Supplementary Material

Measurements of SDS-PAGE separations were performed using both the continuous and discontinuous buffer systems. In both cases, tests were performed in a single chip containing 5 SDS-PAGE channels. Four model proteins were employed, namely parvalbumin (MW 12 kDa), trypsin inhibitor (MW 21 kDa), ovalbumin (MW 45 kDa), and bovine serum albumin (BSA) (MW 66 kDa). Protein was loaded at a concentration of 25 µg/mL, with an estimated 0.53 ng total protein loaded into each SDS-PAGE channel. A constant current of 5 µA was applied during SDS-PAGE separations.

Measurement data for the continuous and discontinuous buffer systems is provided below in section I and section II, respectively. Using this data, the peak capacities for the SDS-PAGE separations may be estimated. Defining the separation time (T) as the total time between the first and last peaks of each electropherogram, and defining the time domain band widths (BW) as the time required for the half-height full-width of each band's intensity profile to pass the detector, the overall peak capacity is estimated from the average T/BW ratio across all five proteins, i.e.

$$peak\ capacity = \frac{1}{n}\sum_{i=1}^{n}\frac{T}{BW_i}$$

where n = 5 and BW_i is the width of the ith protein band.

Table S-1. Summary of estimated peak capacities for each buffer system, and relative standard deviations in measured elution times and peak intensities for between proteins in each case.

	Continuous buffer	Discontinuous buffer
Peak capacity	27	144
Average RSD% of elution times	2.8%	7.8%
Average RSD% of peak intensities	26.5%	28.8%

I. Continuous buffer SDS-PAGE data

Table S-A1. Elution times (sec)

	t_1	t_2	t_3	t_4	t_5	Avg	RSD%
Parvalbumin	277	274	276	274	280	276	0.9%
Trypsin Inhibitor	323	323	321	325	329	324	0.9%
Ovalbumin	390	339	382	391	400	380	6.8%
BSA	434	415	405	420	424	420	2.6%

Table S-A2. Peak intensities (arbitrary units)

	I_1	I_2	I_3	I_4	I_5	Avg	RSD%
Parvalbumin	813	841	1126	1104	870	951	15.9%
Trypsin Inhibitor	13075	4005	10135	3454	5687	7271	57.4%
Ovalbumin	7536	9120	11548	9277	5794	8655	24.8%
BSA	802	990	868	866	926	890	8.0%

Table S-A3. Full width, half-maximum bandwidths (sec)

	$t_{FWHM,1}$	$t_{FWHM,2}$	$t_{FWHM,3}$	$t_{FWHM,4}$	$t_{FWHM,5}$	Avg	RSD%
Parvalbumin	26.75	19.00	22.00	18.00	16.00	20.35	21
Trypsin Inhibitor	3.50	3.50	3.50	4.75	6.50	4.35	30
Ovalbumin	3.50	4.00	3.25	3.00	5.75	3.9	28
BSA	6.25	6.50	6.75	4.50	4.25	5.65	21

II. Discontinuous buffer SDS-PAGE data

Table S-B1. Elution times (sec)

	t_1	t_2	t_3	t_4	t_5	Avg	RSD%
Parvalbumin	276	242	211	221	210	232	11.1%
Trypsin Inhibitor	457	412	372	389	387	403	7.7%
Ovalbumin	493	455	433	460	466	461	4.7%
BSA	563	529	496	485	485	512	6.4%

Table S-B2. Peak intensities (arbitrary units)

	I_1	I_2	I_3	I_4	I_5	Avg	RSD%
Parvalbumin	515	544	553	587	583	556	5.3%
Trypsin Inhibitor	7160	4793	2268	4717	3254	4438	41.7%
Ovalbumin	6387	8558	4651	2080	3111	4957	52.2%
BSA	636	694	860	909	911	802	16.0%

Table S-B3. Full width, half-maximum bandwidths (sec)

	$t_{FWHM,1}$	$t_{FWHM,2}$	$t_{FWHM,3}$	$t_{FWHM,4}$	$t_{FWHM,5}$	Avg	RSD%
Parvalbumin	5.00	5.00	3.25	2.50	4.00	3.95	28
Trypsin Inhibitor	1.00	1.00	0.75	1.00	1.00	0.95	12
Ovalbumin	0.75	0.50	0.50	0.50	0.75	0.60	23
BSA	1.25	1.00	1.00	1.00	1.00	1.05	11