Q1
What is the pH (to nearest 0.01 pH unit) of a solution prepared by mixing 50.0 mL of 0.373 M HCl and 71.0 mL of 0.375 M NaOH?

\[ \text{pH} = \]  

Q2
Calculate the change in pH to 0.01 pH units caused by adding 10. mL of 3.24-M NaOH is added to 340. mL of each of the following solutions.

a) water

\[ \text{pH before mixing} = \]  
\[ \text{pH after mixing} = \]  
\[ \text{pH change} = \]  

b) 0.180 M NH₄⁺

\[ \text{pH before mixing} = \]  
\[ \text{pH after mixing} = \]  
\[ \text{pH change} = \]  
c) 0.180 M NH₃

pH before mixing =

pH after mixing =

pH change =

d) A buffer solution that is 0.180 M in each NH₄⁺ and NH₃

pH before mixing =

pH after mixing =

pH change =

Q3
A 4.208-g sample of a solid, weak, monoprotic acid is used to make 100.0 mL of solution. 20.0 mL of this solution was titrated with 0.09037-M NaOH. The pH after the addition of 24.47 mL of base was 5.08, and the equivalence point was reached with the addition of 40.92 mL of base.

a) How many millimoles of acid are in the original solid sample? Hint: Don't forget the dilution.

________________ mmol acid

b) What is the molar mass of the acid?

________________ g/mol
c) What is the pK_a of the acid?

pK_a = \[ \]