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APPENDICES

APPENDIX A
THE EXPERIMENTAL DATA OF PHYSICAL PROPERTIES

Appendix A1 Water absorption

Table A1-1 Water absorption of PA6 and PA6/GF composites

Week	Material	Mass (g)					Average (g)
		1	2	3	4	5	
0	PA6	6.7888	6.8071	7.0092	6.6943	6.8287	6.8256±0.1147
	PA6/GF (15 wt%)	7.5789	7.5234	7.4908	7.5270	7.7368	7.5714±0.0977
	PA6/GF (30 wt%)	8.4333	8.4525	8.4209	8.3947	8.4838	8.4376±0.0327
1	PA6	7.0564	7.1025	7.1948	7.0735	7.1084	7.1071±0.0534
	PA6/GF (15 wt%)	7.8488	7.7885	7.7579	7.8005	8.0066	7.8405±0.0985
	PA6/GF (30 wt%)	8.6835	8.7028	8.6676	8.6386	8.7278	8.6841±0.0339
2	PA6	7.2540	7.2670	7.4582	7.1462	7.2782	7.2807±0.1124
	PA6/GF (15 wt%)	7.9376	7.8754	7.8458	7.8883	8.0910	7.9276±0.0972
	PA6/GF (30 wt%)	8.7467	8.7608	8.7325	8.7035	8.7927	8.7472±0.0331
3	PA6	7.2843	7.2970	7.4885	7.1763	7.3084	7.3109±0.1124
	PA6/GF (15 wt%)	7.9980	7.9355	7.9049	7.9479	8.1549	7.9882±0.0990
	PA6/GF (30 wt%)	8.7916	8.8069	8.7777	8.7485	8.8383	8.7926±0.0334
5	PA6	7.2846	7.2970	7.4888	7.1764	7.3085	7.3111±0.1125
	PA6/GF (15 wt%)	8.0231	7.9631	7.9322	7.9734	8.1846	8.0153±0.1001
	PA6/GF (30 wt%)	8.8158	8.8471	8.8119	8.7863	8.8725	8.8267±0.0335
7	PA6	7.2842	7.3014	7.4912	7.1775	7.3202	7.3149±0.1130
	PA6/GF (15 wt%)	8.0247	7.9617	7.9306	7.9729	8.1856	8.0151±0.1012
	PA6/GF (30 wt%)	8.8342	8.8527	8.8373	8.8067	8.8936	8.8449±0.0319
10	PA6	7.2746	7.2933	7.4846	7.1690	7.3132	7.3069±0.1139
	PA6/GF (15 wt%)	8.0393	7.9750	7.9440	7.9873	8.1996	8.0290±0.1014
	PA6/GF (30 wt%)	8.8348	8.8543	8.8397	8.8079	8.8934	8.8460±0.0314
13	PA6	7.2742	7.2922	7.4832	7.1686	7.3116	7.3060±0.1135
	PA6/GF (15 wt%)	8.0235	7.9601	7.9287	7.9707	8.1852	8.0136±0.1018
	PA6/GF (30 wt%)	8.8380	8.8575	8.8429	8.8111	8.8966	8.8492±0.0314

Week	Material	Mass (g)					Average (g)
		1	2	3	4	5	
16	PA6	7.2737	7.2910	7.4819	7.1683	7.3099	7.3050±0.1131
	PA6/GF (15 wt%)	8.0268	7.9646	7.9348	7.9752	8.1886	8.0180±0.1010
	PA6/GF (30 wt%)	8.8401	8.8575	8.8457	8.8118	8.8969	8.8504±0.0309

Appendix A2 Mass change

Table A2-1 Mass of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Mass (g)					Average (g)
		1	2	3	4	5	
0	Aggressive Ethanol	6.7582	6.8205	6.7421	6.9603	6.6771	6.7916±0.0956
	Ethanol	6.8659	6.8867	6.8186	6.9262	6.7677	6.8530±0.0615
	Isooctane	6.8077	6.7542	6.7517	6.7820	6.7314	6.7654±0.0297
	Toluene	6.8532	6.7308	6.7872	6.7305	6.9258	6.8055±0.0841
1	Aggressive Ethanol	6.9287	6.9754	6.8887	7.0970	6.8379	6.9455±0.0987
	Ethanol	6.9899	7.0305	6.9435	7.0238	6.9021	6.9780±0.0547
	Isooctane	6.8180	6.7618	6.7593	6.7882	6.7347	6.7724±0.0318
	Toluene	6.8690	6.7465	6.803	6.7469	6.9423	6.8216±0.0842
2	Aggressive Ethanol	7.0950	7.1227	7.0329	7.2215	6.9980	7.0940±0.0866
	Ethanol	7.1131	7.1691	7.0673	7.1185	7.0329	7.1002±0.0521
	Isooctane	6.8220	6.7692	6.7662	6.7959	6.7458	6.7798±0.0296
	Toluene	6.8993	6.7759	6.8298	6.7749	6.9668	6.8493±0.0831
3	Aggressive Ethanol	7.1408	7.1618	7.0712	7.2523	7.0451	7.1342±0.0816
	Ethanol	7.1464	7.2059	7.1019	7.1434	7.0713	7.1338±0.0509
	Isooctane	6.8306	6.7712	6.7698	6.7994	6.7541	6.7850±0.0303
	Toluene	6.9074	6.7833	6.8380	6.7829	6.9758	6.8575±0.0836
5	Aggressive Ethanol	7.1953	7.2044	7.1152	7.2848	7.0983	7.1796±0.0753
	Ethanol	7.1770	7.2432	7.1320	7.1642	7.1054	7.1644±0.0522
	Isooctane	6.8412	6.7851	6.7830	6.8122	6.7623	6.7968±0.0305
	Toluene	6.9134	6.7891	6.8436	6.7885	6.9871	6.8643±0.0856

Week	Chemical	Mass (g)					Average (g)
		1	2	3	4	5	
7	Aggressive Ethanol	7.3398	7.3462	7.2587	7.3922	7.2376	7.3149±0.0646
	Ethanol	7.2915	7.3852	7.2632	7.2410	7.2538	7.2869±0.0580
	Isooctane	6.8555	6.7975	6.7961	6.8254	6.7746	6.8098±0.0313
	Toluene	6.9260	6.8012	6.8554	6.8004	6.9935	6.8753±0.0837
10	Aggressive Ethanol	7.3543	7.3930	7.2966	7.4729	7.2526	7.3539±0.0855
	Ethanol	7.3957	7.4666	7.3589	7.3162	7.3294	7.3734±0.0604
	Isooctane	6.8630	6.8094	6.8030	6.8343	6.7867	6.8193±0.0298
	Toluene	6.9427	6.8195	6.8745	6.8178	7.0109	6.8931±0.0833
13	Aggressive Ethanol	7.3619	7.4037	7.3050	7.4981	7.2595	7.3656±0.0921
	Ethanol	7.4255	7.4793	7.3795	7.3840	7.3403	7.4017±0.0528
	Isooctane	6.8859	6.8264	6.8250	6.8604	6.8068	6.8409±0.0317
	Toluene	6.9575	6.8330	6.8872	6.8294	7.0260	6.9066±0.0846
16	Aggressive Ethanol	7.3686	7.4109	7.3121	7.5096	7.2657	7.3734±0.0940
	Ethanol	7.4353	7.4858	7.3861	7.4196	7.3463	7.4146±0.0524
	Isooctane	6.9021	6.8442	6.8428	6.8715	6.8212	6.8564±0.0312
	Toluene	6.9615	6.8363	6.8908	6.8354	7.0283	6.9105±0.0837

Table A2-2 Mass of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Mass (g)					Average (g)
		1	2	3	4	5	
0	Aggressive Ethanol	7.5358	7.6150	7.4853	7.5167	7.6153	7.5536±0.0590
	Ethanol	7.5380	7.7000	7.6169	7.5046	7.5567	7.5832±0.0770
	Isooctane	7.6822	7.5820	7.6674	7.5583	7.6644	7.6309±0.0565
	Toluene	7.5531	7.3676	7.5942	7.4106	7.5131	7.4877±0.0957
1	Aggressive Ethanol	7.6723	7.7569	7.6226	7.6504	7.7482	7.6901±0.0598
	Ethanol	7.6403	7.8102	7.7416	7.6225	7.6724	7.6974±0.0777
	Isooctane	7.7147	7.6066	7.6989	7.5939	7.6977	7.6624±0.0573
	Toluene	7.6319	7.4038	7.5867	7.4443	7.5491	7.5232±0.0962
2	Aggressive Ethanol	7.7147	7.8010	7.6644	7.6916	7.7878	7.7319±0.0599
	Ethanol	7.6723	7.8448	7.7788	7.6593	7.7067	7.7324±0.0781
	Isooctane	7.7188	7.6148	7.7050	7.5990	7.7038	7.6683±0.0566
	Toluene	7.6403	7.4118	7.5948	7.4531	7.5563	7.5313±0.0961
3	Aggressive Ethanol	7.7608	7.8475	7.7100	7.7362	7.8312	7.7771±0.0598
	Ethanol	7.7075	7.8835	7.8196	7.6985	7.7452	7.7709±0.0790
	Isooctane	7.7254	7.6218	7.7119	7.6032	7.7083	7.6741±0.0570
	Toluene	7.6469	7.4185	7.6015	7.4596	7.5623	7.5378±0.0961
5	Aggressive Ethanol	7.8275	7.9118	7.7734	7.7986	7.8930	7.8409±0.0597
	Ethanol	7.7534	7.9352	7.8723	7.7497	7.8051	7.8231±0.0799
	Isooctane	7.7355	7.6362	7.7240	7.6163	7.7246	7.6873±0.0564
	Toluene	7.6566	7.4369	7.6113	7.4724	7.5686	7.5492±0.0926

Week	Chemical	Mass (g)					Average (g)
		1	2	3	4	5	
7	Aggressive Ethanol	7.8907	7.9696	7.8319	7.8549	7.9477	7.8990±0.0589
	Ethanol	7.8438	7.9821	7.9233	7.7977	7.7952	7.8684±0.0820
	Isooctane	7.7524	7.6433	7.7280	7.6222	7.7359	7.6964±0.0592
	Toluene	7.6678	7.4403	7.6223	7.5835	7.4796	7.5587±0.0960
10	Aggressive Ethanol	7.9903	8.0605	7.9234	7.9424	8.0378	7.9909±0.0591
	Ethanol	7.8568	8.0571	8.0056	7.8701	7.9188	7.9417±0.0870
	Isooctane	7.7600	7.6572	7.7411	7.6331	7.7409	7.7065±0.0571
	Toluene	7.6851	7.4546	7.6374	7.5973	7.4918	7.5732±0.0974
13	Aggressive Ethanol	8.0344	8.1064	7.9649	7.9911	8.0996	8.0393±0.0633
	Ethanol	7.9161	8.1270	8.0774	7.9361	7.9889	8.0091±0.0908
	Isooctane	7.7622	7.6574	7.7449	7.6364	7.7437	7.7089±0.0576
	Toluene	7.687	7.4579	7.6418	7.6012	7.4983	7.5772±0.0965
16	Aggressive Ethanol	8.0483	8.1228	7.9791	8.0076	8.1263	8.0568±0.0666
	Ethanol	7.9584	8.1585	8.0946	7.9594	8.0116	8.0365±0.0879
	Isooctane	7.7683	7.6664	7.7541	7.6441	7.7514	7.7169±0.0572
	Toluene	7.6973	7.4662	7.6506	7.6093	7.5074	7.5862±0.0970

