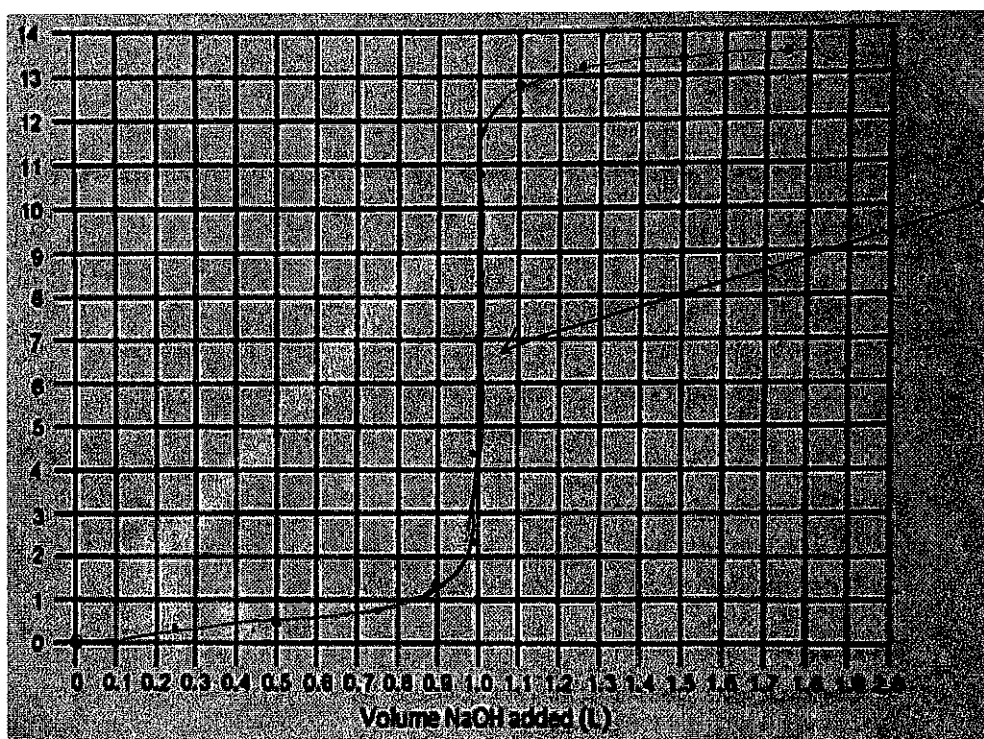1. a) The following table gives the result of slowly adding 1.000 M NaOH to 1.000 L of 1.000 M HCl. Plot this data on the given graph.

| Volume of NaOH added (L)	pH
0.0000	0.00
0.2500	0.22
0.5000	0.48
0.7500	0.85
0.9000	1.28
0.9900	2.30
0.9990	3.30
0.9999	4.30
1.000	7.00
1.0001	9.70
1.0010	10.70
1.0100	11.70
1.1000	12.68
1.2500	13.05
1.5000	13.30
1.7500	13.44
2.0000	13.52

equivalence point

b) What volume of 1.000 M NaOH was required to attain the equivalence point?

1.0 L

2. A 25.0 mL solution of 0.100 M HCl is titrated with NaOH. Use the graph below to determine the concentration of the NaOH.
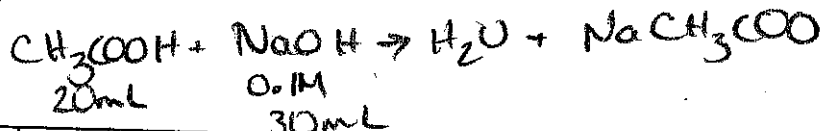

volume of titrant (m L)

