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APPENDICES

Appendix A Data for acidic hydrolysis.

A1 Effect of Acid Type

Table A1.1 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 5 N HCl at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	42.1350
	2	37.6408
	3	50.7725
4	1	54.9575
	2	55.7100
	3	57.5057
6	1	64.1025
	2	82.6875
	3	67.6692
8	1	75.7575
	2	66.6233
	3	76.7083
10	1	66.6283
	2	82.6450
	3	71.0350
12	1	73.0242
	2	82.2600
	3	82.0066

Table A1.1 (continued).

Time (hours)	Sample Number	Hydrolyzed starch (%)
15	1	72.1050
	2	78.2358
	3	77.3450
18	1	77.5683
	2	76.5417
	3	76.5183
21	1	78.3208
	2	80.7250
	3	80.4600
24	1	84.7675
	2	67.9408
	3	83.8642
30	1	88.0283
	2	83.0958
	3	80.9308

Table A1.2 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 5 N H_2SO_4 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	15.2675
	2	20.5200
	3	22.0167
4	1	23.5617
	2	23.3750
	3	23.5733
6	1	20.2475
	2	23.8092
	3	22.1442
8	1	24.3592
	2	24.6358
	3	22.6842
10	1	21.9300
	2	24.4117
	3	23.2717
12	1	20.8058
	2	20.1883
	3	23.0092
15	1	25.0358
	2	23.4083
	3	17.7067
18	1	21.6283
	2	23.4467
	3	24.3100

Table A1.2 (continued).

Time (hours)	Sample Number	Hydrolyzed starch (%)
21	1	13.7433
	2	17.3008
	3	29.6733
24	1	18.0425
	2	24.1750
	3	17.6517
30	1	23.0133
	2	22.1442
	3	23.9400

Table A1.3 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 5 N HNO_3 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	54.4508
	2	50.6117
	3	57.6925
4	1	65.3117
	2	70.9217
	3	66.9842
6	1	78.6592
	2	66.5050
	3	79.5400
8	1	78.7033
	2	82.3042
	3	76.6283
10	1	82.2075
	2	79.0425
	3	85.2275
12	1	83.5558
	2	82.1892
	3	81.4867
15	1	82.6250
	2	87.7192
	3	80.8283
18	1	82.6892
	2	86.1675
	3	83.6867

Table A1.3 (continued).

Time (hours)	Sample Number	Hydrolyzed starch (%)
21	1	91.6158
	2	80.6450
	3	82.5725
24	1	89.6625
	2	81.1208
	3	80.1067
30	1	88.6992
	2	88.9758
	3	83.4350

Table A1.4 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in distilled water at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	0
	2	0
	3	0
4	1	0
	2	0
	3	0
6	1	0
	2	0
	3	0
8	1	0
	2	0
	3	0
10	1	0
	2	0
	3	0
12	1	0
	2	0
	3	0
15	1	0
	2	0
	3	0
18	1	0
	2	0
	3	0

Table A1.4 (continued).

Time (hours)	Sample Number	Hydrolyzed starch (%)
21	1	0
	2	0
	3	0
24	1	0
	2	0
	3	0
30	1	0
	2	0
	3	0

A2 Effect of Concentration

Table A2.1 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 1 N HNO_3 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	19.7917
	2	12.4683
	3	16.5142
4	1	33.3300
	2	24.3542
	3	21.0700
6	1	40.3050
	2	28.4608
	3	31.1108
8	1	37.5683
	2	32.5100
	3	29.4000
10	1	35.6967
	2	32.9508
	3	29.6733
12	1	36.0892
	2	31.8067
	3	29.5575
15	1	35.7742
	2	32.1792
	3	31.5497

Table A2.2 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 3 N HNO_3 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	37.7833
	2	37.7808
	3	40.7025
4	1	42.8117
	2	53.6650
	3	46.6583
6	1	49.4350
	2	52.5833
	3	61.5133
8	1	55.8533
	2	64.9792
	3	65.2842
10	1	66.9258
	2	59.2158
	3	58.6100
12	1	66.4333
	2	75.1966
	3	62.7708
15	1	71.3983
	2	78.2317
	3	76.1217

Table A2.3 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 5 N HNO_3 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	54.4508
	2	50.6117
	3	57.6925
4	1	65.3117
	2	70.9217
	3	66.9842
6	1	78.6592
	2	66.5050
	3	79.5400
8	1	78.7033
	2	82.3042
	3	76.6283
10	1	82.2075
	2	79.0425
	3	85.2275
12	1	81.4867
	2	83.5558
	3	82.1892
15	1	80.8283
	2	82.6250
	3	87.7192