Table A2-3 Mass of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Mass (g)					Average (g)
		1	2	3	4	5	
0	Aggressive Ethanol	8.3688	8.3692	8.4209	8.3218	8.3381	8.3638±0.0379
	Ethanol	8.4018	8.2692	8.4253	8.3624	8.4041	8.3726±0.0621
	Isooctane	8.4827	8.4007	8.3882	8.3696	8.4088	8.4100±0.0432
	Toluene	8.3427	8.3753	8.3900	8.4471	8.3590	8.3828±0.0401
1	Aggressive Ethanol	8.5524	8.5569	8.6024	8.4995	8.5273	8.5477±0.0382
	Ethanol	8.4832	8.3144	8.4911	8.4403	8.4988	8.4456±0.0767
	Isooctane	8.5108	8.4256	8.4229	8.4034	8.4435	8.4412±0.0414
	Toluene	8.3745	8.4071	8.4218	8.4789	8.3908	8.4146±0.0401
2	Aggressive Ethanol	8.5815	8.5808	8.6515	8.5494	8.5874	8.5901±0.0374
	Ethanol	8.5304	8.3982	8.5495	8.5241	8.8531	8.5171±0.0703
	Isooctane	8.5138	8.4318	8.4272	8.4075	8.4481	8.4457±0.0407
	Toluene	8.3855	8.4190	8.4456	8.4991	8.4119	8.4322±0.0431
3	Aggressive Ethanol	8.6308	8.6201	8.6757	8.5887	8.6094	8.6249±0.0324
	Ethanol	8.5631	8.4309	8.5822	8.5568	8.6158	8.5498±0.0703
	Isooctane	8.5153	8.4330	8.4285	8.4089	8.4497	8.4471±0.0408
	Toluene	8.3878	8.4227	8.4480	8.5013	8.4140	8.4348±0.0430
5	Aggressive Ethanol	8.6590	8.6494	8.7053	8.6161	8.6384	8.6536±0.0330
	Ethanol	8.5910	8.4586	8.6088	8.5852	8.6436	8.5774±0.0702
	Isooctane	8.5171	8.4345	8.4298	8.4106	8.4511	8.4486±0.0409
	Toluene	8.3895	8.4245	8.4499	8.5031	8.4156	8.4365±0.0430

Week	Chemical	Mass (g)					Average (g)
		1	2	3	4	5	
7	Aggressive Ethanol	8.6803	8.6688	8.7490	8.6515	8.6828	8.6865±0.0371
	Ethanol	8.6058	8.4839	8.6316	8.6590	8.7227	8.6206±0.0879
	Isooctane	8.5206	8.4383	8.4337	8.4144	8.4553	8.4525±0.0408
	Toluene	8.3905	8.4253	8.4520	8.5050	8.4178	8.4381±0.0433
10	Aggressive Ethanol	8.6715	8.6908	8.7942	8.6881	8.7076	8.7104±0.0485
	Ethanol	8.6613	8.5462	8.6901	8.7284	8.7879	8.6828±0.0899
	Isooctane	8.5361	8.4536	8.4532	8.4326	8.4736	8.4698±0.0398
	Toluene	8.4024	8.4314	8.4628	8.5153	8.4274	8.4479±0.0434
13	Aggressive Ethanol	8.6994	8.7347	8.8290	8.7352	8.7411	8.7479±0.0483
	Ethanol	8.7051	8.5880	8.7310	8.7697	8.8282	8.7244±0.0892
	Isooctane	8.5454	8.4618	8.4603	8.4405	8.4811	8.4778±0.0404
	Toluene	8.4152	8.4445	8.4749	8.5270	8.4388	8.4601±0.0430
16	Aggressive Ethanol	8.7257	8.7493	8.8447	8.7515	8.7602	8.7663±0.0457
	Ethanol	8.7445	8.6267	8.7683	8.8092	8.8643	8.7626±0.0885
	Isooctane	8.5515	8.4682	8.4670	8.4464	8.4869	8.4840±0.0404
	Toluene	8.4367	8.4682	8.4993	8.5509	8.4622	8.4835±0.0438

Appendix A3 Volume change

Table A3-1 Volume of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Volume (cm ³)					Average (cm ³)
		1	2	3	4	5	
0	Aggressive Ethanol	5.9154	5.9551	5.8814	6.0550	5.8168	5.9247±0.0794
	Ethanol	6.0854	6.2015	6.1023	6.2078	6.0643	6.1323±0.0675
	Isooctane	5.9376	5.9016	5.8861	5.9694	5.8714	5.9132±0.0399
	Toluene	6.0043	5.8797	5.9229	5.9156	6.0497	5.9544±0.0701
1	Aggressive Ethanol	6.1055	6.1425	6.0473	6.2103	6.0089	6.1264±0.0714
	Ethanol	6.1553	6.2064	6.1373	6.2494	6.1260	6.1828±0.0601
	Isooctane	5.9442	5.9071	5.8977	5.9769	5.8734	5.9199±0.0408
	Toluene	6.0702	5.9049	5.9350	5.8892	6.0293	5.9657±0.0798
2	Aggressive Ethanol	6.3432	6.3323	6.2504	6.3805	6.2328	6.3078±0.0634
	Ethanol	6.3011	6.3463	6.2525	6.2674	6.2407	6.2816±0.0427
	Isooctane	5.9508	5.9127	5.9190	5.9854	5.8714	5.9278±0.0428
	Toluene	6.0483	5.9245	5.9845	5.9122	6.0640	5.9867±0.0693
3	Aggressive Ethanol	6.3863	6.3771	6.2979	6.4207	6.2798	6.3523±0.606
	Ethanol	6.3184	6.3755	6.2843	6.2697	6.2669	6.3030±0.0454
	Isooctane	5.9562	5.9147	5.9211	5.9866	5.8728	5.9303±0.0432
	Toluene	6.0553	5.9281	6.0029	5.9162	6.0825	5.9970±0.0742
5	Aggressive Ethanol	6.4654	6.4381	6.3768	6.4820	6.3502	6.4225±0.0569
	Ethanol	6.3530	6.4262	6.3255	6.3115	6.3272	6.3487±0.0458
	Isooctane	5.9758	5.9369	5.9217	6.0066	5.8939	5.9470±0.0445
	Toluene	6.0603	5.9299	5.9925	5.9409	6.0912	6.0029±0.0714

Week	Chemical	Volume (cm ³)					Average (cm ³)
		1	2	3	4	5	
7	Aggressive Ethanol	6.5743	6.5424	6.4900	6.5603	6.4591	6.5252±0.0488
	Ethanol	6.4943	6.5759	6.4816	6.3890	6.4859	6.4853±0.0663
	Isooctane	5.9692	5.9385	5.9404	6.0264	5.9057	5.9560±0.0453
	Toluene	6.0424	5.9775	5.9981	5.9468	6.0738	6.0077±0.0507
10	Aggressive Ethanol	6.6083	6.6393	6.5909	6.6767	6.5046	6.6039±0.0644
	Ethanol	6.6245	6.6662	6.5958	6.4829	6.5808	6.5900±0.0682
	Isooctane	5.9751	5.9489	5.9259	6.0279	5.9125	5.9581±0.0457
	Toluene	6.0766	5.9610	6.0159	5.9572	6.1067	6.0235±0.0673
13	Aggressive Ethanol	6.6983	6.6204	6.6981	6.4408	6.6422	6.6199±0.1059
	Ethanol	6.6616	6.7026	6.6280	6.5673	6.6099	6.6339±0.0513
	Isooctane	6.0315	5.9680	5.9585	6.0640	5.9490	5.9942±0.0507
	Toluene	5.9682	6.0148	5.9680	6.1574	6.0036	6.0224±0.0783
16	Aggressive Ethanol	6.7166	6.5839	6.7130	6.4460	6.6454	6.6210±0.11
	Ethanol	6.6707	6.7293	6.6259	6.5921	6.6248	6.6485±0.0531
	Isooctane	6.0462	5.9751	5.9654	6.0717	5.9568	6.0030±0.0522
	Toluene	5.9750	6.0017	5.9926	6.1554	6.0054	6.0260±0.0732

Table A3-2 Volume of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Volume (cm ³)					Average (cm ³)
		1	2	3	4	5	
0	Aggressive Ethanol	6.0286	6.0920	5.9882	6.0134	6.0922	6.0429±0.0472
	Ethanol	6.0304	6.1600	6.0935	6.0037	6.0454	6.0666±0.0616
	Isooctane	6.1458	6.0656	6.1339	6.0466	6.1315	6.1047±0.0452
	Toluene	6.0425	5.8941	6.0754	5.9285	6.0105	5.9902±0.0766
1	Aggressive Ethanol	6.1378	6.2055	6.0981	6.1203	6.1986	6.1521±0.0478
	Ethanol	6.1122	6.2482	6.1933	6.0908	6.1379	6.1579±0.0622
	Isooctane	6.1718	6.0853	6.1591	6.0751	6.1582	6.1299±0.0458
	Toluene	6.1055	5.9230	6.0694	5.9554	6.0393	6.0185±0.0769
2	Aggressive Ethanol	6.1817	6.2408	6.1315	6.1533	6.2302	6.1855±0.0480
	Ethanol	6.1378	6.2758	6.2230	6.1274	6.1654	6.1859±0.0625
	Isooctane	6.1750	6.0918	6.1640	6.0792	6.1630	6.1346±0.0453
	Toluene	6.1122	5.9294	6.0758	5.9625	6.0450	6.0250±0.0769
3	Aggressive Ethanol	6.2086	6.2780	6.1680	6.1890	6.2650	6.2217±0.0479
	Ethanol	6.1660	6.3068	6.2557	6.1588	6.1962	6.2167±0.0632
	Isooctane	6.1803	6.0974	6.1695	6.0826	6.1666	6.1393±0.0456
	Toluene	6.1175	5.9348	6.0812	5.9677	6.0498	6.0302±0.0768
5	Aggressive Ethanol	6.2620	6.3294	6.2187	6.2389	6.3144	6.2727±0.0478
	Ethanol	6.2027	6.3481	6.2978	6.1998	6.2441	6.2585±0.0639
	Isooctane	6.1884	6.1090	6.1792	6.0930	6.1797	6.1499±0.0451
	Toluene	6.1253	5.9495	6.0890	5.9779	6.0549	6.0393±0.0741

