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APPENDIX

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Table 1: Experimental data for conventional fermentation. Conditions: pH 7 and at 37 °C and at 250 rpm agitation.

Time (h)	Glucose (g/l)	Dried cell (g/l)	Alkaline protease activity (unit/ml)	Protein (mg/l)
0	5.913422	0	0	0
2	5.260978	0.53353	0.22	9.285714
5	1.739851	0.913117	0.26	13.57143
8	0.683513	3.888655	0.27	16.42857
11	0.818144	4.382117	0.4	23.57143
17	0.766363	4.491776	1.13	42.14286
23	0.507457	4.27035	1.1	85.71429
29	0.517813	4.249262	1.08	82.14286
35	0.466031	4.436946	1.15	85.71429
41	0.41425	4.698439	1.05	82.14286
47	0.403894	4.723745	1.04	86.42857
53	0.393538	4.734289	1.06	84.28571
59	0.362469	4.723745	1.03	83.57143
71	0.352113	4.73429	1.1	85.71429

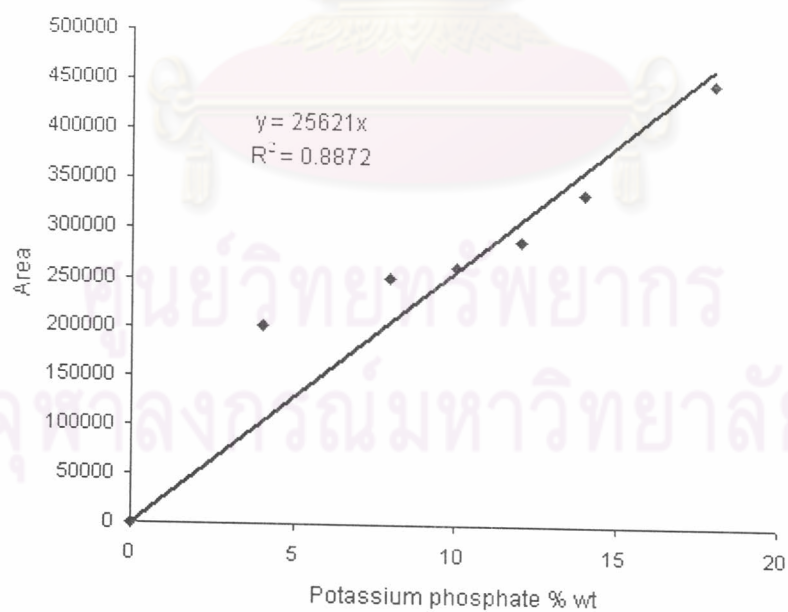


Figure 1: Standard curve for Potassium phosphate.