A3 Effect of Temperature

Table A3.1 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 5 N HNO_3 at 25°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	25.5900
	2	23.7450
	3	17.8825
4	1	21.4775
	2	31.7150
	3	30.8217
6	1	25.3808
	2	31.8983
	3	26.5100
8	1	32.5142
	2	31.4467
	3	24.5858
10	1	31.1825
	2	30.3983
	3	27.8200
12	1	25.5558
	2	26.9192
	3	33.6275
15	1	30.5517
	2	29.8042
	3	28.6942

Table A3.2 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in 5 N HNO_3 at 45°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	25.8550
	2	27.7450
	3	35.9633
4	1	34.2617
	2	44.3933
	3	36.6192
6	1	45.3650
	2	52.2350
	3	39.8325
8	1	52.0158
	2	48.6467
	3	38.6100
10	1	44.0333
	2	53.1400
	3	46.9800
12	1	44.8142
	2	49.0867
	3	54.9850
15	1	46.5425
	2	51.0858
	3	47.2183

A4 Effect of Starch Content

Table A4.1 Data for hydrolyzed starch of 50 μm thick film containing 0, 2, 4, 6, 8, 10, and 12 wt% starch hydrolyzed in 5 N HNO_3 at 65°C.

Starch content (%)	Sample Number	Hydrolyzed starch (%)
0	1	0
	2	0
	3	0
2	1	48.2900
	2	49.2100
	3	51.6900
4	1	51.9025
	2	56.9350
	3	65.6400
6	1	66.6667
	2	66.1367
	3	60.2400
8	1	72.4000
	2	71.4738
	3	61.0088
10	1	70.0913
	2	68.2520
	3	75.5610
12	1	93.9850
	2	85.2150
	3	80.5492

A5 Effect of Thickness

Table A5.1 Data for hydrolyzed starch of 80 μm thick film containing 12 wt% starch hydrolyzed in 5 N HNO_3 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	35.9933
	2	38.2042
	3	33.1792
4	1	47.1700
	2	41.1617
	3	44.8025
6	1	48.7725
	2	42.0658
	3	43.2900
8	1	55.1925
	2	48.8942
	3	43.8208
10	1	44.8717
	2	51.1700
	3	52.1750
12	1	56.1433
	2	58.7658
	3	47.7467
15	1	60.8567
	2	59.8167
	3	55.5558

Table A5.2 Data for hydrolyzed starch of 100 μm thick film containing 12 wt% starch hydrolyzed in 5 N HNO_3 at 65°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	23.4658
	2	20.8067
	3	24.1317
4	1	28.4092
	2	24.9433
	3	26.7558
6	1	31.0283
	2	26.4917
	3	27.4483
8	1	30.6983
	2	31.2575
	3	27.9850
10	1	32.7442
	2	34.6000
	3	35.1108
12	1	35.7700
	2	39.0542
	3	35.6725
15	1	34.4267
	2	37.9733
	3	35.6608

Appendix B Data for enzymatic hydrolysis.

Table B1 Data for hydrolyzed starch of 50 μm thick film containing 12 wt% starch hydrolyzed in pH 6.5 acetate buffer without enzyme at 80°C.

Time (hours)	Sample Number	Hydrolyzed starch (%)
2	1	0.5369
	2	0.7968
	3	0.6039
4	1	1.1780
	2	1.3123
	3	1.1842
6	1	1.6929
	2	1.5979
	3	1.6591
8	1	1.5669
	2	1.7379
	3	1.6820
10	1	1.7449
	2	1.5873
	3	1.6997
12	1	1.6058
	2	1.7857
	3	1.6560

Table B2 Data for starch removal of 50 μm thick film containing 12 wt% starch hydrolyzed in α -amylase in pH 6.5 acetate buffer at 80°C.

Time (hours)	Sample Number	Starch removal (%)
2	1	20.5908
	2	18.9900
	3	21.3383
4	1	26.0783
	2	25.5692
	3	25.4633
6	1	29.5733
	2	31.3758
	3	31.4067
8	1	35.0042
	2	36.5167
	3	35.3533
10	1	35.5950
	2	36.2800
	3	36.2808
12	1	36.0300
	2	37.0117
	3	36.1367

Appendix C Data for mechanical properties.

C1 Tensile Stress at Break

Table C1.1 Data for tensile stress at break in machine direction of untreated LDPE/starch film with thickness of 50 μm containing 12 wt% starch.