Week	Chemical	Volume (cm ³)					Average (cm ³)
		1	2	3	4	5	
7	Aggressive Ethanol	6.3126	6.3757	6.2655	6.2839	6.3582	6.3192±0.0471
	Ethanol	6.2750	6.3857	6.3386	6.2382	6.2362	6.2947±0.0656
	Isooctane	6.2019	6.1146	6.1824	6.0978	6.1887	6.1571±0.0474
	Toluene	6.1342	5.9522	6.0978	6.0668	5.9837	6.0470±0.0768
10	Aggressive Ethanol	6.3922	6.4484	6.3387	6.3539	6.4302	6.3927±0.0472
	Ethanol	6.2854	6.4457	6.4045	6.2961	6.3350	6.3533±0.0696
	Isooctane	6.2080	6.1258	6.1929	6.1065	6.1927	6.1652±0.0457
	Toluene	6.1481	5.9637	6.1099	6.0778	5.9934	6.0586±0.0779
13	Aggressive Ethanol	6.4275	6.4851	6.3719	6.3929	6.4797	6.4314±0.0506
	Ethanol	6.3329	6.5016	6.4619	6.3489	6.3911	6.4073±0.0726
	Isooctane	6.2098	6.1259	6.1959	6.1091	6.1950	6.1671±0.0461
	Toluene	6.1496	5.9663	6.1134	6.0810	5.9986	6.0618±0.0772
16	Aggressive Ethanol	6.4386	6.4982	6.3833	6.4061	6.5010	6.4455±0.0532
	Ethanol	6.3667	6.5268	6.4757	6.3675	6.4093	6.4292±0.0703
	Isooctane	6.2146	6.1331	6.2033	6.1153	6.2011	6.1735±0.0457
	Toluene	6.1578	5.9730	6.1205	6.0874	6.0059	6.0689±0.0776

Table A3-3 Volume of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Volume (cm ³)					Average (cm ³)
		1	2	3	4	5	
0	Aggressive Ethanol	6.1991	6.1994	6.2377	6.1643	6.1764	6.1954±0.0281
	Ethanol	6.1778	6.0803	6.1951	6.1488	6.1795	6.1563±0.0457
	Isooctane	6.2373	6.1770	6.1678	6.1541	6.1829	6.1838±0.0318
	Toluene	6.1343	6.1583	6.1691	6.2111	6.1463	6.1638±0.0295
1	Aggressive Ethanol	6.3351	6.3384	6.3721	6.2959	6.3165	6.3316±0.0283
	Ethanol	6.2376	6.1135	6.2435	6.2061	6.2491	6.2100±0.0564
	Isooctane	6.2579	6.1953	6.1933	6.1790	6.2085	6.2068±0.0304
	Toluene	6.1577	6.1817	6.1925	6.2345	6.1697	6.1872±0.0295
2	Aggressive Ethanol	6.3567	6.3561	6.4085	6.3329	6.3611	6.3631±0.0277
	Ethanol	6.2724	6.1751	6.2864	6.2677	6.3111	6.2625±0.0517
	Isooctane	6.2601	6.1999	6.1965	6.1820	6.2118	6.2100±0.0300
	Toluene	6.1658	6.1904	6.2100	6.2493	6.1852	6.2002±0.0317
3	Aggressive Ethanol	6.3932	6.3853	6.4264	6.3620	6.3773	6.3888±0.0240
	Ethanol	6.2964	6.1992	6.3104	6.2918	6.3351	6.2866±0.0517
	Isooctane	6.2613	6.2007	6.1974	6.1830	6.2130	6.2111±0.0300
	Toluene	6.1675	6.1932	6.2118	6.2510	6.1868	6.2020±0.0316
5	Aggressive Ethanol	6.4140	6.4070	6.4484	6.3823	6.3988	6.4101±0.0245
	Ethanol	6.3169	6.2196	6.3300	6.3126	6.3556	6.3069±0.0516
	Isooctane	6.2626	6.2018	6.1984	6.1843	6.2140	6.2122±0.0301
	Toluene	6.1688	6.1945	6.2132	6.2523	6.1879	6.2033±0.0316

Week	Chemical	Volume (cm ³)					Average (cm ³)
		1	2	3	4	5	
7	Aggressive Ethanol	6.4298	6.4213	6.4807	6.4085	6.4317	6.4344±0.0275
	Ethanol	6.3278	6.2382	6.3468	6.3669	6.4138	6.3387±0.0647
	Isooctane	6.2651	6.2046	6.2013	6.1871	6.2171	6.2150±0.0300
	Toluene	6.1695	6.1951	6.2147	6.2537	6.1896	6.2045±0.0319
10	Aggressive Ethanol	6.4233	6.4376	6.5142	6.4356	6.4500	6.4522±0.0360
	Ethanol	6.3686	6.2840	6.3898	6.4179	6.4617	6.3844±0.0661
	Isooctane	6.2765	6.2159	6.2156	6.2004	6.2306	6.2278±0.0293
	Toluene	6.1782	6.1996	6.2227	6.2613	6.1966	6.2117±0.0319
13	Aggressive Ethanol	6.4440	6.4710	6.5400	6.4705	6.4749	6.4799±0.0357
	Ethanol	6.4008	6.3147	6.4199	6.4483	6.4913	6.4150±0.0656
	Isooctane	6.2834	6.2219	6.2208	6.2063	6.2361	6.2337±0.0297
	Toluene	6.1876	6.2092	6.2316	6.2699	6.2050	6.2206±0.0316
16	Aggressive Ethanol	6.4635	6.4810	6.5516	6.4826	6.4890	6.4935±0.0338
	Ethanol	6.4298	6.3432	6.4473	6.4774	6.5179	6.4431±0.0651
	Isooctane	6.2879	6.2266	6.2257	6.2106	6.2404	6.2382±0.0297
	Toluene	6.2035	6.2266	6.2495	6.2874	6.2222	6.2378±0.0322

APPENDIX B
THE EXPERIMENTAL DATA OF THERMAL PROPERTIES

Appendix B1 Heat distortion temperature

Table B1-1 Heat distortion temperature of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Heat distortion temperature (°C)			Average (°C)
		1	2	3	
0	Aggressive Ethanol	83.9	82.9	84.5	83.77±0.81
	Ethanol				
	Isooctane				
	Toluene				
2	Aggressive Ethanol	59.7	56.5	60.2	58.80±2.01
	Ethanol	60.1	58.7	63.7	60.83±2.58
	Isooctane	82.8	80.8	81.1	81.57±1.08
	Toluene	74.3	73.4	74.2	73.97±0.49
5	Aggressive Ethanol	56.7	55.2	54.5	55.47±1.12
	Ethanol	58.2	57.4	59.2	58.27±0.90
	Isooctane	78.4	79	75.9	77.77±1.64
	Toluene	69.7	71.7	71.8	71.07±1.18
10	Aggressive Ethanol	54.4	56.2	55.4	55.33±0.90
	Ethanol	54.9	55.1	56.3	55.43±0.76
	Isooctane	73.3	72.7	72.3	72.77±0.50
	Toluene	68.2	66	65.8	66.67±1.33
16	Aggressive Ethanol	54.4	51.2	53.9	53.17±1.72
	Ethanol	53.9	53.6	52.2	53.23±0.91
	Isooctane	70.7	70	62.5	67.73±4.55
	Toluene	64.3	61.9	60.6	62.27±1.88

Table B1-2 Heat distortion temperature of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Heat distortion temperature (°C)			Average (°C)
		1	2	3	
0	Aggressive Ethanol	176.3	176.5	176.7	176.5±0.20
	Ethanol				
	Isooctane				
	Toluene				
2	Aggressive Ethanol	119.4	117.5	114.8	117.23±2.31
	Ethanol	125.9	126.4	131.6	127.97±3.16
	Isooctane	160.1	156.5	160.1	158.90±2.08
	Toluene	150.2	150	141.2	147.13±5.14
5	Aggressive Ethanol	95.2	101.6	109.6	102.13±7.21
	Ethanol	115.1	116.6	105.9	112.53±5.79
	Isooctane	145.3	150.2	146.5	147.33±2.55
	Toluene	129.2	134.5	137.8	133.83±4.34
10	Aggressive Ethanol	92.4	89.1	93.2	91.57±2.17
	Ethanol	103	102	103.3	102.77±0.68
	Isooctane	142.4	138	133.5	137.97±4.45
	Toluene	118.3	112.3	113.7	114.77±3.14
16	Aggressive Ethanol	82.1	85.7	80.5	82.77±2.66
	Ethanol	81.5	91.1	89.8	87.47±5.21
	Isooctane	122.7	119.2	117.6	119.83±2.61
	Toluene	109.4	108.5	106.2	108.03±1.65

Table B1-3 Heat distortion temperature of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Heat distortion temperature (°C)			Average (°C)
		1	2	3	
0	Aggressive Ethanol	181.8	183	183.2	182.67±0.76
	Ethanol				
	Isooctane				
	Toluene				
2	Aggressive Ethanol	153.2	147	142.7	147.63±5.28
	Ethanol	149.5	156.5	150.5	152.17±3.79
	Isooctane	174.1	176.1	174.2	174.80±1.13
	Toluene	174	171.2	167.4	170.87±3.31
5	Aggressive Ethanol	142.3	141.9	137.3	140.50±2.78
	Ethanol	140.5	144.9	139.7	141.70±2.80
	Isooctane	173.1	173.8	172.1	173.00±0.85
	Toluene	166	166.9	166.6	166.50±0.46
10	Aggressive Ethanol	134.4	135.9	134.9	135.07±0.76
	Ethanol	130.8	136.8	137.7	135.10±3.75
	Isooctane	172.8	170.3	170.1	171.07±1.50
	Toluene	162.1	164.9	161.1	162.70±1.97
16	Aggressive Ethanol	130.3	133	124.6	129.30±4.29
	Ethanol	125.5	127.7	121.2	124.80±3.31
	Isooctane	167.5	169.1	166.7	167.77±1.22
	Toluene	161.6	164.8	159.8	162.07±2.53