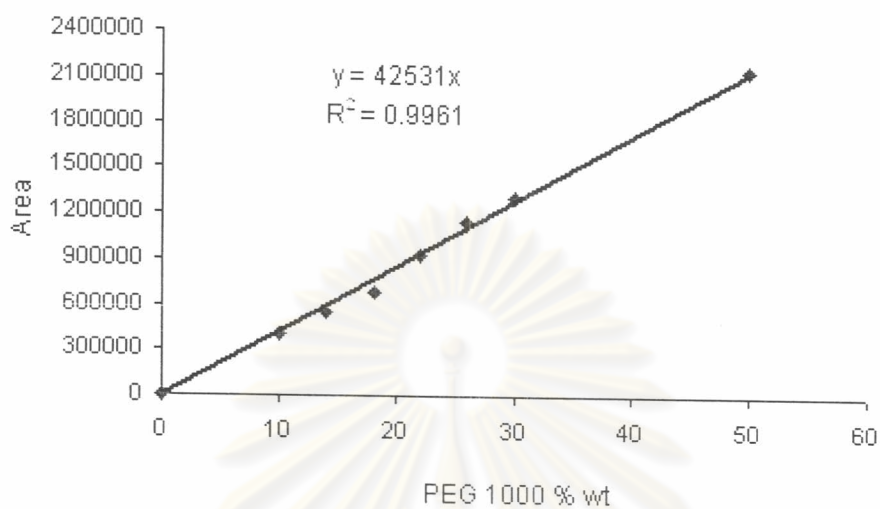


Figure 2: Standard curve for PEG 1000

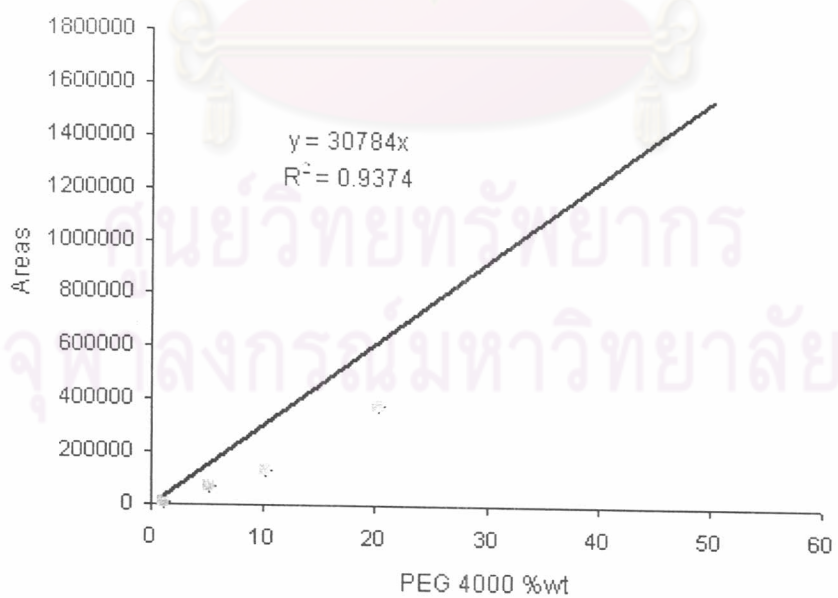


Figure 3: Standard curve for PEG 4000

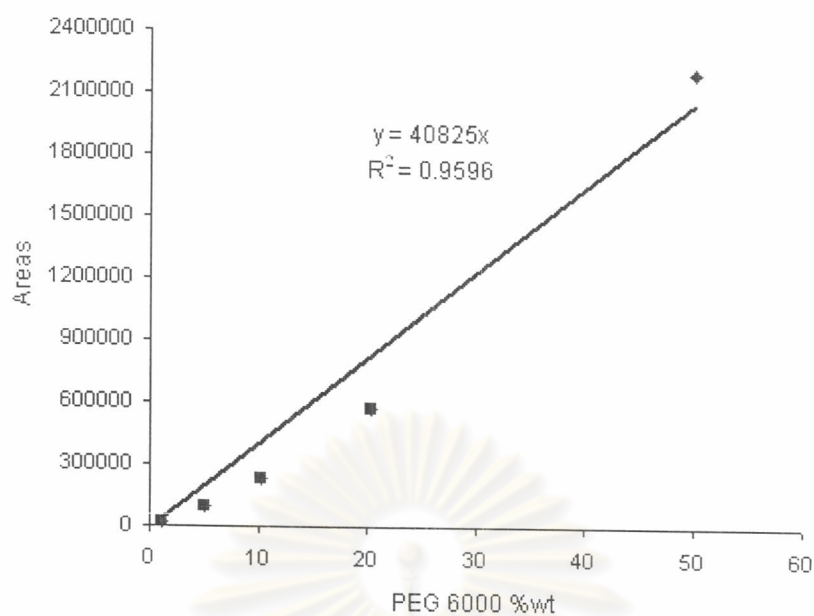


Figure 4: Standard curve for PEG 6000

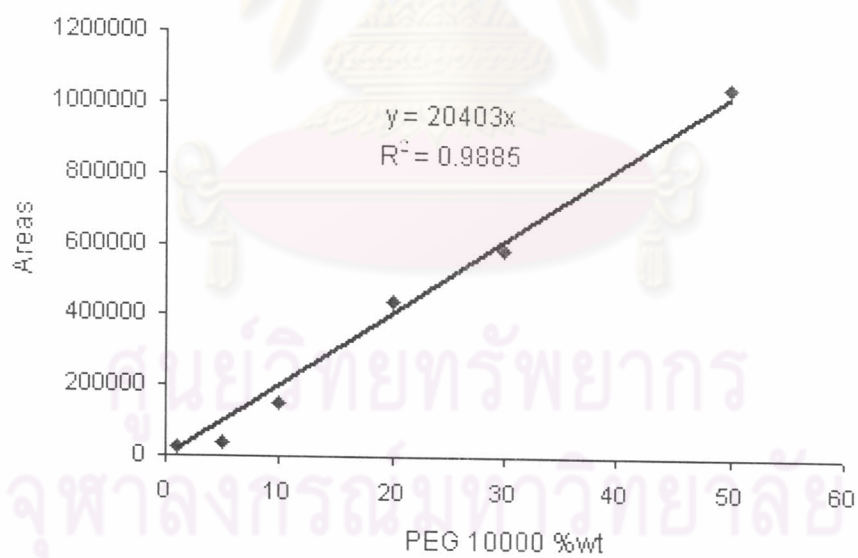


Figure 5: Standard curve for PEG 10000

Table 2: Compositions of phase diagram of PEG 1000 /potassium phosphate systems at system pH 7 and room temperature ($30^{\circ}\text{C} \pm 2^{\circ}\text{C}$).

Top phase		Bottom phase	
Potassium phosphate (%wt)	PEG 1000 (%wt)	Potassium phosphate (%wt)	PEG 1000 (%wt)
3.016876	34.71634	34.48564	0
3.204333	34.84368	40.37309	0
3.275532	35.97775	40.62026	0
2.815207	36.47249	43.73706	0
2.899746	38.08635	46.38322	0
3.312794	33.91509	42.19222	0
2.843499	36.43437	44.71151	0
3.222847	38.31172	45.575	0
3.212296	34.78903	34.06597	0.00779316
5.913832	17.08357	27.30467	0.97614643
10.66597	11.04734	20.10592	2.86722799
4.753444	20.65588	31.52981	0.96234549
10.82399	19.60097	24.32404	3.25088059