$HCl + NaOH \rightarrow NaCl + H_2O$

25 mL   25 mL   25.0 mL

25 mL
0.100M
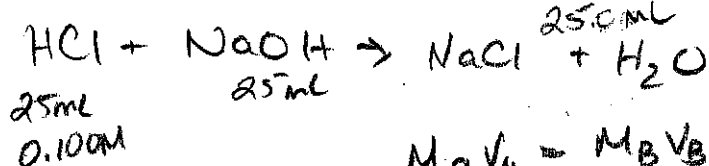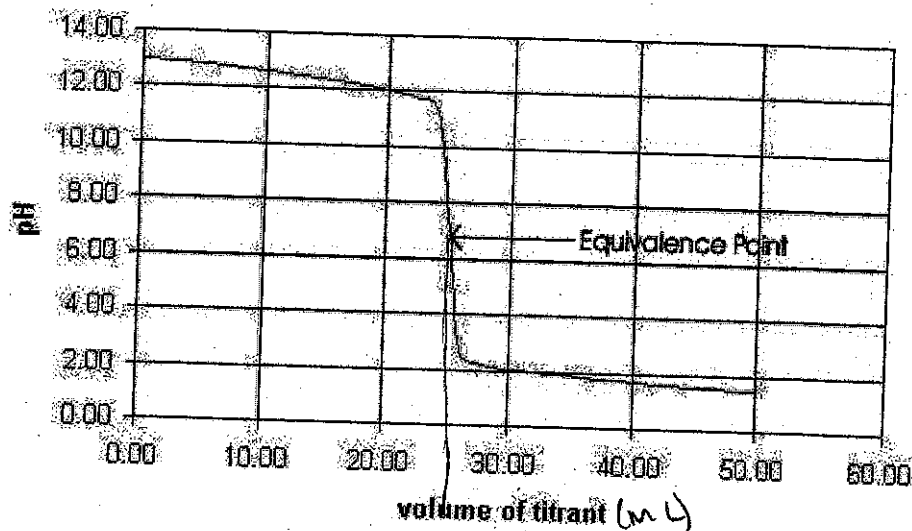
$$M_a V_a = M_B V_B$$

$$(0.1M)(0.025L) = M_B(0.025L)$$

$$M_B = 0.100M.$$

3. 20.0 mL of acetic acid is titrated with 0.100 M NaOH. What is the initial concentration of HCH₃COO?