Appendix B2 Glass transition temperature

Table B2-1 Glass transition temperature of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Glass transition temperature (°C)		Average (°C)
		1	2	
0	Aggressive Ethanol	72.60	74.70	73.65±1.48
	Ethanol			
	Isooctane			
	Toluene			
2	Aggressive Ethanol	-5.20	-5.10	-5.15±0.07
	Ethanol	-3.10	-3.40	-3.25±0.21
	Isooctane	61.60	62.40	62.00±0.57
	Toluene	57.10	57.30	57.20±0.14
5	Aggressive Ethanol	-8.00	-10.30	-9.15±1.63
	Ethanol	-5.10	-6.50	-5.80±0.99
	Isooctane	52.90	53.10	53.00±0.14
	Toluene	49.60	49.00	49.30±0.42
10	Aggressive Ethanol	-11.20	-12.70	-11.95±1.06
	Ethanol	-11.80	-10.80	-11.30±0.71
	Isooctane	47.90	46.40	47.15±1.06
	Toluene	45.50	44.40	44.95±0.78
16	Aggressive Ethanol	-11.70	-14.70	-13.20±2.12
	Ethanol	-14.90	-12.20	-13.55±1.91
	Isooctane	30.60	32.70	31.65±1.48
	Toluene	31.70	30.50	31.10±0.85

Table B2-2 Glass transition temperature of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Glass transition temperature (°C)		Average (°C)
		1	2	
0	Aggressive Ethanol	72.90	74.50	73.70±1.13
	Ethanol			
	Isooctane			
	Toluene			
2	Aggressive Ethanol	-5.80	-5.10	-5.45±0.49
	Ethanol	-4.00	-5.40	-4.70±0.99
	Isooctane	63.60	63.90	63.75±0.21
	Toluene	54.60	54.30	54.45±0.21
5	Aggressive Ethanol	-6.70	-7.60	-7.15±0.63
	Ethanol	-6.10	-7.90	-7.00±1.27
	Isooctane	48.10	48.60	48.35±0.35
	Toluene	46.20	46.50	46.35±0.21
10	Aggressive Ethanol	-10.90	-7.60	-9.25±2.33
	Ethanol	-6.60	-8.00	-7.30±0.99
	Isooctane	47.60	39.40	43.50±5.80
	Toluene	46.20	39.90	43.05±4.45
16	Aggressive Ethanol	-10.60	-9.00	-9.80±1.13
	Ethanol	-12.50	-13.90	-13.20±0.99
	Isooctane	31.30	33.80	32.55±1.77
	Toluene	34.50	31.10	32.80±2.40

Table B2-3 Glass transition temperature of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Glass transition temperature (°C)		Average (°C)
		1	2	
0	Aggressive Ethanol	76.10	73.70	74.90±1.70
	Ethanol			
	Isooctane			
	Toluene			
2	Aggressive Ethanol	-1.40	-1.30	-1.35±0.07
	Ethanol	-5.70	-4.30	-5.00±0.99
	Isooctane	64.50	64.70	64.60±0.14
	Toluene	45.80	48.00	46.90±1.56
5	Aggressive Ethanol	-6.30	-5.90	-6.10±0.28
	Ethanol	-6.00	-5.20	-5.60±0.57
	Isooctane	53.50	53.90	53.70±0.28
	Toluene	45.30	44.90	45.10±0.28
10	Aggressive Ethanol	-9.30	-8.80	-9.05±0.35
	Ethanol	-5.60	-6.40	-6.00±0.57
	Isooctane	50.60	49.90	50.25±0.49
	Toluene	46.50	43.80	45.15±1.91
16	Aggressive Ethanol	-10.70	-9.60	-10.15±0.78
	Ethanol	-5.60	-6.50	-6.05±0.64
	Isooctane	35.70	37.20	36.45±1.06
	Toluene	36.30	32.60	34.45±2.62



APPENDIX C
THE EXPERIMENTAL DATA OF MECHANICAL PROPERTIES

Appendix C1 Tensile Strength

Table C1-1 Tensile strength of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Tensile Strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	66.50	65.36	65.62	66.76	66.71	66.27±0.61
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	43.85	43.35	43.56	44.41	44.22	43.88±0.44
	Ethanol	57.35	57.64	56.83	57.39	56.96	57.23±0.33
	Isooctane	62.71	62.82	62.96	63.51	62.70	62.94±0.34
	Toluene	61.78	61.25	62.38	60.63	62.15	61.64±0.71
2	Aggressive Ethanol	40.49	39.50	40.15	39.87	39.81	39.96±0.37
	Ethanol	52.19	53.17	53.91	53.11	53.64	53.00±0.64
	Isooctane	59.61	58.83	60.47	57.41	57.97	58.86±1.23
	Toluene	58.21	59.00	58.38	58.25	58.11	58.39±0.36
3	Aggressive Ethanol	34.29	33.92	33.94	33.95	34.02	34.02±0.18
	Ethanol	37.07	37.58	36.01	38.38	36.45	37.10±0.93
	Isooctane	51.82	52.81	49.87	52.93	51.88	51.86±1.22
	Toluene	48.65	47.50	51.28	54.23	50.85	50.50±2.60
5	Aggressive Ethanol	28.41	27.60	28.23	27.42	28.04	27.94±0.42
	Ethanol	33.42	31.92	33.11	31.41	33.48	32.67±0.94
	Isooctane	48.55	49.65	49.87	47.48	47.17	48.55±1.22
	Toluene	49.57	48.18	47.66	48.47	47.43	48.26±0.84

Week	Chemical	Tensile Strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	26.18	26.80	26.64	25.86	25.63	26.22±0.50
	Ethanol	26.03	26.34	26.10	26.00	26.31	26.16±0.16
	Isooctane	46.97	44.26	46.61	44.46	44.30	45.32±1.35
	Toluene	43.11	43.66	43.31	43.70	44.05	43.57±0.37
10	Aggressive Ethanol	25.79	25.52	25.90	25.45	26.28	25.79±0.33
	Ethanol	25.81	25.74	25.97	26.22	26.65	26.08±0.36
	Isooctane	43.48	43.13	42.51	43.53	42.88	43.12±0.43
	Toluene	43.79	42.24	43.00	42.99	42.95	43.00±0.55
13	Aggressive Ethanol	26.57	26.92	24.76	25.24	25.00	25.70±0.98
	Ethanol	25.88	25.79	25.83	25.50	25.79	25.76±0.15
	Isooctane	41.50	42.03	41.44	41.94	42.54	41.89±0.44
	Toluene	41.07	40.86	41.96	41.64	40.46	41.20±0.60
16	Aggressive Ethanol	25.23	24.45	25.78	24.65	24.42	24.91±0.59
	Ethanol	24.59	23.86	24.04	24.29	24.29	24.26±0.30
	Isooctane	40.20	38.87	39.11	38.83	39.09	39.22±0.57
	Toluene	38.55	35.96	36.81	38.32	37.77	37.48±1.08

Table C1-2 Tensile strength of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Tensile Strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	123.09	125.89	120.73	123.75	123.71	123.43±1.85
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	87.52	85.86	87.74	85.28	85.20	86.32±1.23
	Ethanol	87.35	87.60	86.33	86.21	87.78	87.05±0.73
	Isooctane	109.97	106.14	108.7	105.29	106.31	107.22±1.86
	Toluene	101.87	101.29	100.18	103.55	100.50	101.48±1.33
2	Aggressive Ethanol	80.23	76.18	82.47	82.75	75.14	79.35±3.52
	Ethanol	83.93	77.25	81.86	74.15	77.13	78.86±3.95
	Isooctane	100.43	98.5	99.50	99.43	102.99	100.17±1.71
	Toluene	93.58	93.81	95.76	96.15	93.63	94.59±1.26
3	Aggressive Ethanol	69.93	69.62	70.62	69.55	68.39	69.62±0.93
	Ethanol	75.27	72.65	72.87	74	75.35	74.03±1.28
	Isooctane	78.42	77.60	80.37	79.88	78.56	78.96±1.13
	Toluene	77.27	76.85	76.23	76.53	77.32	76.84±0.47
5	Aggressive Ethanol	61.25	60.38	60.33	61.32	61	60.86±0.48
	Ethanol	64.05	64.64	64.17	62.52	63.97	63.87±0.80
	Isooctane	77.09	77.46	77.06	77.57	76.88	77.21±0.29
	Toluene	74.96	75.92	74.92	75.06	74.45	75.06±0.53

Week	Chemical	Tensile Strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	53.50	56.93	55.71	54.53	54.16	54.97±1.36
	Ethanol	47.71	53.78	51.30	51.99	52.00	51.36±2.24
	Isooctane	76.12	76.98	76.3	77.46	75.36	76.44±0.81
	Toluene	72.35	75.23	74.25	74.74	73.47	74.01±1.12
10	Aggressive Ethanol	50.36	50.60	49.89	50.39	50.30	50.31±0.26
	Ethanol	50.54	52.05	51.50	52.64	50.98	51.54±0.83
	Isooctane	73.49	74.84	75.15	74.47	76.29	74.85±1.02
	Toluene	72.73	73.23	72.96	73.03	73.83	73.16±0.42
13	Aggressive Ethanol	49.80	48.34	48.43	49.81	48.96	49.07±0.71
	Ethanol	50.58	50.31	51.96	50.55	50.44	50.77±0.67
	Isooctane	73.82	71.93	72.42	72.55	73.31	72.81±0.75
	Toluene	71.82	73.59	73.43	70.53	73.52	72.58±1.36
16	Aggressive Ethanol	48.14	47.94	48.06	47.85	47.96	47.99±0.11
	Ethanol	51.44	50.58	49.22	51.79	50.70	50.75±0.99
	Isooctane	71.44	72.09	72.38	69.69	71.78	71.48±1.06
	Toluene	70.59	68.93	70.93	71.9	71.81	70.83±1.20

Table C1-3 Tensile strength of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Tensile Strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	164.61	165.27	168.81	167.28	169.56	167.11±2.16
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	129.35	127.20	128.95	131.23	130.88	129.52±1.62
	Ethanol	132.51	133.26	133.12	133.79	136.27	133.79±1.68
	Isooctane	144.03	143.66	142.86	143.34	144.80	143.74±1.01
	Toluene	150.76	151.35	151.77	149.34	145.44	149.73±2.89
2	Aggressive Ethanol	118.04	119.00	118.86	122.08	115.17	118.63±2.47
	Ethanol	125.97	120.73	124.80	125.00	123.09	123.92±2.06
	Isooctane	140.13	132.86	149.84	131.47	146.36	140.13±9.33
	Toluene	141.45	137.43	140.92	142.39	145.00	141.44±3.16
3	Aggressive Ethanol	109.74	110.10	110.18	112.67	110.89	110.72
	Ethanol	112.36	114.35	110.55	109.62	111.95	111.77±1.81
	Isooctane	139.12	138.87	136.24	139.18	141.56	138.99±1.89
	Toluene	133.15	132.62	132.28	133.19	131.64	132.58±0.65
5	Aggressive Ethanol	91.74	89.38	87.17	92.50	92.14	90.59±2.26
	Ethanol	96.49	97.64	98.78	98.12	97.50	97.70±0.84
	Isooctane	136.00	130.24	128.77	125.93	135.01	131.19±4.25
	Toluene	120.89	132.23	119.88	126.75	126.84	125.32±5.03