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Table 3: Compositions of phase diagram of PEG 4000 /potassium phosphate systems at system pH 7 and room temperature ($30^{\circ}\text{C} \pm 2^{\circ}\text{C}$).

Top phase		Bottom phase	
Potassium phosphate (%wt)	PEG 4000 (%wt)	Potassium phosphate (%wt)	PEG 4000 (%wt)
31.30729	5.898658	0	9.44620171
31.12768	6.793879	0	9.08921534
8.916657	6.661132	1.89105	4.30706763
6.657517	8.238916	1.082623	4.49886717
18.33487	5.570992	0.228782	8.19845314
21.07523	5.33848	0	8.30646479
38.12503	6.637397	0	11.7273391
15.02648	6.658663	0.642254	7.36658055

Table 4: Compositions of phase diagram of PEG 6000 /potassium phosphate systems at system pH 7 and room temperature ($30^{\circ}\text{C} \pm 2^{\circ}\text{C}$).

Top phase		Bottom phase	
Potassium phosphate (%wt)	PEG 6000 (%wt)	Potassium phosphate (%wt)	PEG 6000 (%wt)
4.80691	40.40989	11.52774	0
4.118304	27.67897	6.910283	0
3.281463	32.36772	9.184268	0
2.295366	38.62924	10.76764	0
2.144071	43.90664	17.57398	0

Table 5: Compositions of phase diagram of PEG 10000 /potassium phosphate systems at system pH 7 and room temperature ($30^{\circ}\text{C} \pm 2^{\circ}\text{C}$).