Starch content (%)	Sample No.	Tensile stress at break (Mpa)
2	1	18.0
	2	18.2
	3	18.7
	4	18.4
	5	17.8
4	1	16.6
	2	17.2
	3	17.3
	4	17.7
	5	18.2
6	1	17.2
	2	16.0
	3	16.6
	4	16.3
	5	15.4
8	1	16.0
	2	16.4
	3	15.8
	4	16.8
	5	15.6

Table C1.1 (continued).

Starch content (%)	Sample No.	Tensile stress at break (Mpa)
10	1	14.7
	2	14.6
	3	14.6
	4	14.1
	5	14.4
12	1	11.5
	2	12.1
	3	12.1
	4	12.0
	5	11.8

Table C1.2 Data for tensile stress at break in machine direction of HNO₃ hydrolyzed film with thickness of 50 μm containing 12 wt% starch.

Starch content (%)	Sample No.	Tensile stress at break (Mpa)
2	1	17.9
	2	17.4
	3	17.7
	4	17.4
	5	17.9
4	1	17.3
	2	17.7
	3	17.1
	4	17.2
	5	17.3
6	1	17.2
	2	17.1
	3	17.2
	4	17.1
	5	16.5
8	1	15.6
	2	15.9
	3	16.2
	4	15.5
	5	16.6

Table C1.2 (continued).

Starch content (%)	Sample No.	Tensile stress at break (Mpa)
10	1	14.1
	2	14.2
	3	13.9
	4	14.2
	5	13.9
12	1	10.8
	2	12.1
	3	11.3
	4	11.6
	5	12.2

Table C1.3 Data for tensile stress at break in machine direction of α -amylase hydrolyzed film with thickness of 50 μm containing 12 wt% starch.

Starch content (%)	Sample No.	Tensile stress at break (Mpa)
2	1	17.2
	2	17.3
	3	17.9
	4	17.3
	5	17.3
4	1	17.1
	2	17.8
	3	17.0
	4	17.1
	5	17.2
6	1	17.2
	2	16.7
	3	16.2
	4	16.0
	5	16.9
8	1	15.7
	2	15.2
	3	15.2
	4	16.1
	5	16.0

Table C1.3 (continued).

Starch content (%)	Sample No.	Tensile stress at break (Mpa)
10	1	15.4
	2	15.5
	3	15.3
	4	14.9
	5	14.1
12	1	11.5
	2	11.6
	3	12.0
	4	11.2
	5	11.9

C2 Elongation at Break

Table C2.1 Data for elongation at break in machine direction of untreated LDPE/starch film with thickness of 50 μm containing 12 wt% starch.

Starch content (%)	Sample No.	Elongation at break (%)
2	1	137.30
	2	134.60
	3	134.90
	4	131.10
	5	140.50
4	1	112.30
	2	121.80
	3	121.20
	4	126.10
	5	111.30
6	1	115.60
	2	119.40
	3	110.00
	4	114.60
	5	115.00
8	1	110.90
	2	108.60
	3	101.00
	4	109.50
	5	109.70

Table C2.1 (continued).

Starch content (%)	Sample No.	Elongation at break (%)
10	1	100.20
	2	93.97
	3	94.89
	4	92.39
	5	92.64
12	1	74.72
	2	70.47
	3	73.64
	4	73.39
	5	75.47

Table C2.2 Data for elongation at break in machine direction of HNO₃ hydrolyzed film with thickness of 50 µm containing 12 wt% starch.

Starch content (%)	Sample No.	Elongation at break (%)
2	1	111.60
	2	107.50
	3	114.50
	4	118.20
	5	114.20
4	1	104.00
	2	98.64
	3	105.60
	4	98.30
	5	110.40
6	1	94.64
	2	97.55
	3	103.00
	4	93.39
	5	96.22
8	1	86.64
	2	89.80
	3	95.56
	4	81.64
	5	93.97

Table C2.2 (continued).

Starch content (%)	Sample No.	Elongation at break (%)
10	1	81.64
	2	85.80
	3	83.89
	4	84.14
	5	81.64
12	1	65.14
	2	73.14
	3	68.64
	4	71.80
	5	69.80

Table C2.3 Data for elongation at break in machine direction of α -amylase hydrolyzed film with thickness of 50 μm containing 12 wt% starch.

Starch content (%)	Sample No.	Elongation at break (%)
2	1	111.70
	2	109.89
	3	107.80
	4	113.50
	5	114.50
4	1	109.80
	2	107.60
	3	101.10
	4	103.60
	5	109.90
6	1	96.89
	2	109.90
	3	94.64
	4	99.89
	5	98.97
8	1	85.30
	2	86.80
	3	85.39
	4	84.14
	5	85.47



Table C2.3 (continued).