Week	Chemical	Tensile Strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	91.37	90.29	89.61	89.76	89.99	90.20±0.70
	Ethanol	92.96	93.06	89.62	88.76	94.03	91.69±2.33
	Isooctane	127.73	124.83	127.60	130.54	131.81	128.50±2.74
	Toluene	118.93	121.42	122.58	126.22	123.34	122.50±2.66
10	Aggressive Ethanol	88.05	87.74	87.74	86.94	89.73	88.04±1.03
	Ethanol	88.44	88.69	88.05	91.55	92.21	89.79±1.94
	Isooctane	127.60	127.04	127.46	128.49	128.64	127.85±0.62
	Toluene	118.31	115.65	118.44	117.07	117.72	117±1.14
13	Aggressive Ethanol	87.75	87.56	86.59	86.89	88.17	87.39±0.64
	Ethanol	89.22	88.29	90.11	91.77	89.71	89.82±1.28
	Isooctane	122.34	121.99	122.73	122.76	120.86	122.14±0.78
	Toluene	118.3	118.17	117.9	116.58	118.43	117.88±0.75
16	Aggressive Ethanol	83.38	87.37	83.89	80.89	87.92	85.69±2.93
	Ethanol	86.49	90.46	90.06	88.61	88.78	88.88±1.56
	Isooctane	119.75	119.56	119.09	120.63	120.56	119.92±0.66
	Toluene	111.9	112.81	112.2	111.04	112.54	112.10±0.68

Appendix C2 Tensile Modulus

Table C2-1 Tensile Modulus of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Tensile Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	2229	2207	2215	2213	2192	2204±22
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	1484	1410	1448	1475	1505	1464±37
	Ethanol	1867	1908	1904	1824	1906	1882±37
	Isooctane	1995	1997	2002	1955	1974	1985±20
	Toluene	1949	1951	2000	1987	1924	1949±47
2	Aggressive Ethanol	1240	1194	1231	1236	1232	1227±19
	Ethanol	1689	1727	1698	1756	1727	1719±27
	Isooctane	1700	1858	1777	1737	1826	1780±64
	Toluene	1732	1791	1778	1777	1761	1768±22
3	Aggressive Ethanol	963	943	903	947	980	947±33
	Ethanol	1068	1137	1013	1103	1062	1077±47
	Isooctane	1699	1673	1571	1711	1648	1649±78
	Toluene	1496	1479	1560	1738	1565	1567±102
5	Aggressive Ethanol	361	325	315	329	295	325±24
	Ethanol	884	731	875	778	878	829±70
	Isooctane	1519	1493	1605	1591	1463	1534±62
	Toluene	1487	1493	1367	1471	1343	1432±71

Week	Chemical	Tensile Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	178	192	200	208	195	195±13
	Ethanol	227	224	223	215	225	223±5
	Isooctane	1298	1156	1320	1182	1155	1222±80
	Toluene	1146	1126	1121	1177	1147	1144±22
10	Aggressive Ethanol	197	182	195	181	190	189±7
	Ethanol	187	195	186	189	196	191±5
	Isooctane	1150	1148	1094	1172	1088	1130±37
	Toluene	1106	1065	1063	1051	1090	1075±22
13	Aggressive Ethanol	175	183	182	197	184	184±8
	Ethanol	182	183	181	185	190	184±4
	Isooctane	1029	990	990	990	1022	1004±20
	Toluene	964	995	1063	964	994	996±40
16	Aggressive Ethanol	204	172	169	166	206	184±19
	Ethanol	182	196	182	184	182	185±6
	Isooctane	848	863	890	877	890	874±18
	Toluene	885	777	901	879	903	869±52

Table C2-2 Tensile modulus of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Tensile Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	3945	3943	3984	3908	3908	3937±28
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	2975	2960	2979	3019	2962	2979±24
	Ethanol	3012	2984	2998	2970	2932	2979±31
	Isooctane	3643	3702	3633	3655	3638	3654±28
	Toluene	3490	3491	3487	3559	3533	3512±32
2	Aggressive Ethanol	2250	2350	2340	2326	2318	2317±39
	Ethanol	2786	2767	2862	2886	2638	2788±97
	Isooctane	3373	3362	3340	3352	3379	3361±16
	Toluene	3119	3127	3197	3185	3298	3186±72
3	Aggressive Ethanol	2226	2250	2233	2207	2229	2229±18
	Ethanol	2457	2369	2371	2344	2268	2362±68
	Isooctane	2493	2492	2649	2603	2631	2573±76
	Toluene	2384	2461	2471	2488	2425	2446±42
5	Aggressive Ethanol	1928	1956	1951	1961	1926	1944±16
	Ethanol	2258	2247	2247	2147	2176	2215±50
	Isooctane	2488	2402	2485	2446	2472	2459±36
	Toluene	2426	2423	2410	2416	2406	2416±8

Week	Chemical	Tensile Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	1760	1766	1761	1728	1628	1728±58
	Ethanol	1671	1879	1711	1623	1849	1746±112
	Isooctane	2306	2360	2392	2417	2472	2389±62
	Toluene	2307	2334	2308	2337	2393	2336±35
10	Aggressive Ethanol	1370	1333	1395	1309	1411	1364±42
	Ethanol	1452	1516	1522	1417	1493	1480±44
	Isooctane	2403	2273	2316	2322	2346	2332±48
	Toluene	2322	2286	2295	2319	2386	2322±39
13	Aggressive Ethanol	1367	1334	1348	1331	1327	1342±16
	Ethanol	1350	1335	1351	1472	1359	1374±56
	Isooctane	2305	2360	2392	2416	2471	2389±62
	Toluene	2307	2272	2303	2307	2307	2299±15
16	Aggressive Ethanol	1344	1340	1336	1302	1344	1333±18
	Ethanol	1363	1369	1349	1351	1362	1359±9
	Isooctane	2261	2184	2279	2205	2287	2243±46
	Toluene	2201	2140	2245	2245	2295	2225±58

Table C2-3 Tensile modulus of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Tensile Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	5622	5592	5757	5601	5560	5626±76
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	4246	4388	4347	4319	4424	4345±68
	Ethanol	4646	4632	4642	4598	4694	4642±40
	Isooctane	5007	5005	4890	5135	4991	5006±123
	Toluene	5067	5260	4897	5152	4951	5066±170
2	Aggressive Ethanol	3792	4094	4123	4001	3660	3934±201
	Ethanol	4253	3956	4072	4270	4247	4160±139
	Isooctane	4840	4785	4865	4723	4973	4837±108
	Toluene	4905	4907	4868	4877	4962	4904±42
3	Aggressive Ethanol	3715	3694	3764	3737	3718	3725±26
	Ethanol	3827	3876	3822	3870	3887	3856±30
	Isooctane	4823	4778	4880	4655	4756	4779±83
	Toluene	4735	4705	4697	4668	4706	4702±24
5	Aggressive Ethanol	3281	3101	3217	3300	3062	3192±106
	Ethanol	3446	3538	3400	3576	3516	3495±64
	Isooctane	4956	4694	4712	4522	4938	4764±182
	Toluene	4664	4555	4749	4270	4534	4555±181

Week	Chemical	Tensile Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	3029	3013	2982	2892	2924	2968±58
	Ethanol	3074	3231	3140	3090	3236	3154±77
	Isooctane	4306	4124	4323	4456	4259	4294±120
	Toluene	4113	4136	3961	3998	4146	4071±85
10	Aggressive Ethanol	2784	2855	2653	2616	2595	2701±113
	Ethanol	2864	2726	2941	2787	2861	2836±82
	Isooctane	4234	4308	4274	4166	4455	4287±96
	Toluene	3983	4048	3924	4118	4066	4028±75
13	Aggressive Ethanol	2506	2547	2476	2530	2580	2528±40
	Ethanol	2694	2624	2628	2668	2678	2659±31
	Isooctane	4185	4223	4192	4235	4141	4195±37
	Toluene	3902	3978	3925	3959	3823	3917±60
16	Aggressive Ethanol	2567	2452	2530	2532	2458	2508±51
	Ethanol	2528	2623	2649	2551	2621	2594±52
	Isooctane	3978	4146	4036	3987	4198	4069±98
	Toluene	3781	3810	3784	3832	3817	3805±22

Appendix C3 Flexural Strength

Table C3-1 Flexural strength of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Flexural Strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	99.05	100.83	101.02	100.70	99.53	100.23±0.88
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	50.61	51.16	51.39	52.49	50.89	51.31±0.72
	Ethanol	55.74	55.50	54.91	55.46	54.42	55.21±0.53
	Isooctane	70.01	76.87	76.49	76.90	76.33	75.32±2.98
	Toluene	68.01	68.88	69.18	70.11	69.53	69.14±0.78
2	Aggressive Ethanol	46.78	46.96	48.57	46.07	47.78	47.10±1.06
	Ethanol	45.89	49.97	49.13	46.85	47.96	47.98±1.14
	Isooctane	59.26	59.75	58.04	59.83	59.50	59.28±0.73
	Toluene	59.90	60.59	60.38	59.79	58.73	59.87±0.72
3	Aggressive Ethanol	31.16	31.31	31.53	31.08	31.49	31.31±0.20
	Ethanol	31.22	31.52	30.77	30.86	31.74	31.22±0.42
	Isooctane	58.42	58.65	57.82	56.45	58.95	58.06±0.99
	Toluene	56.07	59.73	57.75	56.56	57.03	57.43±1.43
5	Aggressive Ethanol	25.72	24.89	25.26	24.55	25.53	25.19±0.48
	Ethanol	30.58	30.52	30.04	29.40	28.41	29.99±1.18
	Isooctane	56.57	54.43	56.02	57.67	55.39	56.02±1.41
	Toluene	45.04	44.27	42.17	46.56	43.62	44.33±1.63

Week	Chemical	Flexural Strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	23.55	22.80	23.96	23.93	22.67	23.38±0.55
	Ethanol	27.18	27.98	27.72	27.15	26.83	27.37±0.47
	Isooctane	42.07	42.59	44.89	43.18	41.35	42.82±1.34
	Toluene	39.74	39.27	39.05	39.94	40.16	39.63±0.46
10	Aggressive Ethanol	22.58	22.19	22.94	23.42	22.49	22.72±0.47
	Ethanol	21.71	22.91	20.62	21.15	21.18	21.51±0.87
	Isooctane	37.39	36.05	36.97	37.28	35.69	36.68±0.76
	Toluene	34.73	35.43	34.31	35.20	34.00	34.73±0.69
13	Aggressive Ethanol	19.96	20.44	20.46	20.57	20.58	20.40±0.26
	Ethanol	21.34	20.99	21.05	20.99	21.31	21.14±0.17
	Isooctane	33.64	33.20	35.13	36.11	37.71	35.16±1.84
	Toluene	34.28	33.96	33.46	33.52	34.42	33.93±0.44
16	Aggressive Ethanol	19.62	20.73	20.01	20.16	21.10	20.33±0.59
	Ethanol	20.34	20.65	20.05	21.32	20.52	20.57±0.47
	Isooctane	34.96	33.42	34.26	35.68	34.58	34.58±0.84
	Toluene	33.71	33.67	33.68	33.86	33.55	33.70±0.11

