**

**ANSWER:**
- strong acid
- combination of strong acid and strong base - buffer system
- combination of weak acid and strong base - buffer system
- combination of weak acid and conjugate base - buffer system
- weak acid
- strong base
- weak base

**Correct**

Part G

For your titration, how many mmol of base have been added after the addition of 6.100 mL of the base?

**Report your answer in mmol to three significant figures.**

**ANSWER:** [Answer not displayed]

Part H
For your titration, how many mmol of conjugate base have been formed after the addition of 6.100 mL of base?

Report your answer in mmol to three significant figures.

ANSWER: Answer not displayed

Part I

For your titration, how many mmol of weak acid remain after the addition of 6.100 mL of base?

Report your answer in mmol to three significant figures.

ANSWER: Answer not displayed

Part J

For your titration, what is the pH after the addition of 6.100 mL of base?

Report the pH to two decimal places.

ANSWER: Answer not displayed

Part K

What is the best chemical description of the contents of the flask at the equivalence point in your titration?

You only get one attempt - make it good.

ANSWER: 
- A solution of a weak base
- A solution of a weak acid
- A solution of a strong base
- A solution of a strong acid

Part L

What is the total volume in the flask at the equivalence point?

Report your answer to three significant figures.

ANSWER: Answer not displayed

Part M

What is the pH at the equivalence point?

Report the pH to two decimal places.
<table>
<thead>
<tr>
<th>ANSWER:</th>
<th>Answer not displayed</th>
</tr>
</thead>
</table>

**Part N**

What is the pH of your titration after 10.0 mL of base have been added past the equivalence point? **Report the pH to two decimal places.**

**ANSWER:** Answer not displayed