Starch content (%)	Sample No.	Elongation at break (%)
10	1	82.55
	2	89.55
	3	72.89
	4	76.64
	5	85.47
12	1	60.80
	2	64.22
	3	68.22
	4	62.22
	5	64.14

C3 Gloss Value

Table C3.1 Data for gloss of untreated LDPE/starch film with thickness of 50 μm containing 12 wt% starch in machine direction.

Starch content (%)	Sample No.	Gloss
0	1	47.4
	2	48.0
	3	48.1
	4	47.7
	5	48.0
2	1	20.9
	2	21.1
	3	21.0
	4	20.9
	5	20.9
4	1	13.0
	2	13.2
	3	13.4
	4	13.4
	5	13.6
6	1	8.4
	2	8.4
	3	8.1
	4	8.1
	5	8.1

Table C3.1 (continued).

Starch content (%)	Sample No.	Gloss
8	1	4.6
	2	4.7
	3	4.6
	4	4.7
	5	4.8
10	1	3.3
	2	3.4
	3	3.4
	4	3.4
	5	3.5
12	1	3.1
	2	3.2
	3	3.3
	4	3.2
	5	3.2

Table C3.2 Data for gloss of HNO₃ hydrolyzed film with thickness of 50 μm containing 12 wt% starch in machine direction.

Starch content (%)	Sample No.	Gloss
0	1	47.4
	2	47.9
	3	46.9
	4	48.0
	5	48.1
2	1	42.6
	2	42.1
	3	43.2
	4	42.9
	5	42.0
4	1	35.8
	2	36.5
	3	36.8
	4	36.8
	5	36.0
6	1	31.9
	2	31.2
	3	31.1
	4	31.3
	5	31.2

Table C3.2 (continued).

Starch content (%)	Sample No.	Gloss
8	1	23.2
	2	22.9
	3	23.8
	4	23.2
	5	23.3
10	1	17.5
	2	16.0
	3	17.4
	4	16.6
	5	16.8
12	1	14.5
	2	14.6
	3	15.0
	4	14.5
	5	14.5

Table C3.3 Data for gloss of α -amylase hydrolyzed film with thickness of 50 μm containing 12 wt% starch in machine direction.

Starch content (%)	Sample No.	Gloss
0	1	47.3
	2	47.2
	3	49.5
	4	47.2
	5	48.4
2	1	41.7
	2	41.0
	3	40.8
	4	41.3
	5	40.8
4	1	32.0
	2	31.5
	3	31.4
	4	31.3
	5	32.6
6	1	18.1
	2	21.0
	3	20.9
	4	21.1
	5	21.1

Table C3.3 (continued).

Starch content (%)	Sample No.	Gloss
8	1	13.2
	2	13.7
	3	13.2
	4	13.6
	5	13.2
10	1	12.2
	2	12.7
	3	12.3
	4	12.5
	5	11.8
12	1	10.6
	2	10.5
	3	10.6
	4	10.6
	5	10.5

Table C3.4 Data for gloss of untreated LDPE/starch film with thickness of 50 μm containing 12 wt% starch in transverse direction.

Starch content (%)	Sample No.	Gloss
0	1	61.6
	2	61.3
	3	61.8
	4	62.1
	5	61.4
2	1	53.6
	2	53.3
	3	53.4
	4	53.4
	5	53.5
4	1	45.5
	2	46.5
	3	46.8
	4	46.8.
	5	46.7
6	1	27.0
	2	28.2
	3	27.1
	4	27.7
	5	28.3

Table C3.4 (continued).

Starch content (%)	Sample No.	Gloss
8	1	17.7
	2	17.8
	3	17.2
	4	17.6
	5	18.2
10	1	15.6
	2	17.9
	3	16.6
	4	17.3
	5	17.4
12	1	13.0
	2	13.0
	3	12.9
	4	12.6
	5	12.7

Table C3.5 Data for gloss of HNO₃ hydrolyzed film with thickness of 50 μm containing 12 wt% starch in transverse direction.

Starch content (%)	Sample No.	Gloss
0	1	61.4
	2	63.5
	3	61.4
	4	60.5
	5	60.7
2	1	57.0
	2	57.7
	3	57.4
	4	58.7
	5	58.8
4	1	53.4
	2	53.8
	3	54.9
	4	54.2
	5	54.4
6	1	36.8
	2	37.9
	3	36.8
	4	35.5
	5	36.4

Table C3.5 (continued).