Table C3-2 Flexural strength of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Flexural Strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	149.78	148.77	154.20	150.60	149.12	150.49±2.19
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	124.74	128.32	126.75	121.88	130.29	126.40±3.25
	Ethanol	140.67	136.22	143.12	135.92	138.77	138.94±3.04
	Isooctane	150.33	145.38	142.88	149.19	149.84	147.53±3.25
	Toluene	145.93	141.36	139.74	142.84	145.94	143.16±2.76
2	Aggressive Ethanol	99.86	102.87	99.77	99.60	101.18	100.66±1.39
	Ethanol	100.12	103.99	102.86	103.83	104.75	103.11±1.80
	Isooctane	145.98	144.17	141.09	136.51	145.25	142.60±3.88
	Toluene	130.43	132.11	142.82	143.10	133.71	136.43±6.07
3	Aggressive Ethanol	97.73	97.24	96.52	95.37	94.86	96.34±1.22
	Ethanol	98.08	97.82	98.88	98.54	96.43	97.95±0.94
	Isooctane	139.82	140.32	138.00	144.63	144.12	141.38±2.87
	Toluene	124.26	124.81	122.73	126.57	124.90	124.65±1.38
5	Aggressive Ethanol	70.72	72.85	74.47	74.27	72.53	72.97±1.52
	Ethanol	78.35	80.29	77.87	82.78	79.82	79.82±1.94
	Isooctane	96.65	100.72	104.65	102.80	102.77	101.52±3.06
	Toluene	102.02	100.92	100.59	100.83	101.47	101.17±0.58

Week	Chemical	Flexural Strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	60.98	63.80	60.98	63.13	65.88	62.95±2.07
	Ethanol	66.63	68.77	67.79	68.05	65.90	67.43±1.15
	Isooctane	84.52	84.67	83.86	81.83	83.88	83.75±1.13
	Toluene	83.26	83.22	85.46	85.85	82.77	84.11±1.43
10	Aggressive Ethanol	63.56	62.76	63.12	60.85	62.25	62.51±1.04
	Ethanol	61.01	61.03	60.84	61.76	61.03	61.13±0.36
	Isooctane	85.33	83.54	84.97	84.70	79.17	83.54±2.54
	Toluene	82.74	86.99	82.60	86.11	81.68	84.03±2.36
13	Aggressive Ethanol	60.41	60.01	60.45	60.18	58.38	59.89±0.86
	Ethanol	62.72	63.58	59.16	63.07	60.00	61.71±1.99
	Isooctane	82.48	83.35	82.22	82.20	82.56	82.56±0.47
	Toluene	83.45	84.24	76.05	83.28	85.45	82.49±3.70
16	Aggressive Ethanol	58.80	58.25	58.07	58.03	59.50	58.53±0.62
	Ethanol	62.02	60.49	60.56	60.34	61.26	60.93±0.70
	Isooctane	79.60	78.52	78.22	76.74	80.62	78.74±1.47
	Toluene	74.55	73.77	72.22	74.76	73.87	73.83±1.00

Table C3-3 Flexural strength of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Flexural Strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	209.68	215.26	211.97	216.28	215.99	213.84±2.89
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	164.57	165.91	172.58	172.32	170.18	169.11±3.69
	Ethanol	179.36	177.97	177.23	178.25	180.15	178.71±1.15
	Isooctane	206.41	211.48	208.79	215.78	208.37	210.16±3.62
	Toluene	205.19	210.29	203.13	208.22	210.55	207.48±3.24
2	Aggressive Ethanol	142.09	142.66	144.16	141.80	140.00	142.14±1.50
	Ethanol	145.88	149.84	145.45	148.46	151.91	148.31±2.71
	Isooctane	200.48	184.60	194.46	196.52	188.14	192.84±6.41
	Toluene	176.84	179.53	175.53	180.79	178.23	178.20±2.07
3	Aggressive Ethanol	133.80	132.23	131.35	129.06	132.72	131.83±1.78
	Ethanol	141.37	140.69	141.06	140.18	140.35	140.73±0.49
	Isooctane	173.17	180.76	185.83	186.15	178.95	180.97±5.37
	Toluene	173.02	171.92	165.20	170.32	171.88	170.47±3.10
5	Aggressive Ethanol	115.78	115.13	115.66	115.44	115.19	115.44±0.28
	Ethanol	121.79	122.94	120.03	123.05	122.39	122.04±1.23
	Isooctane	169.31	167.24	165.85	164.27	168.15	166.96±1.97
	Toluene	158.48	155.79	156.97	156.26	154.93	156.48±1.34

Week	Chemical	Flexural Strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	107.77	111.97	110.31	109.50	109.83	109.88±1.51
	Ethanol	111.96	113.80	116.33	114.61	113.44	114.03±1.61
	Isooctane	159.44	160.68	162.84	161.25	157.83	160.41±1.89
	Toluene	147.22	153.05	151.85	152.62	150.28	151.01±2.37
10	Aggressive Ethanol	104.01	104.88	104.30	104.07	104.34	104.32±0.34
	Ethanol	103.66	105.60	107.71	102.70	105.66	105.07±1.95
	Isooctane	153.99	154.45	151.99	152.16	151.35	152.79±1.35
	Toluene	151.48	148.09	147.61	148.64	149.97	149.16±1.57
13	Aggressive Ethanol	104.61	103.46	103.39	104.21	103.18	103.77±0.61
	Ethanol	105.13	104.45	105.45	103.78	104.70	104.70±0.64
	Isooctane	142.62	146.14	144.66	148.74	141.36	144.71±2.91
	Toluene	139.58	136.94	137.74	139.83	139.71	138.76±1.33
16	Aggressive Ethanol	103.06	100.92	103.50	103.68	101.84	102.60±1.18
	Ethanol	103.43	104.00	105.14	107.48	103.34	104.68±1.72
	Isooctane	142.42	141.94	138.72	139.03	142.01	140.82±1.79
	Toluene	132.64	129.73	133.22	133.49	131.30	132.08±1.56



Appendix C4 Flexural Modulus

Table C4-1 Flexural modulus of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Flexural Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	2544	2558	2601	2602	2586	2578±26
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	1032	961	958	959	991	980±32
	Ethanol	1154	1153	1154	1159	1158	1156±3
	Isooctane	2517	2502	2490	2470	2795	2555±135
	Toluene	2633	2677	2679	2632	2695	2663±29
2	Aggressive Ethanol	968	972	947	943	970	957±14
	Ethanol	1072	1031	1078	1036	1041	1052±21
	Isooctane	2506	2566	2461	2543	2453	2506±50
	Toluene	2504	2475	2523	2478	2534	2503±26
3	Aggressive Ethanol	651	635	655	650	649	648±9
	Ethanol	702	647	720	678	658	681±30
	Isooctane	2577	2502	2408	2490	2500	2495±60
	Toluene	2554	2410	2514	2382	2477	2467±71
5	Aggressive Ethanol	514	479	523	497	509	505±17
	Ethanol	643	634	626	629	611	629±12
	Isooctane	1238	1251	1207	1320	1240	1251±42
	Toluene	1159	1227	1154	1154	1103	1160±44

Week	Chemical	Flexural Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	469	462	476	479	461	469±7
	Ethanol	520	543	522	496	502	516±18
	Isooctane	884	921	913	892	865	895±22
	Toluene	845	841	854	856	873	854±13
10	Aggressive Ethanol	440	414	444	430	422	430±13
	Ethanol	429	419	437	428	472	437±21
	Isooctane	814	853	830	814	814	825±17
	Toluene	785	764	785	764	775	775±10
13	Aggressive Ethanol	435	429	425	427	418	427±6
	Ethanol	421	435	421	447	434	432±11
	Isooctane	750	876	866	799	827	824±51
	Toluene	772	743	758	788	746	761±19
16	Aggressive Ethanol	415	424	417	410	409	415±6
	Ethanol	419	412	416	427	416	418±5
	Isooctane	767	776	809	793	821	793±22
	Toluene	740	761	753	760	773	757±12

Table C4-2 Flexural modulus of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Flexural Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	4068	4234	4419	4355	4213	4258±136
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	3390	3421	3492	3409	3339	3410±55
	Ethanol	3721	3603	3691	3610	3611	3647±55
	Isooctane	4319	4096	4154	4207	4205	4196±82
	Toluene	4213	4072	4121	4082	4027	4103±70
2	Aggressive Ethanol	2575	2609	2545	2507	2509	2549±44
	Ethanol	2609	2755	2680	2740	2742	2705±61
	Isooctane	4136	4055	4244	4064	4234	4146±90
	Toluene	3752	3708	4027	4251	3988	3945±221
3	Aggressive Ethanol	2605	2558	2451	2470	2429	2503±76
	Ethanol	2527	2543	2515	2543	2506	2527±16
	Isooctane	4012	3998	3965	4187	4260	4084±131
	Toluene	3606	3509	3521	3675	3662	3595±77
5	Aggressive Ethanol	1711	1671	1653	1699	1740	1695±34
	Ethanol	1881	1903	1831	1870	1870	1871±26
	Isooctane	2516	2630	2711	2737	2415	2602±135
	Toluene	2415	2594	2517	2571	2573	2534±72
7	Aggressive Ethanol	1544	1560	1541	1562	1618	1565±31
	Ethanol	1677	1674	1653	1663	1641	1661±15
	Isooctane	2330	2351	2300	2275	2358	2323±35

Week	Chemical	Flexural Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
	Toluene	2232	2158	2280	2283	2198	2230±54
10	Aggressive Ethanol	1585	1591	1608	1489	1559	1567±47
	Ethanol	1599	1710	1595	1583	1758	1649±80
	Isooctane	2271	2321	2304	2289	2181	2273±54
	Toluene	2140	2367	2162	2122	2158	2190±100
13	Aggressive Ethanol	1606	1549	1555	1539	1565	1563±26
	Ethanol	1648	1653	1541	1677	1508	1605±76
	Isooctane	2222	2288	2262	2258	2315	2269±35
	Toluene	1939	2150	2202	2256	2263	2162±132
16	Aggressive Ethanol	1573	1573	1518	1542	1591	1559±29
	Ethanol	1585	1563	1561	1591	1584	1577±14
	Isooctane	2117	2068	2090	2129	2151	2111±33
	Toluene	1980	1996	1934	1983	1946	1968±26

