儀器設定:

TISAB buffer : 11.4 ml gl CH_3COOH , 11.6197 g NaCl, 6.1087 g NaOH ,
0.4040 g CDTA 以去離子水稀釋至 200 ml , pH 5.13

electrode : Fluoride Ion Selective Electrode （ F ISE)

結果：

牙膏重量: 0.2053 g

濃度 (ppm)	0.5	1.0	2.0	5.0	茶	牙膏
pF -log[F⁻]	0.3010	0	-0.3010	-0.6990	/	/
電位 (mv)	71.2	54.7	37.3	14.5	68.4	36.6
溫度 (°C)	18.5	18.7	18.2	18.4	21.1	19.4

(1) Plot potential in **mV** versus pF (**-log** of fluoride concentration) of the standards. Use the method of least squares to find the best fitting line to the data.

$\quad$ y = 56.827x + 54.355 $\quad$ r^2 : 0.9999

(2) Determine F⁻ concentration(μg/g) of the toothpaste.

$\quad$ 36.6 = 56.827x + 54.355

$\quad\quad$ x = -0.3124 = pF = - log [F]

$\quad\quad$ [F] = 10 $^{0.3124}$ = 2.0531 ppm (μg /ml)

$\quad\quad$ 2.0531×50 ml = 102.655 μg

$\quad$ ∵牙膏重量 0.2053 g

$\quad$ 102.655/0.2053 = 500.024μg/g

(3)Determine F⁻ concentration (ppm) of the tea sample.

$\quad$ 68.4 = 56.827x + 54.355

$\quad\quad$ x = 0.2471 = pF = - log [F]

$\quad\quad$ [F] = 10 $^{-0.2471}$ = 0.5661 ppm (μg /ml)

$\quad\quad$ 0.5661× $\frac{25ml}{12.5ml}$ = 1.1322 ppm

(4) What is the slope of your calibration curve and how is this related to the Nernst equation? Compare your slope with the Nernstian slope and comment on its closeness to theory. ($\ln a = 2.303 \times \log a$)

$t = (18.5 + 18.7 + 18.2 + 18.4)/4 = 18.45 \ ^oC$

Nernstian slope $= \dfrac{RT}{nF} = \dfrac{8.314 \times (18.45 + 273.15)}{1 \times 96485} = 0.02513$

$-\ln [F^-] = -2.303 \log [F^-] = 2.303 \ pF$

$0.02513 \times 2.303 = 0.05787 \ V = 57.87 \ mv$

實驗值：56.827

$(57.87 - 56.827)/57.87 = 1.80 \ \%$

potential vs pF

$y = 56.827x + 54.355$
$R^2 = 0.9999$