

- 15-20.** Ideally, the electrode should be calibrated at 37° using two buffers bracketing the pH of the blood. It would be reasonable to use the MOPSO and HEPES buffers in Table 15-3 that are recommended for use with physiologic fluids. The pH of these standards at 37°C is 6.695 and 7.370. The standards should be thermostatted to 37° during calibration and the blood should also be at 37° during the measurement.
- 15-21.** Uncertainty in pH of standard buffers, junction potential, junction potential drift, sodium or acid errors at extreme pH values, equilibration time, hydration of glass, and temperature of measurement and calibration.
- 15-26.** (a) $(4.63)(59.16 \text{ mV}) = 274 \text{ mV}$. The factor 59.16 mV is the value of $(RT \ln 10)/F$ at 298.15 K.
- (b) At 310.15 K (37°C), $(RT \ln 10)/F = (8.3145 \text{ J K}^{-1})(310.15)(\ln 10)/(96485) = 61.54 \text{ mV}$. $(4.63)(61.54 \text{ mV}) = 285 \text{ mV}$.

15-35. $[F^-]_{\text{Providence}} = 1.00 \text{ mg F}^-/\text{L} = 5.26 \times 10^{-5} \text{ M}$
 $E_{\text{Providence}} = \text{constant} - 0.05916 \log [5.26 \times 10^{-5}]$
 $E_{\text{Foxboro}} = \text{constant} - 0.05916 \log [F^-]_{\text{Foxboro}}$
 $\Delta E = E_{\text{Foxboro}} - E_{\text{Providence}} = 0.0400 \text{ V}$
 $= -0.05916 \log \frac{[F^-]_{\text{Foxboro}}}{5.26 \times 10^{-5}} \Rightarrow [F^-]_{\text{Foxboro}} = 1.11 \times 10^{-5} \text{ M} = 0.211 \text{ mg/L}$

- 15-38.** From the graph below, $E = -22.5 \text{ mV}$ gives
 $\log [Ca^{2+}] = -2.62 \Rightarrow [Ca^{2+}] = 2.4 \times 10^{-3} \text{ M}$.
The slope is $28.14 \text{ mV} \Rightarrow 0.02814 \text{ V} = \beta(0.05916 \text{ V})/2 \Rightarrow \beta = 0.9513$.