Table C4-3 Flexural modulus of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Flexural Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	7001	6817	6919	6864	6924	6905±69
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	4634	4775	4764	4692	4678	4709±60
	Ethanol	4943	4854	4870	4953	4936	4911±45
	Isooctane	6341	6548	6519	6807	6594	6562±167
	Toluene	5981	6302	6205	6083	6131	6140±122
2	Aggressive Ethanol	3855	3843	3926	3878	3848	3870±34
	Ethanol	3959	4030	3975	4039	4059	4012±43
	Isooctane	5826	5796	5615	5553	6076	5773±205
	Toluene	5363	5272	5365	5264	5408	5334±63
3	Aggressive Ethanol	3618	3569	3520	3577	3625	3582±42
	Ethanol	3746	3799	3770	3744	3750	3762±23
	Isooctane	5777	5641	5813	5564	5628	5685±106
	Toluene	5165	5039	5240	5127	5193	5153±76
5	Aggressive Ethanol	3059	3060	3069	3033	3039	3052±15
	Ethanol	3245	3208	3155	3218	3150	3195±42
	Isooctane	4968	4933	4760	4789	4884	4867±90
	Toluene	4583	4594	4517	4506	4592	4558±43

Week	Chemical	Flexural Modulus (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	2977	3066	3001	3105	3079	3046±54
	Ethanol	3008	3095	3153	3168	3161	3117±67
	Isooctane	4722	4855	4845	4857	4849	4826±58
	Toluene	4448	4596	4509	4544	4592	4538±62
10	Aggressive Ethanol	2984	2950	2966	2946	2947	2959±16
	Ethanol	2917	3104	3048	3053	3029	3030±69
	Isooctane	4610	4626	4576	4634	4586	4606±25
	Toluene	4479	4403	4405	4440	4404	4426±33
13	Aggressive Ethanol	2887	2898	2939	2924	3047	2939±64
	Ethanol	2990	2922	2924	2963	2943	2948±29
	Isooctane	4322	4170	4286	4453	4514	4349±137
	Toluene	4148	4196	4172	4127	4197	4168±31
16	Aggressive Ethanol	2870	2855	2937	2912	2933	2901±37
	Ethanol	2888	2876	2885	2994	2926	2914±49
	Isooctane	4371	4405	4347	4256	4380	4352±57
	Toluene	4112	4118	4075	3944	4081	4066±71

Appendix C5 Compressive Strength

Table C5-1 Compressive strength of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Compressive strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	43.24	43.53	47.18	42.88	42.34	43.83±1.92
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	32.73	30.54	27.09	28.55	28.88	29.56±2.16
	Ethanol	27.82	32.62	30.82	29.77	31.46	30.50±1.82
	Isooctane	41.31	41.42	40.49	41.38	42.07	41.33±0.56
	Toluene	42.14	39.89	41.12	40.34	42.53	41.20±1.13
2	Aggressive Ethanol	23.61	24.62	24.39	24.91	21.81	23.87±1.25
	Ethanol	24.87	24.67	25.88	25.63	24.67	25.14±0.57
	Isooctane	38.00	39.94	38.73	38.54	38.90	38.82±0.71
	Toluene	38.35	40.07	36.43	37.24	35.76	37.57±1.70
3	Aggressive Ethanol	21.13	21.48	21.05	20.59	20.62	20.97±0.38
	Ethanol	21.27	22.18	21.64	21.27	21.81	21.63±0.39
	Isooctane	35.01	36.06	36.68	34.99	35.26	35.60±0.74
	Toluene	33.20	36.06	35.32	34.10	37.03	35.14±1.53
5	Aggressive Ethanol	17.55	16.81	16.80	16.11	16.08	16.67±0.61
	Ethanol	19.93	19.84	19.40	20.08	19.21	19.69±0.37
	Isooctane	34.16	31.82	31.34	33.09	32.53	32.59±1.11
	Toluene	30.63	32.15	31.73	32.19	33.01	31.94±0.86

Week	Chemical	Compressive strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	15.11	15.72	15.26	16.45	13.95	15.30±0.92
	Ethanol	20.44	18.58	19.50	19.80	18.86	19.44±0.74
	Isooctane	30.89	29.19	32.78	31.17	28.28	30.46±1.76
	Toluene	29.96	30.23	32.44	28.62	30.92	30.43±1.40
10	Aggressive Ethanol	13.48	14.00	15.90	13.84	13.62	14.17±0.99
	Ethanol	18.62	19.67	20.84	20.67	17.01	19.36±1.59
	Isooctane	28.72	26.12	29.94	25.88	27.98	27.73±1.73
	Toluene	28.26	28.40	28.61	28.85	26.65	28.15±0.87
13	Aggressive Ethanol	13.22	13.35	14.77	13.98	14.76	14.02±0.74
	Ethanol	18.44	19.82	19.72	17.91	19.29	19.04±0.83
	Isooctane	27.76	26.96	25.86	25.45	28.88	26.98±1.40
	Toluene	26.39	26.19	25.93	27.51	25.80	26.36±0.68
16	Aggressive Ethanol	12.98	13.42	13.57	14.03	14.47	13.69±0.57
	Ethanol	18.77	19.10	17.43	18.36	19.02	18.54±0.68
	Isooctane	26.70	26.24	26.36	25.95	26.23	26.30±0.27
	Toluene	26.26	24.40	26.61	25.85	25.65	25.75±0.84

Table C5-2 Compressive strength of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Compressive strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	70.51	70.17	63.41	67.91	78.42	70.08±5.45
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	49.16	52.25	47.99	47.66	44.56	48.32±2.78
	Ethanol	51.46	51.00	50.43	46.75	47.91	49.51±2.06
	Isooctane	66.58	67.09	66.33	65.09	64.44	65.91±1.10
	Toluene	63.79	59.63	61.59	65.16	62.13	62.46±2.12
2	Aggressive Ethanol	41.86	44.49	43.37	40.12	43.28	42.63±1.68
	Ethanol	35.87	42.69	39.76	51.79	40.44	42.11±5.94
	Isooctane	61.60	61.68	60.60	59.47	59.16	60.50±1.17
	Toluene	54.05	54.23	61.33	58.65	51.29	55.91±4.02
3	Aggressive Ethanol	36.16	39.25	34.99	34.66	31.56	35.32±2.78
	Ethanol	34.31	38.76	34.36	37.00	36.93	36.27±1.91
	Isooctane	55.43	53.13	54.62	58.54	50.51	54.45±2.96
	Toluene	54.76	56.13	49.76	47.57	53.85	52.41±3.60
5	Aggressive Ethanol	35.04	26.99	34.72	34.09	30.65	32.30±3.45
	Ethanol	35.06	34.37	34.98	34.54	35.26	34.84±0.37
	Isooctane	55.70	52.30	48.99	47.07	48.52	50.52±3.47
	Toluene	49.31	53.33	45.69	46.26	45.94	48.11±3.27

Week	Chemical	Compressive strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	30.08	32.83	32.74	28.69	29.39	30.74±1.93
	Ethanol	29.87	32.69	29.76	35.79	30.44	31.71±2.57
	Isooctane	45.43	43.13	44.62	48.54	50.51	46.45±3.01
	Toluene	44.05	44.23	51.33	48.65	41.29	45.91±4.02
10	Aggressive Ethanol	26.96	27.49	28.93	27.43	27.13	27.59±0.78
	Ethanol	31.96	31.50	30.93	27.25	28.41	30.01±2.06
	Isooctane	45.70	42.30	42.99	41.07	42.52	42.92±1.71
	Toluene	43.79	39.63	41.59	46.59	42.13	42.75±2.61
13	Aggressive Ethanol	25.17	27.07	23.99	24.35	25.71	25.26±1.22
	Ethanol	29.39	29.51	29.81	25.12	30.96	28.96±2.23
	Isooctane	42.57	40.88	43.72	40.23	42.96	42.07±1.46
	Toluene	36.95	42.31	38.69	39.26	38.94	39.23±1.94
16	Aggressive Ethanol	24.37	24.02	23.17	22.98	23.68	23.64±0.58
	Ethanol	27.11	25.56	25.16	29.80	29.73	27.47±2.22
	Isooctane	42.09	40.61	41.87	41.13	42.56	41.65±0.78
	Toluene	36.79	36.63	38.59	36.16	39.13	37.46±1.31

Table C5-3 Compressive strength of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Compressive strength (MPa)					Average (MPa)
		1	2	3	4	5	
0	Aggressive Ethanol	132.52	130.60	126.93	112.19	127.19	125.89±8.01
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	82.25	81.22	95.21	81.99	90.38	86.21±6.26
	Ethanol	94.35	84.46	97.31	89.59	88.75	90.89±5.02
	Isooctane	119.91	115.64	114.97	120.34	116.08	117.39±2.53
	Toluene	101.06	111.26	109.49	113.00	112.23	109.41±4.85
2	Aggressive Ethanol	78.99	78.75	71.57	71.51	87.53	77.67±6.62
	Ethanol	74.89	96.89	92.37	72.69	80.42	83.45±10.71
	Isooctane	102.15	111.86	105.38	100.19	109.62	105.84±4.91
	Toluene	91.03	92.93	91.56	89.64	92.52	91.54±1.30
3	Aggressive Ethanol	68.22	71.83	68.64	61.82	65.42	67.18±3.76
	Ethanol	72.07	73.23	72.25	74.11	68.22	71.98±2.25
	Isooctane	93.94	94.01	91.50	89.82	90.06	91.87±2.03
	Toluene	90.41	87.23	87.28	87.76	84.73	87.48±2.02
5	Aggressive Ethanol	66.93	66.16	60.52	63.27	64.15	64.21±2.54
	Ethanol	68.35	68.16	67.55	65.07	68.10	67.44±1.36
	Isooctane	90.65	84.74	89.68	85.83	80.69	86.32±4.02
	Toluene	85.85	75.49	78.79	82.18	85.24	81.51±4.39

Week	Chemical	Compressive strength (MPa)					Average (MPa)
		1	2	3	4	5	
7	Aggressive Ethanol	65.95	66.89	56.77	56.64	63.17	61.89±4.92
	Ethanol	55.99	59.91	58.46	65.50	63.32	60.64±3.80
	Isooctane	76.52	89.27	84.04	73.93	86.50	82.05±6.57
	Toluene	78.01	74.02	73.55	73.95	77.66	75.44±2.20
10	Aggressive Ethanol	50.26	58.98	51.41	58.05	48.14	52.78±4.85
	Ethanol	51.96	58.47	53.00	52.70	57.16	54.66±2.94
	Isooctane	84.23	77.06	77.36	80.57	81.49	80.14±3.00
	Toluene	65.59	67.81	68.84	70.64	67.97	68.17±1.83
13	Aggressive Ethanol	49.34	48.77	48.01	46.54	44.32	47.40±2.01
	Ethanol	47.44	51.72	52.37	46.92	54.71	50.63±3.35
	Isooctane	75.96	79.30	77.76	76.81	75.08	76.98±1.63
	Toluene	60.61	61.28	66.74	59.95	62.64	62.24±2.70
16	Aggressive Ethanol	47.84	44.89	45.61	43.68	44.66	45.34±1.56
	Ethanol	53.63	50.46	45.92	48.72	44.51	48.65±3.63
	Isooctane	74.32	80.11	71.32	70.01	76.42	74.44±4.04
	Toluene	62.92	59.56	58.74	57.34	62.14	60.14±2.34