Top phase		Bottom phase	
Potassium phosphate (%wt)	PEG 10000 (%wt)	Potassium phosphate (%wt)	PEG 10000 (%wt)
2.600541	76.92616	21.06773805	0
3.839945	45.57451	5.976109301	0
2.669112	53.51745	7.395203627	0
2.458813	63.62354	9.166961601	0
1.851245	71.68852	9.637993934	0

Table 6: Experimental data for ATPs obtained by 12.46 %w/w of PEG 4000, and 9.89 %w/w of potassium phosphate system. Conditions: pH 7, 37°C and 250 rpm of stirrer.

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)
	Top phase	Bottom phase	
0	2.288732	7.30116	0
4	2.43372	7.042254	0
10	0.880282	2.972245	0
16	0.393538	0.372825	0.05
23	0.548882	0.704225	0.33
28	0.4971	0.776719	0.34
34	0.57995	0.859569	0.41
40	0.1657	0.238194	0.51
47	0.24855	0.289975	0.73
52	0.103563	0.258906	0.7
58	0.051781	0.134631	0.78
64	0.051781	0.155344	0.97
70	0.031069	0	1.09

Table 7: Experimental data for ATPs obtained by 12.46 %w/w of PEG 6000, and 9.89 %w/w of potassium phosphate system. Conditions: pH 7, 37° C and 250 rpm of stirrer.

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)
	Top phase	Bottom phase	
0	2.526926	6.690141	0
4	2.216239	6.72121	0.01
10	0.186413	0.424606	0.06
16	0.186413	0.321044	0.05
23	0.6628	0.6628	0.27
28	0.6628	0.859569	0.13
34	0.393538	1.128832	0.27
40	0.217481	0.186413	0.39
47	0.196769	0.279619	0.59
52	0.08285	0.144988	0.43
58	0.062138	0	0.54
64	0.041425	0	0.65
70	0	0	0.72

Table 8: Experimental data for ATPs obtained by 12.46 %w/w of PEG 10000, and 9.89 %w/w of potassium phosphate system. Conditions: pH 7, 37° C and 250 rpm of stirrer.

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)
	Top phase	Bottom phase	
0	2.174814	7.38401	0
4	2.133389	6.959403	0.01
10	0.673157	2.84797	0.01
16	0.621375	0.507457	0
23	0.569594	0.683513	0.11
28	0.538525	0.900994	0.12
34	0.393538	1.139188	0.03
40	0.155344	0.41425	0.18
47	0.321044	0.3314	0.37
52	0.031069	0.424606	0.19
58	0.103563	0.072494	0.32
64	0.093206	0.155344	0.35
70	0.010356	0	0.43

Table 9: Experimental data for ATPs obtained by point A in the Table 4.3
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.174814	6.55551	0	0
5	2.174814	6.545153	0	1.428571
11	2.123032	6.431234	0	5
23	0.683513	0.559238	0.05	20
35	0.372825	0.548882	0.14	21.42857
47	0.403894	0.538525	0.25	26.42857
59	0.217481	0.362469	0.38	29.28571
71	0.155344	0.103563	0.56	31.42857

Table 10: Experimental data for ATPs obtained by point B in the Table 4.3 or Table 4.4, Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.226595	7.13546	0	0
5	2.060895	7.073322	0	4.285714
11	1.967688	7.156172	0.03	9.285714
23	0.983844	0.932063	0.05	25
35	0.434963	0.787075	0.1	32.85714
47	0.341756	0.466031	0.15	34.28571
59	0.310688	0.279619	0.18	36.42857
71	0.176056	0.176056	0.42	37.14286

