ANEXOS I

RESULTADOS DE LA DETERMINACIÓN DE LA DIFUSIVIDAD TÉRMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACIÓN PARA FILETE

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "FILETE"					
Numero de Ts registradas c / 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
1	15,2356	**0,20411998**	16,9204	**0,20411998**	-18
2	15,1301	**0,20550173**	16,8628	**0,20483757**	-18
3	15,1326	**0,20546910**	16,9107	**0,20424152**	-18
4	15,1329	**0,20546505**	16,9759	**0,20343094**	-18
5	15,1334	**0,20545750**	17,0159	**0,20293413**	-18
6	15,1356	**0,20542861**	16,9961	**0,20317965**	-18
7	15,1520	**0,20521386**	17,0420	**0,20261138**	-18
8	15,2508	**0,20392265**	17,1714	**0,20100940**	-18
9	15,3905	**0,20210082**	17,2909	**0,19953658**	-18
10	15,4032	**0,20193542**	17,3319	**0,19903249**	-18
11	15,4100	**0,20184779**	17,3504	**0,19880494**	-18
12	15,3750	**0,20230225**	17,3220	**0,19915438**	-18
13	15,3991	**0,20198916**	17,3222	**0,19915242**	-18
14	15,3903	**0,20210390**	17,2815	**0,19965297**	-18
15	15,3822	**0,20220962**	17,2630	**0,19988098**	-18
16	15,3455	**0,20268651**	17,2439	**0,20011533**	-18
17	15,3283	**0,20291127**	17,2532	**0,20000107**	-18
18	15,3134	**0,20310515**	17,2142	**0,20048186**	-18
19	15,2951	**0,20334322**	17,1884	**0,20079958**	-18
20	15,3026	**0,20324633**	17,2020	**0,20063176**	-18
21	15,2908	**0,20340010**	17,2237	**0,20036503**	-18
22	15,3037	**0,20323204**	17,2416	**0,20014365**	-18
23	15,2817	**0,20351878**	17,2340	**0,20023809**	-18
24	15,2661	**0,20372283**	17,2082	**0,20055529**	-18
25	15,2312	**0,20417748**	17,1817	**0,20088237**	-18
26	15,2108	**0,20444461**	17,1559	**0,20120145**	-18
27	15,2458	**0,20398714**	17,1782	**0,20092601**	-18
28	15,2593	**0,20381096**	17,1907	**0,20077142**	-18
29	15,2686	**0,20368967**	17,1724	**0,20099822**	-18
30	15,2556	**0,20385969**	17,1670	**0,20106440**	-18
31	15,2502	**0,20393047**	17,1636	**0,20110645**	-18
32	15,2431	**0,20402309**	17,1624	**0,20112160**	-18
33	15,2362	**0,20411282**	17,1566	**0,20119324**	-18
34	15,2267	**0,20423650**	17,1572	**0,20118511**	-18
35	15,2291	**0,20420612**	17,1588	**0,20116616**	-18
36	15,2183	**0,20434609**	17,1527	**0,20124047**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "FILETE"					
Numero de Ts registradas c / 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
42	15,2425	**0,20403013**	17,1512	**0,20126000**	-18
43	15,2353	**0,20412392**	17,1341	**0,20147047**	-18
44	15,2216	**0,20430386**	17,1222	**0,20161742**	-18
45	15,2207	**0,20431573**	17,1254	**0,20157800**	-18
46	15,2018	**0,20456219**	17,1090	**0,20178067**	-18
47	15,2057	**0,20451105**	17,1147	**0,20171067**	-18
48	15,1936	**0,20467035**	17,1096	**0,20177400**	-18
49	15,1756	**0,20490497**	17,0990	**0,20190519**	-18
50	15,1929	**0,20467850**	17,1121	**0,20174305**	-18
51	15,1867	**0,20476044**	17,1098	**0,20177174**	-18
52	15,2005	**0,20457989**	17,1212	**0,20163075**	-18
53	15,1954	**0,20464624**	17,1132	**0,20172880**	-18
54	15,1889	**0,20473100**	17,1080	**0,20179401**	-18
55	15,1936	**0,20466979**	17,1147	**0,20171093**	-18
56	15,1989	**0,20460037**	17,1216	**0,20162560**	-18
57	15,2119	**0,20442997**	17,1309	**0,20151033**	-18
58	15,2050	**0,20452009**	17,1210	**0,20163238**	-18
59	15,1911	**0,20470246**	17,1134	**0,20172714**	-18
60	15,2135	**0,20440971**	17,1305	**0,20151533**	-18
61	15,2133	**0,20441171**	17,1312	**0,20150673**	-18
62	15,2065	**0,20450117**	17,1244	**0,20159134**	-18
63	15,2163	**0,20437317**	17,1325	**0,20149020**	-18
64	15,2304	**0,20418915**	17,1528	**0,20123914**	-18
65	15,2258	**0,20424839**	17,1470	**0,20131079**	-18
66	15,2255	**0,20425253**	17,1438	**0,20135125**	-18
67	15,2425	**0,20402983**	17,1577	**0,20117903**	-18
68	15,2576	**0,20383311**	17,1749	**0,20096697**	-18
69	15,2410	**0,20405018**	17,1693	**0,20103555**	-18
70	15,2262	**0,20424333**	17,1583	**0,20117197**	-18
71	15,2180	**0,20435110**	17,1456	**0,20132830**	-18
72	15,1998	**0,20458814**	17,1259	**0,20157266**	-18
73	15,2020	**0,20456003**	17,1315	**0,20150338**	-18
74	15,1963	**0,20463474**	17,1288	**0,20153651**	-18
75	15,1931	**0,20467679**	17,1211	**0,20163163**	-18
76	15,1961	**0,20463737**	17,1262	**0,20156837**	-18
