Chem 112  Hour Test 3 Winter 1998

PROBLEM 1 (final values):  
For convenience, use $\text{HLac}$ to symbolize lactic acid, and $\text{Lac}^-$ for lactate ion.

A) $\frac{[\text{Lac}^-]}{[\text{HLac}]} = 7.4$

B) $[\text{HLac}] = 0.030 \, \text{M}$ and $[\text{Lac}^-] = 0.22 \, \text{M}$

PROBLEM 5 (final values):
A) With 0.50 mmol $\text{O}_3^{2-}$ and 1.50 mmol $\text{HCO}_3^-$, $\text{pH} = 9.77$

B) With $\text{HCO}_3^-$ at 1st e.p., $\text{pH} = 8.31$

C) With 0.0400 M $\text{CO}_3^{2-}$ at start of titration, $[\text{OH}^-] = 2.67 \times 10^{-3} \, \text{M}$

or $\text{pH} = 11.43$

Chem 112  Prob Test 3 Winter 1998

PROBLEM 1 (final values):
A) With 10.00 mmol $\text{HCO}_2\text{H}$ and 8.75 mmol $\text{HCO}_3^-$, $\text{pH} = 3.70$

B) With 18.75 mmol $\text{HCO}_2\text{H}$ and 16.00 mmol $\text{HCO}_3^-$, $\text{pH} = 3.69$

C) With 18.75 mmol $\text{HCO}_2\text{H}$ (and some counter ions) in 125 mL total volume,

$\text{pH} = 2.29$

D) With 18.75 mmol $\text{HCO}_3^-$ and 18.75 mmol $\text{NH}_4^+$ after net rxn,

$\text{pH} = 6.51$

PROBLEM 2 (final values):
a) The actual zwitterion in soln is $\text{H}_3\text{N}-\text{CHR}-\text{COO}^-$

b) Zwitterion is the intermediate family member, at center of pH line.

i) $\text{pH} = 5.97$

ii) $\text{pH} = 1.78$

iii) $\text{pH} = 9.84$

iv) $\text{pH} = 11.02$, since $[\text{OH}^-] = \text{approx.} \, 1.054 \times 10^{-3} \, \text{M}$

d) Answers ii and iv are not independent of volume