EXP 2

Calculations

1.b.

Buffer phosphate (0.1M).

Micromoles.

0.1 → 1000ml
X → 100 ml

$\left(\frac{0.1 \text{ moles} \times 100 \text{ ml}}{1000 \text{ mL}}\right) = 0.01 \text{ moles}.$

$(0.01 \times 1 \times 10^{-6}) = 1.0 \times 10^{-8}$ micromoles.

c. Yes the buffer will be valid.

3. Most efficient way to make up HEPES buffer pH 8.5
Starting material/compounds. NaOH or KOH
Reagents. Aluminium foil.

5. $pH = -\log[H^+]$.

$pH = -\log[0.1M]$

$= 1$

6. $pH = -\log[H^+]$.

$= -\log[H^+]$

$m_1 v_1 = m_2 v_2$

$1.0M \times 2ml = m_2 \times 50mL$.

$m_2 = \left(\frac{1.0M \times 2ml}{50mL}\right) = 0.04M$

$pH = -\log[0.04]$

1.40

7. $m_1 \times v_1 = m_2 v_2$.

$1m \times 2mL = m_2 \times 100ml$

$m_2 = \left(\frac{1 \times 2ml}{100mL}\right)$

$= 0.02$

$PH = -\log[0.02]$.

$= 1.70$.

2.12

8. $3ml \times M_2 = 0.1M \times 100mL$

$m_2 = \left(\frac{3mL}{0.1M \times 100mL}\right)$

$= 0.3$

$pH = 0.52$.

9. Upon dilution there is decrease in ionic strength, the pka will change and therefore the pH of solution changes

Additional Problem set

3. $pH = 5$

$pH = -\log[H^+]$

$5 = -\log[H^+]$

$\frac{5}{-\log} = \frac{-\log[H^+]}{-\log}$

$[H^+] = 1.0 \times 10^{-5} M$.

$millimolar = \left(\frac{1.0 \times 10^{-5}}{1000}\right) = 1.0 \times 10^{-2}$ mM

$micromolar = \left(\frac{1.0 \times 10^{-5}}{1.0 \times 10^{-6}}\right)$

$= 1.0 \times 10^{1}$ micromolar