77	15,2012	**0,20456997**	17,1342	**0,20146931**	-18
78	15,1980	**0,20461229**	17,1397	**0,20140145**	-18
79	15,1944	**0,20465945**	17,1349	**0,20146069**	-18
80	15,1902	**0,20471428**	17,1342	**0,20147017**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "FILETE"					
Numero de Ts registradas c / 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
83	15,1930	**0,20467716**	17,1312	**0,20150697**	-18
84	15,2011	**0,20457131**	17,1429	**0,20136212**	-18
85	15,1886	**0,20473574**	17,1325	**0,20149073**	-18
86	15,1802	**0,20484545**	17,1277	**0,20154945**	-18
87	15,1874	**0,20475059**	17,1328	**0,20148656**	-18
88	15,1902	**0,20471366**	17,1369	**0,20143594**	-18
89	15,1925	**0,20468393**	17,1441	**0,20134675**	-18
90	15,1917	**0,20469460**	17,1480	**0,20129934**	-18
⋮	⋮	⋮	⋮	⋮	⋮
22.580	-17,7717	**2,36723150**	-17,9002	**2,74808544**	-18
22581	-17,7739	**2,37146579**	-17,9029	**2,76001622**	-18
22.582	-17,7761	**2,37574177**	-17,9056	**2,77228403**	-18
22.583	-17,7784	**2,38006028**	-17,9083	**2,78490848**	-18
22584	-17,7806	**2,38442215**	-17,9110	**2,79791092**	-18
22.585	-17,7828	**2,38882828**	-17,9137	**2,81131470**	-18
22.586	-17,7850	**2,39327957**	-17,9164	**2,82514537**	-18
22587	-17,7872	**2,39777696**	-17,9191	**2,83943102**	-18
22.588	-17,7894	**2,40232141**	-17,9218	**2,85420261**	-18
22.589	-17,7916	**2,40691391**	-17,9245	**2,86949437**	-18
22590	-17,7939	**2,41155550**	-17,9272	**2,88534428**	-18
22.591	-17,7961	**2,41624723**	-17,9300	**2,90179463**	-18
22.592	-17,7983	**2,42099021**	-17,9327	**2,91889270**	-18
22593	-17,8005	**2,42578555**	-17,9354	**2,93669160**	-18
22.594	-17,8027	**2,43063443**	-17,9381	**2,95525125**	-18
22.595	-17,8049	**2,43553806**	-17,9408	**2,97463960**	-18
22596	-17,8071	**2,44049770**	-17,9435	**2,99493412**	-18
22.597	-17,8094	**2,44551462**	-17,9462	**3,01622370**	-18
22.598	-17,8116	**2,45059018**	-17,9489	**3,03861094**	-18
22599	-17,8138	**2,45572576**	-17,9516	**3,06221524**	-18
22.600	-17,8160	**2,46092279**	-17,9543	**3,08717657**	-18
22.601	-17,8182	**2,46618277**	-17,9570	**3,11366052**	-18
22602	-17,8204	**2,47150724**	-17,9597	**3,14186498**	-18
22.603	-17,8227	**2,47689780**	-17,9624	**3,17202915**	-18
22.604	-17,8249	**2,48235611**	-17,9651	**3,20444580**	-18
22605	-17,8271	**2,48788389**	-17,9678	**3,23947869**	-18
22.606	-17,8293	**2,49348294**	-17,9705	**3,27758749**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "FILETE"					
Numero de Ts registradas c / 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
22.607	-17,8315	**2,49915512**	-17,9732	**3,31936477**	-18
22608	-17,8337	**2,50490236**	-17,9759	**3,36559278**	-18
22.609	-17,8359	**2,51072668**	-17,9786	**3,41733418**	-18
22.610	-17,8382	**2,51663017**	-17,9813	**3,47608442**	-18
22611	-17,8404	**2,52261502**	-17,9840	**3,54404434**	-18
22.612	-17,8426	**2,52868350**	-17,9867	**3,62464795**	-18
22.613	-17,8448	**2,53483797**	-17,9894	**3,72370028**	-18
22614	-17,8470	**2,54108092**	-17,9921	**3,85223320**	-18
22.615	-17,8492	**2,54741492**	-17,9949	**4,03560331**	-18
22.616	-17,8514	**2,55384267**	-17,9976	**4,35923176**	-18
22617	-17,8537	**2,56036698**	-18,0003		
22.618	-17,8559	**2,56699080**	-18,0030		
22.619	-17,8581	**2,57371721**	-18,0057		
22620	-17,8603	**2,58054945**	-18,0084		
22.621	-17,8625	**2,58749089**	-18,0111		
22.622	-17,8647	**2,59454508**	-18,0138		
22623	-17,8670	**2,60171574**	-18,0165		
22.624	-17,8692	**2,60900679**	-18,0192		
22.625	-17,8714	**2,61642234**	-18,0219		
22626	-17,8736	**2,62396671**	-18,0246		
22.627	-17,8758	**2,63164446**	-18,0273		
22.628	-17,8780	**2,63946039**	-18,0300		
22629	-17,8802	**2,64741956**	-18,0327		
22.630	-17,8825	**2,65552732**	-18,0354		
22.631	-17,8847	**2,66378933**	-18,0381		
22632	-17,8869	**2,67221157**	-18,0408		
22.633	-17,8891	**2,68080038**	-18,0435		
22.634	-17,8913	**2,68956248**	-18,0462		
22635	-17,8935	**2,69850500**	-18,0489		
22.636	-17,8957	**2,70763553**	-18,0516		
22.637	-17,8980	**2,71696216**	-18,0543		
22638	-17,9002	**2,72649348**	-18,0571		
22.639	-17,9024	**2,73623868**	-18,0598		
22.640	-17,9046	**2,74620759**	-18,0625		
22641	-17,9068	**2,75641071**	-18,0652		
22.642	-17,9090	**2,76685932**	-18,0679		
22.643	-17,9113	**2,77756552**	-18,0706		