Table 11: Experimental data for ATPs obtained by point C in the Table 4.3
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.154101	8.119304	0	0
5	2.071251	7.777548	0	0.714286
11	1.946976	7.71541	0.03	2.142857
23	0.983844	1.139188	0.04	16.42857
35	0.849213	1.025269	0.04	22.85714
47	0.466031	0.372825	0.09	30.71429
59	0.445319	0.362469	0.12	32.85714
71	0.455675	0.269263	0.25	36.42857

Table 12: Experimental data for ATPs obtained by point D in the Table 4.4
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	3.086164	7.342585	0	0
5	3.003314	7.30116	0	0.714286
11	2.26802	4.504971	0.04	13.57143
23	0.6628	0.973488	0.29	24.28571
35	0.383181	0.983844	0.41	23.57143
47	0.341756	0.683513	0.66	24.28571
59	0.207125	0.258906	0.91	27.14286
71	0.144988	0.144988	1.21	30.71429

Table 13: Experimental data for ATPs obtained by point E in the Table 4.4
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	1.729495	6.938691	0	0
5	1.719138	6.928335	0	5.714286
11	1.729495	6.88691	0	8.571429
23	0.258906	0.341756	0.04	22.85714
35	0.735294	0.735294	0.05	36.42857
47	0.466031	0.41425	0.08	41.42857
59	0.466031	0.310688	0.11	43.57143
71	0.434963	0.269263	0.15	45.71429

Table 14: Experimental data for ATPs obtained by point A1 in the Table 4.5
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.82	6.25	0	0
5	0.538525	1.998757	0.24	5
11	0.57995	0.900994	0.56	18.57143
23	0.403894	0.652444	1.2	17.14286
35	0.072494	0.517813	1.63	18.57143
47	0.062138	0.3314	1.94	30.71429
59	0.062138	0.403894	2.11	21.42857
71	0.051781	0.383181	1.95	30

Table 15: Experimental data for ATPs obtained by point A2 in the Table 4.5
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.309445	6.451947	0	0
5	2.01947	4.929577	0.19	12.14286
11	0.559238	2.050539	0.58	22.85714
23	0.434963	0.6628	0.47	22.85714
35	0.300331	0.4971	0.7	17.14286
47	0.238194	0.445319	1.13	25.71429
59	0.062138	0.310688	1.25	20
71	0.103563	0.362469	1.33	25.71429

Table 16: Experimental data for ATPs obtained by point A3 in the Table 4.5
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.371582	5.809859	0	0
5	2.340514	5.716653	0.12	19.28571
11	1.418807	3.003314	0.08	22.14286
23	0.062138	0.1657	0.45	30.71429
35	0.051781	0.051781	0.48	36.42857
47	0.041425	0.08285	0.75	41.42857
59	0.020713	0.124275	1.07	54.28571
71	0.031069	0.113919	1.2	56.42857

Table 17: Experimental data for ATPs obtained by point A4 in the Table 4.5
Conditions: pH 7, 37° C and 250 rpm of stirrer

Time (h)	Glucose (g/l)		Alkaline protease activity in the top phase (unit/ml)	Protein in the top phase (mg/l)
	Top phase	Bottom phase		
0	2.01	5.260978	0	0
5	1.159901	3.541839	0.08	9.285714
11	0.849213	0.932063	0.42	9.285714
23	0.020713	0.155344	0.5	15
35	0.031069	0.103563	0.64	39.28571
47	0.010356	0.176056	0.7	43.57143
59	0.051781	0.041425	1.12	69.28571
71	0.031069	0.051781	1.18	75

BIOGRAPHY

Mr. Cao Xuan Thang was born on September 3rd, 1978 in Hai Duong province, Vietnam. He graduated the Bachelor's Degree of Engineering of Food Technology from Hanoi University of Technology (HUT), Vietnam. After that, he works as a lecturer assistant in Quality Control and Tropical-Food Department, Hanoi University of Technology, Vietnam.



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