Starch content (%)	Sample No.	Gloss
8	1	31.0
	2	32.0
	3	32.4
	4	32.4
	5	32.8
10	1	18.9
	2	19.0
	3	18.9
	4	18.9
	5	18.9
12	1	17.9
	2	17.6
	3	17.5
	4	17.2
	5	17.9

Table C3.6 Data for gloss of α -amylase hydrolyzed film with thickness of 50 μm containing 12 wt% starch in transverse direction.

Starch content (%)	Sample No.	Gloss
0	1	62.6
	2	63.7
	3	63.8
	4	61.9
	5	61.5
2	1	50.1
	2	55.8
	3	53.7
	4	54.0
	5	53.4
4	1	50.4
	2	50.0
	3	50.5
	4	50.5
	5	50.5
6	1	28.4
	2	30.0
	3	28.1
	4	28.6
	5	28.6

Table C3.6 (continued).

Starch content (%)	Sample No.	Gloss
8	1	22.1
	2	20.2
	3	22.7
	4	23.1
	5	22.7
10	1	17.9
	2	18.0
	3	17.9
	4	17.4
	5	17.4
12	1	14.2
	2	15.3
	3	15.6
	4	14.6
	5	14.6

C4 Tear Resistance

Table C4.1 Data for tear resistance of untreated LDPE/starch film with thickness of 50 μm containing 12 wt% starch in machine direction.

Starch content (%)	Sample No.	Tear resistance (mN)
0	1	9040
	2	9120
	3	8800
	4	9600
	5	9040
2	1	6800
	2	7680
	3	7360
	4	6800
	5	7600
4	1	7680
	2	7680
	3	7840
	4	7520
	5	8000
6	1	7840
	2	7840
	3	8000
	4	8320
	5	8320

Table C4.1 (continued).

Starch content (%)	Sample No.	Tear resistance (mN)
8	1	8160
	2	8080
	3	8480
	4	8320
	5	8080
10	1	8000
	2	7520
	3	8080
	4	7520
	5	7680
12	1	7440
	2	6960
	3	7440
	4	7520
	5	7360

Table C4.2 Data for tear resistance of HNO₃ hydrolyzed film with thickness of 50 μm containing 12 wt% starch in machine direction.

Starch content (%)	Sample No.	Tear resistance (mN)
0	1	9040
	2	8400
	3	9600
	4	9600
	5	8800
2	1	6560
	2	6560
	3	6800
	4	6400
	5	6800
4	1	6480
	2	6400
	3	6560
	4	6640
	5	6400
6	1	5920
	2	6240
	3	6080
	4	6160
	5	6240

Table C4.2 (continued).

Starch content (%)	Sample No.	Tear resistance (mN)
8	1	5920
	2	5760
	3	6080
	4	5840
	5	5600
10	1	5440
	2	5600
	3	5280
	4	4960
	5	5040
12	1	4960
	2	5120
	3	4960
	4	4800
	5	4880

Table C4.3 Data for tear resistance of α -amylase hydrolyzed film with thickness of 50 μm containing 12 wt% starch in machine direction.

Starch content (%)	Sample No.	Tear resistance (mN)
0	1	9120
	2	9760
	3	9600
	4	8640
	5	8640
2	1	7200
	2	6880
	3	7520
	4	7040
	5	6960
4	1	6880
	2	6720
	3	6880
	4	6720
	5	6400
6	1	6400
	2	6560
	3	6400
	4	6480
	5	6400

Table C4.3 (continued).

Starch content (%)	Sample No.	Tear resistance (mN)
8	1	6000
	2	6080
	3	5760
	4	5920
	5	6240
10	1	5760
	2	5600
	3	5440
	4	5600
	5	5120
12	1	4800
	2	4960
	3	5200
	4	5280
	5	4800

Table C4.4 Data for tear resistance of untreated LDPE/starch film with thickness of 50 μm containing 12 wt% starch in transverse direction.

Starch content (%)	Sample No.	Tear resistance (mN)
0	1	10 720
	2	10 320
	3	10 720
	4	10 560
	5	10 560
2	1	8000
	2	9040
	3	7760
	4	9120
	5	8480
4	1	8800
	2	10 320
	3	8480
	4	8800
	5	9600
6	1	12 240
	2	12 080
	3	11 600
	4	10 720
	5	12 000

Table C4.4 (continued).

Starch content (%)	Sample No.	Tear resistance (mN)
8	1	11 360
	2	13 120
	3	12 160
	4	12 160
	5	11 520
10	1	10 880
	2	10 880
	3	11 280
	4	11 840
	5	11 200
12	1	7520
	2	8320
	3	7760
	4	7840
	5	7840

Table C4.5 Data for tear resistance of HNO₃ hydrolyzed film with thickness of 50 μm containing 12 wt% starch in transverse direction.