GRAFICO Nº 1 FILETE DE LLAMA

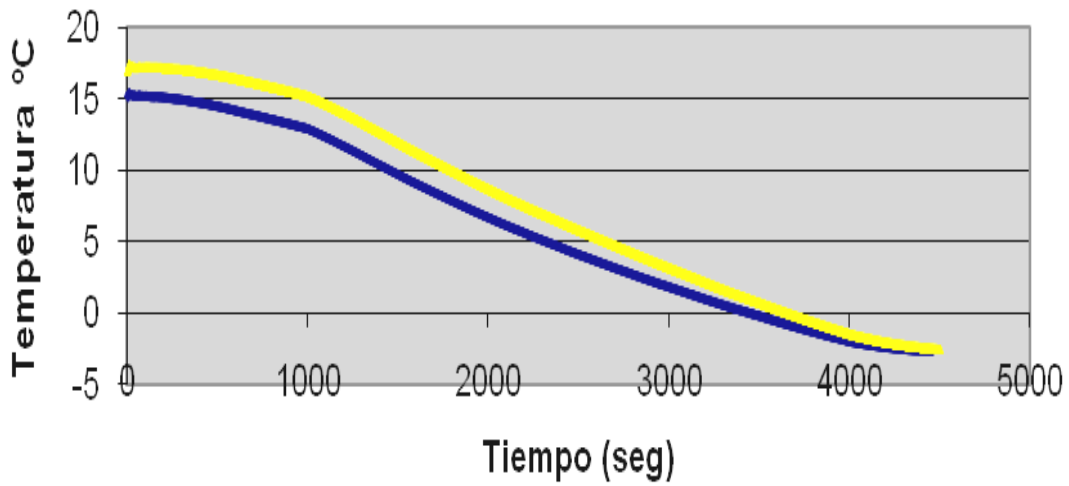
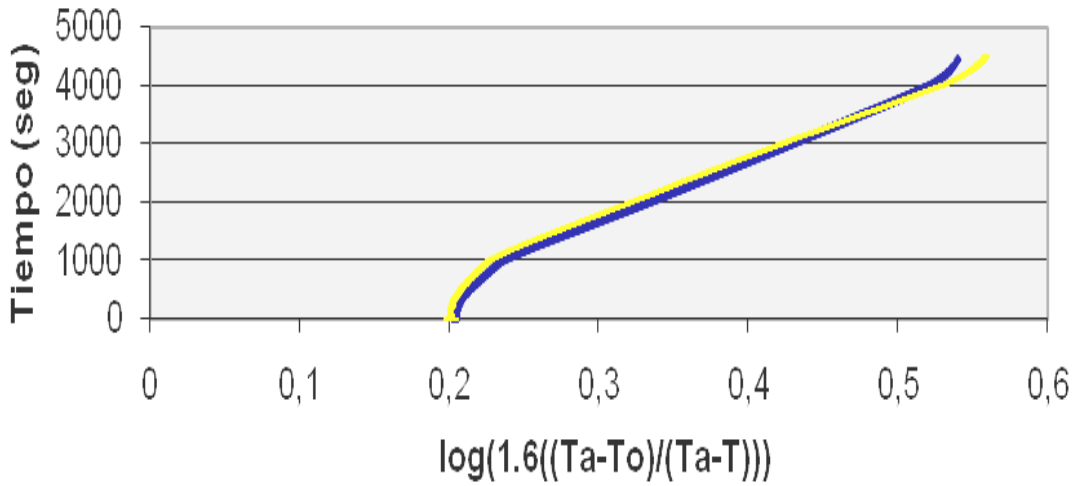
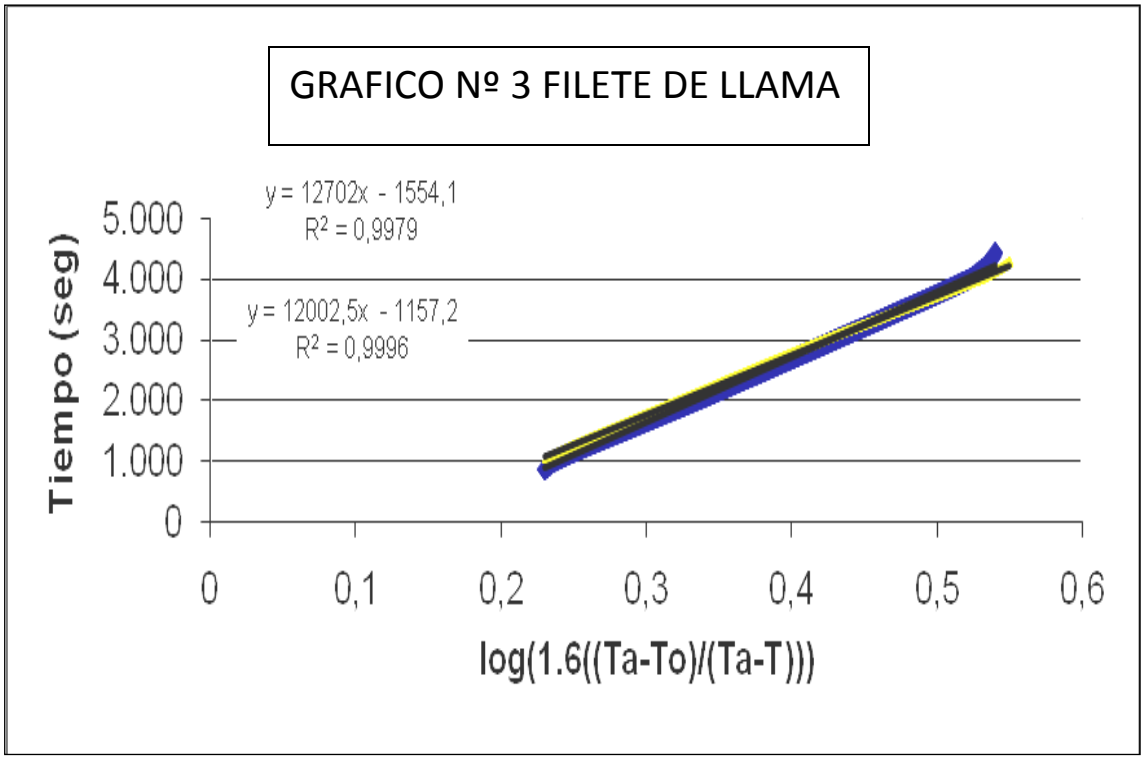