Appendix C6 Impact Strength

Table C6-1 Impact strength of PA6 immersed in chemicals of surrogate gasohol

Week	Chemical	Impact Strength (kJ/m ²)					Average (kJ/m ²)
		1	2	3	4	5	
0	Aggressive Ethanol	8.86	9.54	6.61	9.39	7.59	8.40±1.26
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	49.57	55.91	52.27	49.12	55.44	52.46±3.17
	Ethanol	32.41	30.91	32.47	32.26	31.89	31.99±0.64
	Isooctane	18.36	17.78	19.17	18.03	18.44	18.36±0.53
	Toluene	20.07	20.07	21.17	19.64	20.27	20.24±0.57
2	Aggressive Ethanol	127.03	123.33	127.54	124.41	125.86	125.63±1.76
	Ethanol	117.63	121.99	100.03	124.40	119.29	116.67±9.65
	Isooctane	21.16	22.11	21.25	22.67	21.94	21.83±0.63
	Toluene	26.16	26.37	26.71	26.75	26.76	26.55±0.27
3	Aggressive Ethanol	-	-	-	-	-	-
	Ethanol	-	-	-	-	-	-
	Isooctane	27.65	28.57	32.12	28.52	31.41	29.65±1.98
	Toluene	31.07	33.08	28.82	30.80	33.12	31.38±1.80
5	Aggressive Ethanol	-	-	-	-	-	-
	Ethanol	-	-	-	-	-	-
	Isooctane	30.73	32.25	31.52	31.17	30.99	31.33±0.59
	Toluene	35.82	36.43	35.44	34.15	34.60	35.29±0.92

Week	Chemical	Impact Strength (kJ/m ²)					Average (kJ/m ²)
		1	2	3	4	5	
7	Aggressive Ethanol	-	-	-	-	-	-
	Ethanol	-	-	-	-	-	-
	Isooctane	39.57	39.25	35.87	45.90	49.74	42.07±5.61
	Toluene	50.78	52.33	50.86	50.56	53.87	51.68±1.41
10	Aggressive Ethanol	-	-	-	-	-	-
	Ethanol	-	-	-	-	-	-
	Isooctane	43.59	43.91	44.96	44.46	44.21	44.23±0.52
	Toluene	60.87	62.49	58.29	60.69	64.80	61.43±2.41
13	Aggressive Ethanol	-	-	-	-	-	-
	Ethanol	-	-	-	-	-	-
	Isooctane	49.90	50.73	45.53	49.67	50.12	49.19±2.08
	Toluene	147.22	148.06	137.07	143.19	132.20	141.55±6.79
16	Aggressive Ethanol	-	-	-	-	-	-
	Ethanol	-	-	-	-	-	-
	Isooctane	78.82	77.64	79.79	84.36	75.57	79.24±3.27
	Toluene	-	-	-	-	-	-

Table C6-2 Impact strength of PA6/GF (15 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Impact Strength (kJ/m ²)					Average (kJ/m ²)
		1	2	3	4	5	
0	Aggressive Ethanol	10.70	10.80	10.83	10.74	11.77	10.97±0.45
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	19.35	19.85	19.83	19.09	18.48	19.32±0.57
	Ethanol	16.34	14.83	15.54	15.67	16.57	15.79±0.69
	Isooctane	11.80	12.02	11.66	12.53	12.43	12.09±0.38
	Toluene	13.21	13.11	13.18	13.08	13.29	13.17±0.09
2	Aggressive Ethanol	22.28	20.63	20.60	21.58	22.44	21.51±0.88
	Ethanol	17.22	19.93	17.42	17.28	18.94	18.16±1.22
	Isooctane	13.37	14.26	16.02	15.49	13.75	14.58±1.14
	Toluene	18.09	15.24	16.04	15.38	16.85	16.32±1.18
3	Aggressive Ethanol	27.55	27.40	27.13	26.25	27.61	27.19±0.56
	Ethanol	27.00	27.37	27.06	28.38	28.15	27.59±0.64
	Isooctane	16.62	17.15	16.60	16.02	15.95	16.47±0.50
	Toluene	20.33	20.69	19.81	18.29	19.09	19.47±1.02
5	Aggressive Ethanol	34.44	34.08	33.76	36.98	33.95	34.64±1.33
	Ethanol	32.76	31.58	29.98	33.92	32.52	32.15±1.47
	Isooctane	17.39	18.17	17.91	17.21	17.28	17.59±0.42
	Toluene	21.07	18.45	18.71	18.67	21.58	19.35±1.49

Week	Chemical	Impact Strength (kJ/m ²)					Average (kJ/m ²)
		1	2	3	4	5	
7	Aggressive Ethanol	40.09	42.19	40.85	39.86	41.66	40.93±1.00
	Ethanol	42.73	39.44	42.09	41.53	38.87	40.93±1.69
	Isooctane	17.60	18.09	17.86	17.93	17.90	17.87±0.18
	Toluene	22.92	21.87	19.27	22.53	19.88	21.29±1.63
10	Aggressive Ethanol	47.43	47.72	51.78	48.23	47.64	48.56±1.83
	Ethanol	44.79	43.99	44.33	44.94	42.97	44.20±0.78
	Isooctane	18.39	17.89	19.13	19.56	18.95	18.78±0.65
	Toluene	22.86	23.33	22.01	23.46	24.43	23.22±0.88
13	Aggressive Ethanol	50.44	49.87	50.56	50.79	50.31	50.39±0.34
	Ethanol	46.72	47.97	48.47	48.30	48.25	47.94±0.71
	Isooctane	21.45	20.51	21.20	20.00	20.09	20.65±0.65
	Toluene	24.51	24.71	24.12	24.59	24.25	24.44±0.24
16	Aggressive Ethanol	55.22	54.84	56.24	54.38	54.84	55.11±0.70
	Ethanol	53.24	52.53	49.46	51.19	49.70	51.22±1.67
	Isooctane	24.42	25.10	24.81	24.94	24.87	24.83±0.25
	Toluene	26.41	26.26	26.23	26.83	25.12	26.17±0.64

Table C6-3 Impact strength of PA6/GF (30 wt%) composite immersed in chemicals of surrogate gasohol

Week	Chemical	Impact Strength (kJ/m ²)					Average (kJ/m ²)
		1	2	3	4	5	
0	Aggressive Ethanol	18.44	19.80	19.23	18.82	19.10	19.08±0.51
	Ethanol						
	Isooctane						
	Toluene						
1	Aggressive Ethanol	27.47	27.89	27.51	26.21	27.85	27.38±0.69
	Ethanol	26.05	26.25	27.66	25.95	27.40	26.66±0.80
	Isooctane	21.67	20.86	20.56	20.71	21.48	21.05±0.49
	Toluene	22.55	21.19	22.13	22.85	23.17	22.38±0.77
2	Aggressive Ethanol	30.24	29.86	29.07	30.60	29.32	29.82±0.63
	Ethanol	30.19	31.23	30.74	31.21	30.83	30.84±0.43
	Isooctane	22.20	22.45	23.45	24.78	23.63	23.30±1.03
	Toluene	24.25	24.53	24.77	25.21	24.75	24.70±0.35
3	Aggressive Ethanol	37.20	38.57	38.07	38.63	40.48	38.59±1.20
	Ethanol	31.56	34.83	31.87	34.90	36.51	33.93±2.14
	Isooctane	25.26	23.63	26.43	23.77	24.94	24.81±1.15
	Toluene	26.33	27.67	27.83	28.89	26.49	27.44±1.05
5	Aggressive Ethanol	44.04	44.38	42.37	41.50	38.98	42.26±2.18
	Ethanol	37.09	42.00	35.12	35.86	41.23	38.26±3.15
	Isooctane	25.40	25.24	24.85	26.08	26.39	25.59±0.63
	Toluene	27.73	28.19	29.83	28.98	30.52	29.05±1.15

Week	Chemical	Impact Strength (kJ/m ²)					Average (kJ/m ²)
		1	2	3	4	5	
7	Aggressive Ethanol	47.65	44.43	45.55	44.38	44.78	45.36±1.37
	Ethanol	39.71	37.82	37.66	40.16	40.65	39.20±1.37
	Isooctane	26.14	26.47	25.89	25.71	28.77	26.60±1.25
	Toluene	31.46	30.29	31.80	31.19	30.63	31.08±0.61
10	Aggressive Ethanol	49.27	46.30	47.64	45.37	49.18	47.55±1.73
	Ethanol	43.42	43.39	41.61	38.21	37.74	40.88±2.75
	Isooctane	30.26	25.94	26.21	28.85	27.22	27.70±1.83
	Toluene	34.57	33.24	31.47	32.60	34.78	33.33±1.38
13	Aggressive Ethanol	50.29	50.74	52.06	50.48	51.10	50.93±0.70
	Ethanol	43.36	43.58	43.22	46.25	40.93	43.47±1.89
	Isooctane	28.25	28.31	29.65	28.21	28.24	28.53±0.63
	Toluene	34.10	35.55	35.56	36.28	36.56	35.61±0.95
16	Aggressive Ethanol	52.12	51.91	53.11	51.90	50.69	51.95±0.86
	Ethanol	45.29	45.68	48.00	46.75	48.00	46.74±1.26
	Isooctane	33.23	30.74	34.30	34.99	35.85	33.82±1.97
	Toluene	37.47	39.93	38.01	39.56	38.61	1.07

APPENDIX D
PRESENTATION

1. Siriporn Kaensri and Varun Taepaisitphongse. 2010. Influences of Chemicals in Surrogate Gasohol on Mechanical Properties of Glass Fiber Reinforced Nylon 6 Composites. Proceeding of PCT-1st Polymer Conference of Thailand: 438-442
2. Varun Taepaisitphongse and Siriporn Kaensri. 2011. Influences of Chemicals in Surrogate Gasohol on Mechanical and Thermal Properties of Glass Fiber Reinforced Nylon 6 Composites. Proceeding of 5th Srinakharinwirot Vichakarn: SWU5-1168

VITA

Miss Siriporn Kaensri was born in Prachinburi, Thailand, on January 4th, 1986. She received her high school diploma in 2003 from Triamudomsuksanomklao Kabinburi School, Prachinburi. She received the Bachelor of Engineering Degree with a major in Chemical Engineering from the Faculty of Engineering, Burapha University, Chonburi, in 2007. She continued her study for a Master's Degree in Chemical Engineering at the Department of Chemical Engineering Faculty of Engineering, Chulalongkorn University, Bangkok, in 2008.