$$CH_3COOH + NaOH \rightarrow H_2O + NaCH_3COO$$

20 mL   0.1M
           30 mL

$$M_A V_A = M_B V_B$$

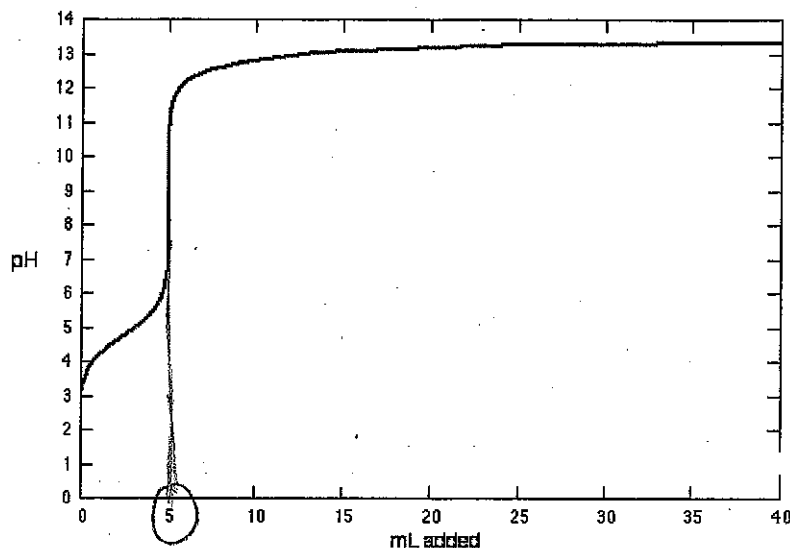$$M_A (0.02L) = (0.1M)(0.03L)$$

$$M_A = 0.150M.$$

mL added
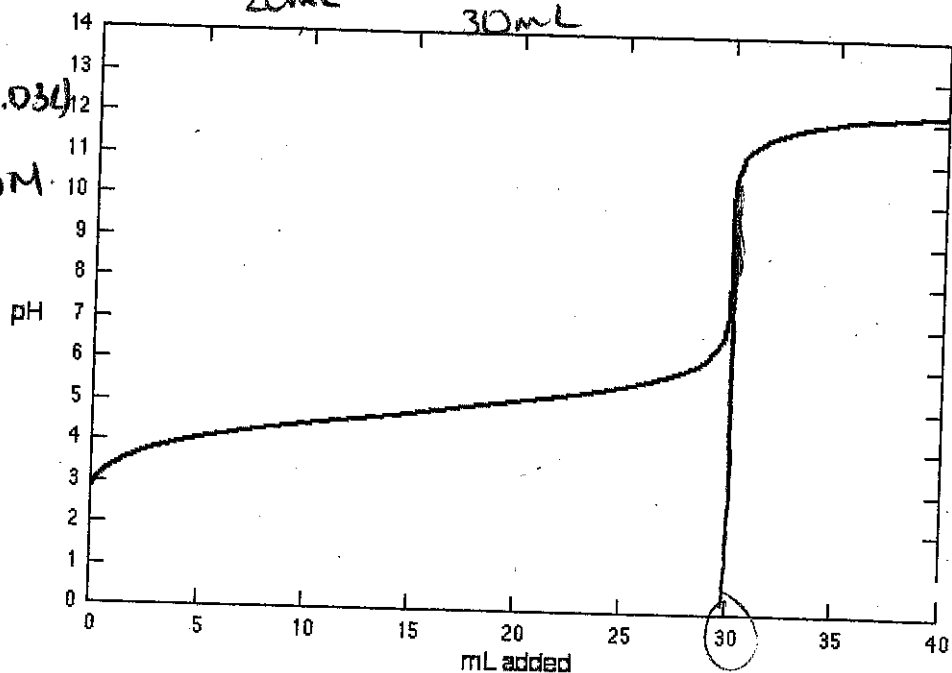
4. 20.0 mL of a weak acid, 0.100 M, is titrated with NaOH. What is the concentration of NaOH?

$MAV_A = M_B V_B$
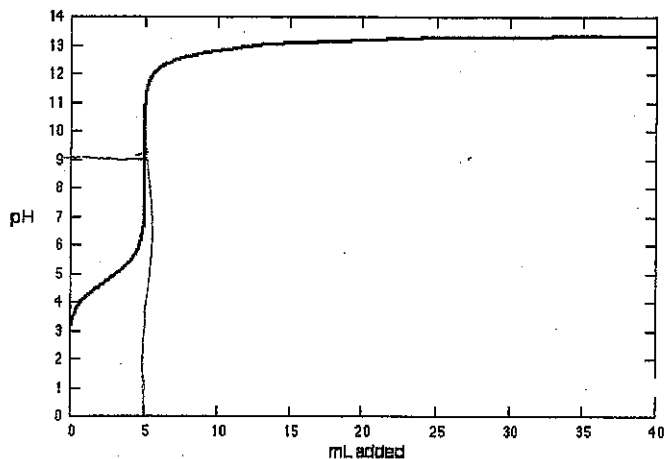
$(0.1M)(0.02L) = M_B (0.005L)$

$M_B = 0.400M$

5. Which indicator would best be used for the following titrations?
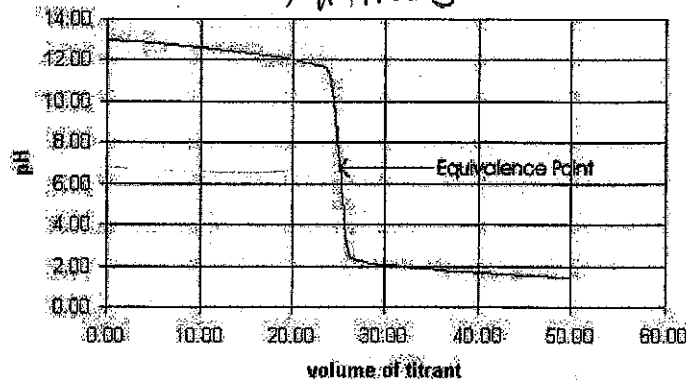
a)

phenol thalein

b) an equivalence point around 3.50

Methyl yellow

c) litmus

6. How many equivalence points would H_2CO_3 have if you titrated it with NaOH? How do you know?

2 equiv. pts b/c polyprotic