GRAFICO Nº 2 FILETE DE LLAMA





$$t = 0.398\frac{r^2}{\alpha}\log\left(1.6\frac{Ta-To}{Ta-T}\right)$$

$$\alpha = \frac{0.398r^2}{f*60}$$

REPETICIONES	*fc*	*A*
R1	12702,00	9,44723E-09
R2	12002,50	9,99781E-09

ANEXOS II

RESULTADOS DE LA DETERMINACIÓN DE LA DIFUSIVIDAD TÉRMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACIÓN PARA LOMO

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "LOMO"					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
1	10,06661663	**0,204119983**	10,5159445	**0,204119983**	-18
2	10,06165342	**0,204196789**	10,51351075	**0,20415705**	-18
3	10,05932371	**0,204232846**	10,51227663	**0,204175848**	-18
4	10,05400475	**0,204315179**	10,50941400	**0,204219453**	-18
5	10,05056142	**0,204368487**	10,50679413	**0,204259364**	-18
6	10,04646929	**0,204431848**	10,50406600	**0,204300929**	-18
7	10,04127654	**0,204512265**	10,50172813	**0,20433655**	-18
8	10,03651279	**0,20458605**	10,49992463	**0,204364032**	-18
9	10,03297333	**0,204640881**	10,49580913	**0,20442675**	-18
10	10,02943013	**0,204695777**	10,49423263	**0,204450778**	-18
11	10,02565692	**0,204754244**	10,49217188	**0,204482188**	-18
12	10,02381383	**0,204782806**	10,48908813	**0,204529195**	-18
13	10,01965233	**0,204847303**	10,48698063	**0,204561323**	-18
14	10,01495888	**0,204920056**	10,48477588	**0,204594937**	-18
15	10,01125263	**0,204977515**	10,48281338	**0,204624859**	-18
16	10,00801929	**0,205027648**	10,48065575	**0,204657759**	-18
17	10,00440813	**0,205083647**	10,47840813	**0,204692034**	-18
18	9,999808833	**0,205154979**	10,47562463	**0,204734484**	-18
19	9,99569000	**0,205218869**	10,47215788	**0,20478736**	-18
20	9,9923885	**0,205270088**	10,46910775	**0,204833887**	-18
21	9,987972917	**0,2053386**	10,46678563	**0,204869313**	-18
22	9,98505525	**0,205383876**	10,46464638	**0,204901951**	-18
23	9,980620167	**0,205452709**	10,46233925	**0,204937153**	-18
24	9,976505167	**0,205516584**	10,45988988	**0,204974528**	-18
25	9,971843875	**0,20558895**	10,45774225	**0,205007302**	-18
26	9,967347333	**0,205658769**	10,45543763	**0,205042474**	-18
27	9,963000542	**0,205726274**	10,45168275	**0,205099786**	-18
28	9,959868	**0,205774928**	10,44885563	**0,205142942**	-18
29	9,956767042	**0,205823098**	10,44645538	**0,205179585**	-18
30	9,952158375	**0,205894697**	10,44383963	**0,205219522**	-18
31	9,948006833	**0,205959204**	10,44084988	**0,205265174**	-18
32	9,94318925	**0,206034073**	10,43771013	**0,20531312**	-18
33	9,939149292	**0,206096867**	10,43491963	**0,205355738**	-18
34	9,934664625	**0,206166583**	10,43291313	**0,205386385**	-18
35	9,93125725	**0,20621956**	10,43018488	**0,20542806**	-18
36	9,926137958	**0,206299166**	10,42747563	**0,205469448**	-18
37	9,921236667	**0,206375395**	10,42458375	**0,20551363**	-18
38	9,916681	**0,206446261**	10,42089813	**0,205569946**	-18
39	9,913075833	**0,20650235**	10,419365	**0,205593374**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "LOMO"					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
42	9,903358417	**0,206653567**	10,4116935	**0,205710623**	-18
43	9,899667167	**0,206711023**	10,40983288	**0,205739065**	-18
44	9,8964405	**0,206761253**	10,4066155	**0,205788251**	-18
45	9,892926917	**0,206815956**	10,403813	**0,205831099**	-18
46	9,888162292	**0,206890148**	10,4001915	**0,205886475**	-18
47	9,88397125	**0,206955419**	10,397693	**0,205924684**	-18
48	9,88002675	**0,207016859**	10,39450263	**0,205973478**	-18
49	9,877552	**0,207055411**	10,39213075	**0,206009757**	-18
50	9,873027917	**0,207125895**	10,38951588	**0,206049757**	-18
51	9,868967292	**0,207189169**	10,3864735	**0,206096301**	-18
52	9,864365625	**0,207260885**	10,38356525	**0,206140797**	-18
53	9,860872917	**0,207315326**	10,37918788	**0,20620778**	-18
54	9,8560795	**0,207390052**	10,37601375	**0,206256358**	-18
55	9,850909542	**0,207470662**	10,37295088	**0,206303237**	-18
56	9,846833125	**0,207534233**	10,36961525	**0,206354298**	-18
57	9,842662417	**0,207599283**	10,3663645	**0,206404064**	-18
58	9,837127208	**0,207685631**	10,36354813	**0,206447186**	-18
59	9,832882583	**0,207751858**	10,36048525	**0,206494086**	-18
60	9,829492625	**0,207804757**	10,35843088	**0,206525547**	-18
61	9,825235875	**0,207871191**	10,3546895	**0,206582848**	-18
62	9,820555792	**0,207944243**	10,35153413	**0,20663118**	-18
63	9,816826833	**0,208002458**	10,348353	**0,206679911**	-18
64	9,812475375	**0,208070401**	10,34508963	**0,206729909**	-18
65	9,809282917	**0,208120255**	10,34149025	**0,206785061**	-18
66	9,804951542	**0,208187903**	10,33870463	**0,206827749**	-18
67	9,800632667	**0,208255366**	10,33621063	**0,206865971**	-18
68	9,797248	**0,208308243**	10,332869	**0,20691719**	-18
69	9,793433667	**0,208367841**	10,32955475	**0,206967995**	-18
70	9,79036125	**0,208415853**	10,32667938	**0,207012077**	-18
71	9,785449083	**0,208492625**	10,32435575	**0,207047703**	-18
72	9,782214583	**0,208543184**	10,32095525	**0,207099846**	-18
73	9,778279875	**0,208604696**	10,31867463	**0,20713482**	-18
74	9,774196958	**0,208668534**	10,31641663	**0,20716945**	-18
75	9,76972775	**0,208738423**	10,31359375	**0,207212747**	-18
76	9,766009125	**0,208796583**	10,31082663	**0,207255193**	-18
77	9,761830208	**0,208861951**	10,30760788	**0,207304572**	-18
78	9,758266875	**0,208917698**	10,30468563	**0,207349408**	-18
79	9,754253083	**0,208980501**	10,30269025	**0,207380025**	-18
80	9,749620958	**0,20905299**	10,29939088	**0,207430656**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "LOMO"					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
82	9,740136208	**0,209201456**	10,29256325	**0,207535448**	-18
83	9,736930708	**0,209251644**	10,29068388	**0,207564298**	-18
84	9,73255625	**0,209320143**	10,28777638	**0,207608933**	-18
85	9,728246667	**0,209387636**	10,28443638	**0,207660214**	-18
86	9,724720875	**0,209442863**	10,28138525	**0,207707066**	-18
87	9,720054208	**0,20951597**	10,2783675	**0,207753409**	-18
88	9,71608325	**0,209578188**	10,27522925	**0,207801609**	-18
89	9,712032042	**0,209641673**	10,27219188	**0,207848264**	-18
⋮	⋮	⋮	⋮	⋮	⋮
20802	-17,73664867	**2,231774524**	-17,16535787	**1,737707443**	-18
20.803	-17,74046737	**2,238118086**	-17,16967675	**1,739960545**	-18
20.804	-17,74428608	**2,244555681**	-17,17399562	**1,742225396**	-18
20805	-17,74810479	**2,251090139**	-17,1783145	**1,74450212**	-18
20.806	-17,7519235	**2,257724419**	-17,18263337	**1,746790843**	-18
20.807	-17,75574221	**2,264461619**	-17,18695225	**1,749091691**	-18
20808	-17,75956092	**2,271304982**	-17,19127112	**1,751404794**	-18
20.809	-17,76337962	**2,278257907**	-17,19559	**1,753730283**	-18
20.810	-17,76719833	**2,28532396**	-17,19990887	**1,75606829**	-18
20811	-17,77101704	**2,292506883**	-17,20422775	**1,758418953**	-18
20.812	-17,77483575	**2,299810608**	-17,20854662	**1,760782408**	-18
20.813	-17,77865446	**2,307239266**	-17,2128655	**1,763158796**	-18
20814	-17,78247317	**2,314797207**	-17,21718437	**1,765548258**	-18
20.815	-17,78629187	**2,322489011**	-17,22150325	**1,76795094**	-18
20.816	-17,79011058	**2,330319505**	-17,22582212	**1,770366988**	-18
20817	-17,79392929	**2,338293781**	-17,230141	**1,772796552**	-18
20.818	-17,797748	**2,34641722**	-17,23445987	**1,775239785**	-18
20.819	-17,80156671	**2,354695508**	-17,23877875	**1,77769684**	-18
20820	-17,80538542	**2,363134664**	-17,24309762	**1,780167875**	-18
20.821	-17,80920412	**2,371741064**	-17,2474165	**1,782653051**	-18
20.822	-17,81302283	**2,380521471**	-17,25173537	**1,785152529**	-18
20823	-17,81684154	**2,389483066**	-17,25605425	**1,787666476**	-18
20.824	-17,82066025	**2,398633485**	-17,26037312	**1,79019506**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION "LOMO"

