

APPENDIX D

DIELECTRIC PROPERTIES OF HEATED OIL PALM FRUIT AND ESTIMATED ELECTRIC FIELD, RATE OF HEAT GENERATION AND RATE OF TEMPERATURE INCREMENT

Table D1: Run for investigation of microwave heating of oil palm fruit

RUN	Design of experiment		
	Oil palm fruit (kg)	Microwave power (W)	Heating time (min)
1	0.5	Medium	10
2	0.5	Medium High	10
3	0.5	High	10
4	1	Medium	10
5	1	Medium High	10
6	1	High	10
7	1.5	Medium	10
8	1.5	Medium High	10
9	1.5	High	10

Table D2: Dielectric properties of heated oil palm fruit for investigation of microwave heating of oil palm fruit

RUN	Dielectric constant			Dielectric loss factor		
	1	2	3	1	2	3
1	13.1951	13.4880	15.4423	2.3418	2.1230	3.1373
2	15.8310	15.8182	15.8246	2.4809	2.4387	2.8106
3	14.3725	17.6623	13.8501	2.4432	3.1558	2.3598
4	16.0890	13.8683	17.7314	2.8021	2.7910	2.9973
5	12.2116	11.8905	11.6099	2.6047	2.9321	2.7618
6	11.7542	11.8433	9.3708	2.5763	2.5841	3.7904
7	12.9352	13.0392	13.1097	2.7578	2.7718	3.2595
8	10.9154	10.0620	11.8153	4.3716	2.9943	5.9798
9	13.7965	13.7949	13.8119	5.5442	5.5655	5.2595

Table D3: Electric field and rate of heat generation from investigation of microwave heating of oil palm fruit

RUN	Electric field, E_z (V/m)			Rate of heat generation, P_v (W/m ³)		
	1	2	3	1	2	3
1	-1387.498	-1415.578	-1502.871	613879.783	579277.429	964868.953
2	-1650.970	-1604.870	-1569.901	920781.841	855277.586	943218.750
3	-1498.774	-1714.534	-1427.113	747308.703	1263195.880	654426.817
4	-1220.574	-1226.014	-1079.969	522628.990	528894.814	601972.498
5	-1262.617	-1199.549	-1189.879	565418.641	574491.342	532435.099
6	-1536.503	-1389.206	-1468.859	900781.345	733435.888	1113562.089
7	-1131.388	-1135.967	-1164.044	966342.615	977923.573	970403.833
8	-971.644	-1036.082	-931.561	561983.732	437675.553	706607.744
9	-1319.261	-1315.794	-1278.435	653571.875	653441.731	725399.610

Table D4: Rate of temperature increment from investigation of microwave heating of oil palm fruit

RUN	Rate of temperature increment ($^{\circ}\text{C/s}$)		
	1	2	3
1	0.372	0.351	0.584
2	0.557	0.518	0.571
3	0.452	0.765	0.396
4	0.316	0.320	0.364
5	0.342	0.348	0.322
6	0.545	0.444	0.674
7	0.585	0.592	0.588
8	0.340	0.265	0.428
9	0.396	0.396	0.439