Starch content (%)	Sample No.	Tear resistance (mN)
0	1	10 560
	2	10 160
	3	10 400
	4	9760
	5	10 320
2	1	7360
	2	7200
	3	8000
	4	7760
	5	8000
4	1	7600
	2	7360
	3	7040
	4	6880
	5	7200
6	1	6560
	2	6880
	3	6720
	4	6880
	5	6880

Table C4.5 (continued).

Starch content (%)	Sample No.	Tear resistance (mN)
8	1	6560
	2	6400
	3	6480
	4	6560
	5	6400
10	1	6400
	2	6240
	3	6320
	4	6080
	5	6160
12	1	6080
	2	5920
	3	6160
	4	6000
	5	5920

Table C4.6 Data for tear resistance of α -amylase hydrolyzed film with thickness of 50 μm containing 12 wt% starch in transverse direction.

Starch content (%)	Sample No.	Tear resistance (mN)
0	1	10 720
	2	10 080
	3	9760
	4	10 320
	5	10 560
2	1	8320
	2	8560
	3	8480
	4	8640
	5	8160
4	1	8000
	2	8800
	3	8480
	4	8640
	5	8640
6	1	8000
	2	8320
	3	7680
	4	7680
	5	7520

Table C4.6 (continued).

Starch content (%)	Sample No.	Tear resistance (mN)
8	1	7200
	2	6720
	3	6880
	4	7040
	5	6720
10	1	6880
	2	6960
	3	6400
	4	6400
	5	6560
12	1	5920
	2	6000
	3	6080
	4	6400
	5	6240

Appendix D Data for gas permeability.

D1 Gas Permeability of Untreated LDPE/starch Film

Table D1.1 Data for gas permeability for N₂.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	9.1796
	2	9.1796
	3	9.1796
	4	9.1796
	5	9.1796
2	1	11.4938
	2	11.4938
	3	11.4938
	4	11.4938
	5	11.4938
4	1	12.1043
	2	12.1043
	3	12.1043
	4	12.1043
	5	12.1043
6	1	15.8126
	2	15.9045
	3	15.9045
	4	15.8126
	5	15.9045

Table D1.1 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	19.6805
	2	19.6805
	3	19.6805
	4	19.8231
	5	19.8231
10	1	21.3714
	2	21.3714
	3	21.2061
	4	21.3714
	5	21.2061
12	1	45.5927
	2	46.3656
	3	45.5927
	4	45.5927
	5	45.5927

Table D1.2 Data for gas permeability for CO₂.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	9.7008
	2	9.7008
	3	9.7008
	4	9.7008
	5	9.7008
2	1	12.2121
	2	12.2672
	3	12.2672
	4	12.2121
	5	12.2672
4	1	12.4910
	2	12.5486
	3	12.4910
	4	12.5486
	5	12.5486
6	1	17.4746
	2	17.4746
	3	17.4746
	4	17.4746
	5	17.4746

Table D1.2 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	24.4247
	2	24.4247
	3	24.2086
	4	24.2086
	5	24.4247
10	1	25.3292
	2	25.3292
	3	25.3292
	4	25.3292
	5	25.3292
12	1	51.6146
	2	51.6146
	3	51.6146
	4	51.6146
	5	51.6146

Table D1.3 Data for gas permeability for C₂H₄.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	8.0460
	2	8.0460
	3	8.0460
	4	8.0460
	5	8.0460
2	1	11.8423
	2	11.8423
	3	11.8423
	4	11.8423
	5	11.8423
4	1	11.3980
	2	11.3980
	3	11.3980
	4	11.3507
	5	11.3980
6	1	16.7824
	2	16.7824
	3	16.7824
	4	16.8863
	5	16.7824

Table D1.3 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	27.0850
	2	26.8191
	3	27.0850
	4	27.0850
	5	27.0850
10	1	25.3292
	2	25.0972
	3	25.3292
	4	25.3292
	5	25.0972
12	1	65.1310
	2	65.1310
	3	65.1310
	4	65.1310
	5	65.1310

Table D1.4 Data for gas permeability for C₃H₈.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	7.4741
	2	7.4949
	3	7.4949
	4	7.4949
	5	7.4741
2	1	8.2394
	2	8.2147
	3	8.2147
	4	8.2147
	5	8.2394
4	1	9.0883
	2	9.0583
	3	9.0883
	4	9.0883
	5	9.0883
6	1	9.4329
	2	9.3682
	3	9.4006
	4	9.4006
	5	9.4329