Numero de Ts registradas C/ 2seg	Temperatura R1	Log(1,6((Ta-To)/(Ta-T)))	Temperatura R2	Log(1,6((Ta-To)/(Ta-T)))	Temperatura medio
20.828	-17,83593508	**2,437294323**	-17,27764862	**1,80045924**	-18
20829	-17,83975379	**2,447522283**	-17,2819675	**1,803063641**	-18
20.830	-17,8435725	**2,457996941**	-17,28628637	**1,805683756**	-18
20.831	-17,84739121	**2,468730491**	-17,29060525	**1,808319773**	-18
20832	-17,85120992	**2,479736058**	-17,29492412	**1,810971888**	-18
20.833	-17,85502862	**2,491027787**	-17,299243	**1,813640299**	-18
20.834	-17,85884733	**2,502620958**	-17,30356187	**1,816325206**	-18
20835	-17,86266604	**2,514532107**	-17,30788075	**1,819026815**	-18
20.836	-17,86648475	**2,526779172**	-17,31219962	**1,821745335**	-18
20.837	-17,87030346	**2,539381649**	-17,3165185	**1,82448098**	-18
20838	-17,87412217	**2,552360786**	-17,32083737	**1,827233965**	-18
20.839	-17,87794087	**2,565739793**	-17,32515625	**1,830004513**	-18
20.840	-17,88175958	**2,579544094**	-17,32947512	**1,83279285**	-18
20841	-17,88557829	**2,593801618**	-17,333794	**1,835599204**	-18
20.842	-17,889397	**2,608543138**	-17,33811287	**1,83842381**	-18
20.843	-17,89321571	**2,623802674**	-17,34243175	**1,841266908**	-18
20844	-17,89703442	**2,639617961**	-17,34675062	**1,844128741**	-18
20.845	-17,90085312	**2,656031015**	-17,3510695	**1,847009557**	-18
20.846	-17,90467183	**2,673088804**	-17,35538837	**1,84990961**	-18
20847	-17,90849054	**2,69084406**	-17,35970725	**1,852829159**	-18
20.848	-17,91230925	**2,709356261**	-17,36402612	**1,855768468**	-18
20.849	-17,91612796	**2,72869283**	-17,368345	**1,858727805**	-18
20850	-17,91994667	**2,748930625**	-17,37266387	**1,861707446**	-18
20.851	-17,92376537	**2,770157777**	-17,37698275	**1,864707672**	-18
20.852	-17,92758408	**2,792476013**	-17,38130162	**1,867728768**	-18
20853	-17,93140279	**2,816003603**	-17,3856205	**1,870771027**	-18
20.854	-17,9352215	**2,840879158**	-17,38993937	**1,873834748**	-18
20.855	-17,93904021	**2,867266571**	-17,39425825	**1,876920236**	-18
20856	-17,94285892	**2,895361575**	-17,39857712	**1,880027801**	-18
20.857	-17,94667762	**2,92540056**	-17,402896	**1,883157763**	-18
20.858	-17,95049633	**2,957672677**	-17,40721487	**1,886310446**	-18
20859	-17,95431504	**2,992536812**	-17,41153375	**1,889486183**	-18
20.860	-17,95813375	**3,030445983**	-17,41585262	**1,892685314**	-18
20.861	-17,96195246	**3,071983444**	-17,4201715	**1,895908185**	-18
20862	-17,96577117	**3,117917948**	-17,42449037	**1,899155152**	-18
20.863	-17,96958987	**3,16929184**	-17,42880925	**1,902426578**	-18
20.864	-17,97340858	**3,22756857**	-17,43312812	**1,905722833**	-18
20865	-17,97722729	**3,294895361**	-17,437447	**1,909044298**	-18

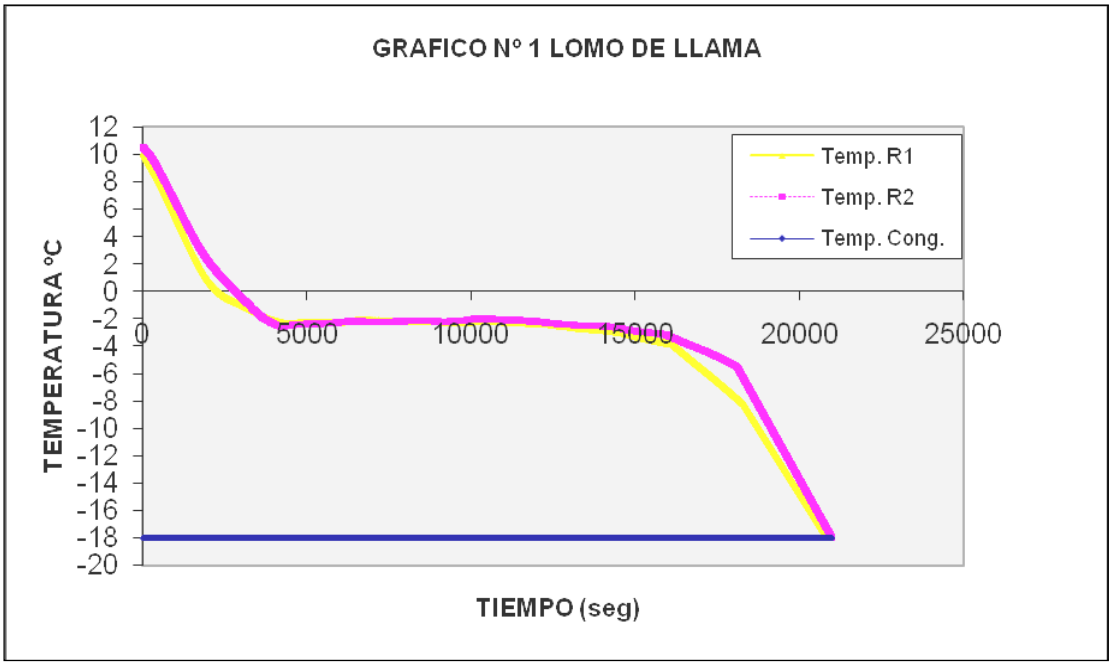


GRAFICO N° 1 LOMO DE LLAMA
TEMPERATURA °C
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
5000
10000
15000
20000
25000
Temp. R1
Temp. R2
Temp. Cong.
TIEMPO (seg)