Table D1.4 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	10.2074
	2	10.2456
	3	10.2842
	4	10.2456
	5	10.2074
10	1	12.5486
	2	12.6646
	3	12.6646
	4	12.6061
	5	12.6061
12	1	19.9676
	2	20.1146
	3	19.8231
	4	20.1146
	5	19.8231

Table D1.5 Data for gas permeability for C₃H₆.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	8.7958
	2	8.79.58
	3	8.7958
	4	8.7678
	5	8.7678
2	1	9.8758
	2	9.8400
	3	9.8400
	4	9.8400
	5	9.8758
4	1	11.2574
	2	11.3507
	3	11.3507
	4	11.3038
	5	11.3507
6	1	12.1580
	2	12.1580
	3	12.1580
	4	12.1580
	5	12.1580

Table D1.5 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	17.0976
	2	17.0976
	3	16.9912
	4	16.9912
	5	16.9912
10	1	25.3292
	2	25.3292
	3	25.3292
	4	24.8690
	5	24.8690
12	1	44.1221
	2	43.4216
	3	44.1221
	4	43.4216
	5	44.1221

D2 Gas Permeability of HNO₃ Hydrolyzed Film

Table D2.1 Data for gas permeability for N₂.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	8.8243
	2	8.8243
	3	8.8243
	4	8.8243
	5	8.8243
2	1	232.8145
	2	232.8145
	3	232.8145
	4	232.8145
	5	232.8145
4	1	266.8810
	2	266.8810
	3	266.8810
	4	266.8810
	5	266.8810
6	1	280.5666
	2	287.9532
	3	280.5666
	4	287.9532
	5	287.9532

Table D2.1 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	303.9495
	2	303.9495
	3	303.9495
	4	303.9495
	5	303.9495
10	1	312.6317
	2	312.6317
	3	312.6317
	4	312.6317
	5	312.6317
12	1	475.7469
	2	475.7469
	3	475.7469
	4	497.3895
	5	497.3895

Table D2.2 Data for gas permeability for CO₂.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	9.2729
	2	9.2729
	3	9.2729
	4	9.2729
	5	9.2729
2	1	188.6590
	2	188.6590
	3	191.9656
	4	191.9656
	5	191.9656
4	1	210.4273
	2	210.4273
	3	214.5509
	4	214.5509
	5	214.5509
6	1	280.5666
	2	280.5666
	3	273.5570
	4	280.5666
	5	273.5570

Table D2.2 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	331.5817
	2	331.5817
	3	331.5817
	4	331.5817
	5	331.5817
10	1	280.5666
	2	280.5666
	3	280.5666
	4	280.5666
	5	280.5666
12	1	521.0287
	2	497.3895
	3	521.0287
	4	497.3895
	5	497.3895

Table D2.3 Data for gas permeability for C₂H₄.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	9.5649
	2	9.5649
	3	9.5316
	4	9.5316
	5	9.5316
2	1	243.1596
	2	237.8710
	3	243.1596
	4	243.1596
	5	237.8710
4	1	260.5289
	2	260.5289
	3	260.5289
	4	260.5289
	5	260.5289
6	1	312.6317
	2	312.6317
	3	303.9495
	4	303.9495
	5	303.9495

Table D1.1 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	364.7394
	2	364.7394
	3	364.7394
	4	364.7394
	5	364.7394
10	1	377.3180
	2	364.7394
	3	364.7394
	4	377.3180
	5	377.3180
12	1	607.8991
	2	607.8991
	3	607.8991
	4	607.8991
	5	575.8967

Table D2.4 Data for gas permeability for C₃H₈.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	8.2394
	2	8.2147
	3	8.2394
	4	8.2147
	5	8.2394
2	1	118.9355
	2	118.9355
	3	118.9355
	4	117.6593
	5	117.6593
4	1	143.9766
	2	142.1058
	3	140.2833
	4	140.2833
	5	140.2833
6	1	131.8331
	2	131.8331
	3	133.4429
	4	133.0865
	5	133.4429

Table D2.4 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	133.4429
	2	131.8331
	3	131.8331
	4	131.8331
	5	131.8331
10	1	135.0865
	2	136.7785
	3	133.4429
	4	133.4429
	5	135.0865
12	1	158.5807
	2	165.7884
	3	163.3182
	4	165.7884
	5	160.9156

Table D2.5 Data for gas permeability for C₃H₆.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	8.6024
	2	8.6024
	3	8.6024
	4	8.5754
	5	8.5754
2	1	149.8936
	2	151.9772
	3	149.8936
	4	149.8936
	5	151.9772
4	1	158.5807
	2	158.5807
	3	158.5807
	4	160.9156
	5	158.5807
6	1	154.1139
	2	151.9772
	3	154.1139
	4	154.1139
	5	151.9772