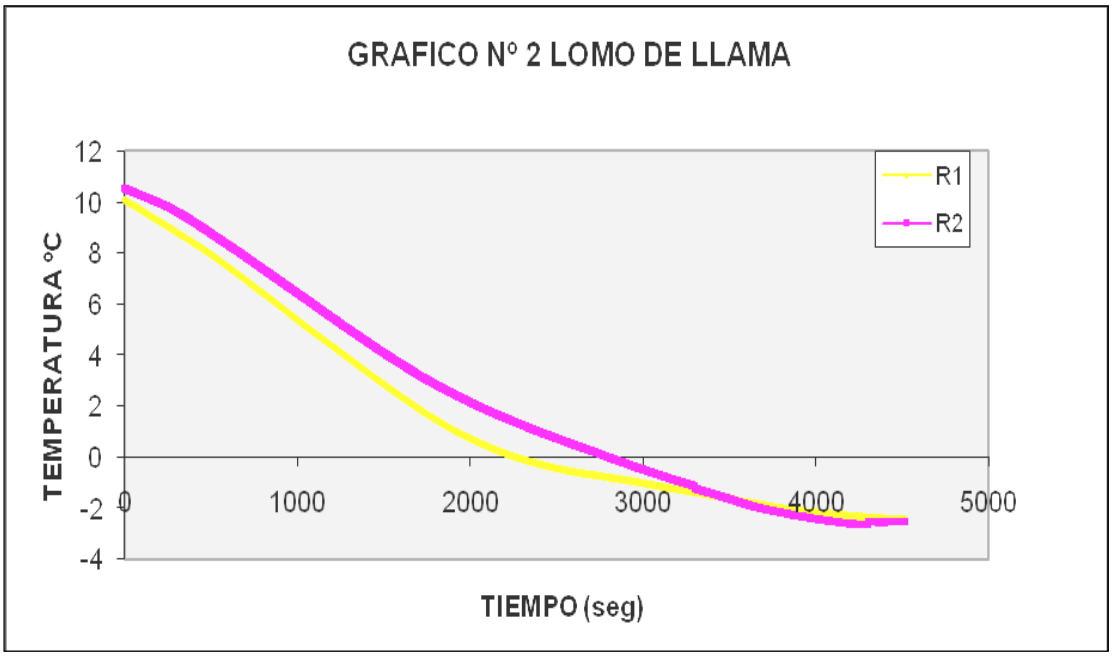
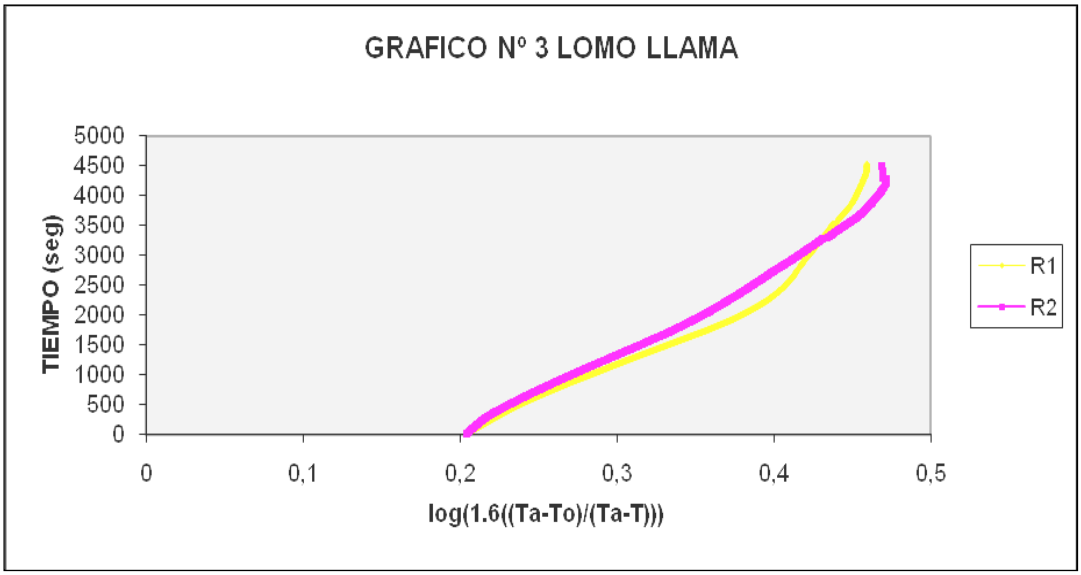
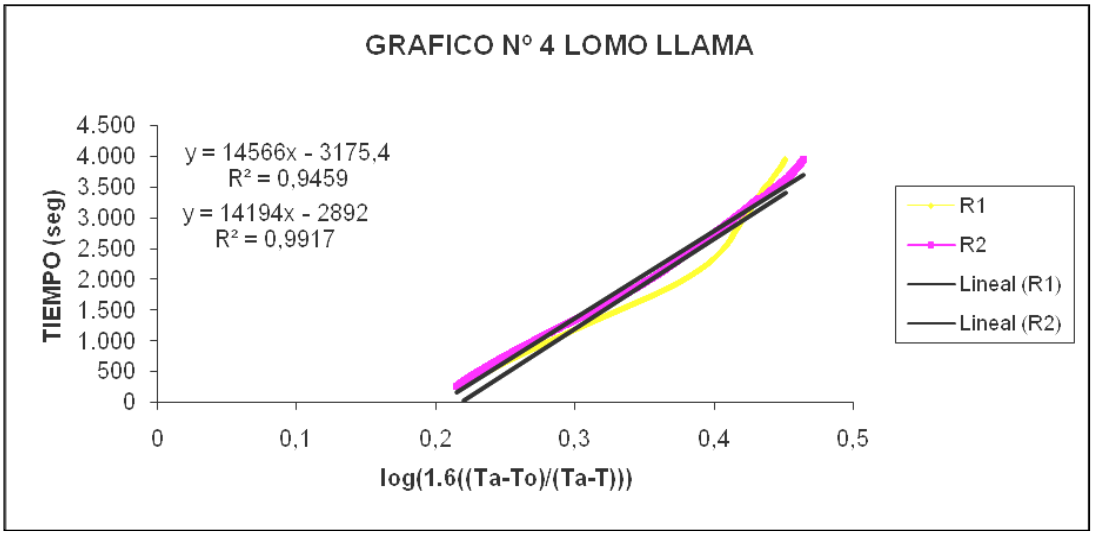


GRAFICO N° 2 LOMO DE LLAMA
TEMPERATURA °C
12
10
8
6
4
2
0
-2
-4
0
1000
2000
3000
4000
5000
R1
R2
TIEMPO (seg)





$$t = 0.398\frac{r^2}{\alpha}\log\left(1.6\frac{Ta-To}{Ta-T}\right) \qquad \alpha = \frac{0.398r^2}{f*60}$$

REPETICIONES	*fc*	*α*
R1	14566,00	8,23827E-09
R2	14194,00	8,45418E-09

ANEXOS III

RESULTADOS DE LA DETERMINACIÓN DE LA DIFUSIVIDAD TÉRMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACIÓN PARA SOLOMILLO