Table D2.5 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	151.9772
	2	151.9772
	3	154.1139
	4	154.1139
	5	154.1139
10	1	142.1058
	2	140.2833
	3	133.4429
	4	133.4429
	5	133.4429
12	1	179.3774
	2	179.3774
	3	176.4865
	4	173.6827
	5	173.6827

D3 Gas Permeability of α -Amylase Hydrolyzed Film

Table D3.1 Data for gas permeability for N₂.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	11.0751
	2	11.0751
	3	11.0751
	4	11.0751
	5	11.0751
2	1	182.3697
	2	182.3697
	3	182.3697
	4	182.3697
	5	182.3637
4	1	227.9609
	2	227.9609
	3	227.9607
	4	223.3104
	5	223.3104
6	1	260.5289
	2	260.5289
	3	260.5289
	4	260.5289
	5	260.5289

Table D3.1 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	280.5666
	2	280.5666
	3	280.5666
	4	273.5570
	5	280.5666
10	1	312.6317
	2	312.6317
	3	312.6317
	4	312.6317
	5	312.6317
12	1	420.8547
	2	405.2644
	3	420.8547
	4	420.8547
	5	420.8547

Table D3.2 Data for gas permeability for CO₂.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	11.1655
	2	11.1655
	3	11.1655
	4	11.2114
	5	11.2114
2	1	107.2754
	2	107.2754
	3	106.2361
	4	106.2361
	5	107.2754
4	1	117.6593
	2	117.6593
	3	116.4072
	4	116.4072
	5	116.4072
6	1	131.8331
	2	131.8331
	3	130.2620
	4	131.8331
	5	130.2620

Table D3.2 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	260.5289
	2	260.5289
	3	260.5289
	4	254.4668
	5	254.4668
10	1	377.3180
	2	364.7394
	3	364.7394
	4	352.9730
	5	364.7394
12	1	364.7394
	2	364.7394
	3	364.7394
	4	364.7394
	5	364.7394

Table D3.3 Data for gas permeability for C₂H₄.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	11.3567
	2	11.3038
	3	11.3038
	4	11.3038
	5	11.3038
2	1	98.5787
	2	98.5787
	3	98.5787
	4	98.5787
	5	98.5787
4	1	104.2106
	2	104.2106
	3	104.2106
	4	104.2292
	5	103.2292
6	1	108.3390
	2	108.3390
	3	109.4218
	4	108.3390
	5	108.3390

Table D3.3 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	254.4668
	2	243.1596
	3	254.4668
	4	248.6851
	5	243.1596
10	1	475.7469
	2	475.7469
	3	475.7469
	4	475.7469
	5	475.7469
12	1	521.0287
	2	521.0287
	3	521.0287
	4	521.0287
	5	521.0287

Table D3.4 Data for gas permeability for C₃H₈.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	9.9836
	2	9.9473
	3	9.9473
	4	9.9115
	5	9.9115
2	1	64.7443
	2	64.3672
	3	64.3672
	4	64.3672
	5	64.7443
4	1	81.0548
	2	81.0548
	3	81.0548
	4	80.4554
	5	80.4554
6	1	91.1824
	2	90.4331
	3	92.7294
	4	93.5222
	5	92.7294



Table D3.4 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	135.0865
	2	135.0865
	3	133.4429
	4	135.0865
	5	135.0865
10	1	138.5091
	2	138.5091
	3	138.5091
	4	138.5091
	5	140.2833
12	1	156.3183
	2	156.3183
	3	156.3183
	4	154.1139
	5	154.1139

Table D3.5 Data for gas permeability for C₃H₆.

Starch content (%)	Sample No.	Gas permeability (barrers)
0	1	11.1201
	2	11.1655
	3	11.1655
	4	11.1655
	5	11.1655
2	1	70.1440
	2	70.1440
	3	70.1440
	4	69.6945
	5	69.6945
4	1	90.4331
	2	90.4331
	3	90.4331
	4	89.6887
	5	89.6887
6	1	95.9828
	2	93.5222
	3	95.1513
	4	93.5222
	5	93.5222

Table D3.5 (continued).

Starch content (%)	Sample No.	Gas permeability (barrers)
8	1	138.5091
	2	138.5091
	3	138.5091
	4	138.5091
	5	136.7785
10	1	142.1058
	2	142.1058
	3	142.1058
	4	142.1058
	5	140.2833
12	1	160.9156
	2	160.9156
	3	158.5807
	4	158.5807
	5	158.5807

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