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “SOLOMILLO”					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
1	7,699756	**0,204119983**	11,079786	**0,204119983**	-18
2	8,332942	**0,1935496**	11,074796	**0,204194513**	-18
3	8,008445	**0,198934595**	11,058398	**0,204439521**	-18
4	7,918994	**0,200430842**	11,192909	**0,202433815**	-18
5	7,883238	**0,201030377**	11,280722	**0,201129408**	-18
6	7,857443	**0,201463407**	11,295149	**0,200915478**	-18
7	7,960592	**0,199734391**	11,346065	**0,200161314**	-18
8	8,06397	**0,198008416**	11,462642	**0,198439500**	-18
9	7,990001	**0,199242686**	11,538419	**0,197323942**	-18
10	8,047735	**0,198279018**	11,541001	**0,197285982**	-18
11	8,054515	**0,198165989**	11,46231	**0,198444394**	-18
12	8,06196	**0,198041909**	11,398954	**0,199379310**	-18
13	8,106479	**0,197300681**	11,430783	**0,198909372**	-18
14	8,113819	**0,197178593**	11,454766	**0,198555612**	-18
15	8,190424	**0,195906453**	11,48013	**0,198181795**	-18
16	8,179256	**0,196091683**	11,493202	**0,197989264**	-18
17	8,135973	**0,196810310**	11,499699	**0,197893604**	-18
18	8,152033	**0,196543527**	11,549591	**0,197159715**	-18
19	8,136698	**0,196798263**	11,594473	**0,196500578**	-18
20	8,144603	**0,196666931**	11,534541	**0,197380963**	-18
21	8,138858	**0,196762373**	11,551395	**0,197133202**	-18
22	8,175561	**0,196152984**	11,575489	**0,196779255**	-18
23	8,170625	**0,196234888**	11,566831	**0,196906410**	-18
24	8,176056	**0,196144772**	11,557967	**0,197036629**	-18
25	8,178486	**0,196104457**	11,541384	**0,197280351**	-18
26	8,156604	**0,196467625**	11,567058	**0,196903076**	-18
27	8,162203	**0,196374672**	11,574912	**0,196787728**	-18
28	8,143307	**0,196688460**	11,576037	**0,196771208**	-18
29	8,161522	**0,196385976**	11,587789	**0,196598676**	-18
30	8,174051	**0,196178038**	11,585904	**0,196626345**	-18
31	8,192996	**0,195863806**	11,583417	**0,196662854**	-18
32	8,212977	**0,195532636**	11,552507	**0,197116860**	-18
33	8,215774	**0,195486298**	11,542805	**0,197259461**	-18
34	8,24141	**0,195061816**	11,541237	**0,197282512**	-18
35	8,229773	**0,195254451**	11,537836	**0,197332514**	-18
36	8,237844	**0,195120837**	11,55242	**0,197118139**	-18
37	8,254944	**0,194837886**	11,532927	**0,197404697**	-18
38	8,268352	**0,194616155**	11,539255	**0,197311651**	-18
39	8,269236	**0,194601541**	11,54137	**0,197280557**	-18
40	8,278326	**0,194451287**	11,554165	**0,197092495**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “SOLOMILLO”					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
43	8,282395	**0,194384045**	11,576881	**0,196758815**	-18
44	8,285167	**0,194338242**	11,57972	**0,196717130**	-18
45	8,275104	**0,194504539**	11,597058	**0,196462645**	-18
46	8,275062	**0,194505233**	11,597048	**0,196462792**	-18
47	8,272775	**0,194543036**	11,601762	**0,196393626**	-18
48	8,269479	**0,194597523**	11,612107	**0,196241879**	-18
49	8,26786	**0,19462429**	11,62264	**0,196087428**	-18
50	8,277666	**0,194462194**	11,627318	**0,196018850**	-18
51	8,273889	**0,194524622**	11,628806	**0,195997038**	-18
52	8,269553	**0,1945963**	11,634447	**0,195914361**	-18
53	8,281084	**0,194405708**	11,642533	**0,195795877**	-18
54	8,289925	**0,194259636**	11,643399	**0,195783189**	-18
55	8,297514	**0,194134288**	11,637081	**0,195875762**	-18
56	8,297265	**0,1941384**	11,642551	**0,195795613**	-18
57	8,30291	**0,194045184**	11,642413	**0,195797635**	-18
58	8,302371	**0,194054083**	11,639622	**0,195838528**	-18
59	8,313716	**0,1938668**	11,633775	**0,195924210**	-18
60	8,338599	**0,193456312**	11,646313	**0,195740499**	-18
61	8,339536	**0,193440863**	11,636183	**0,195888921**	-18
62	8,337483	**0,193474714**	11,654014	**0,195627701**	-18
63	8,337301	**0,193477716**	11,672615	**0,195355367**	-18
64	8,332594	**0,19355534**	11,670112	**0,195392003**	-18
65	8,334131	**0,193529991**	11,678087	**0,195275285**	-18
66	8,348802	**0,193288109**	11,685831	**0,195161978**	-18
67	8,354140	**0,193200134**	11,694791	**0,195030916**	-18
68	8,351544	**0,193242916**	11,689207	**0,195112591**	-18
69	8,354121	**0,193200447**	11,686278	**0,195155439**	-18
70	8,359851	**0,193106032**	11,690506	**0,19509359**	-18
71	8,364528	**0,193028982**	11,692584	**0,195063195**	-18
72	8,375789	**0,192843523**	11,69055	**0,195092946**	-18
73	8,374699	**0,192861471**	11,685225	**0,195170844**	-18
74	8,367258	**0,192984014**	11,688781	**0,195118823**	-18
75	8,365090	**0,193019725**	11,695695	**0,195017695**	-18
76	8,371356	**0,192916521**	11,710976	**0,19479427**	-18
77	8,367307	**0,192983207**	11,689648	**0,19510614**	-18
78	8,374780	**0,192860137**	11,701064	**0,194939181**	-18
79	8,375642	**0,192845943**	11,70471	**0,194885872**	-18
80	8,371107	**0,192920622**	11,701531	**0,194932353**	-18
81	8,381400	**0,192751144**	11,70138	**0,194934561**	-18
82	8,381624	**0,192747456**	11,699661	**0,194959697**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “SOLOMILLO”					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
84	8,378339	**0,192801537**	11,69631	**0,195008701**	-18
85	8,38683	**0,192661764**	11,706501	**0,194859688**	-18
86	8,389321	**0,192620767**	11,718217	**0,194688439**	-18
87	8,394417	**0,192536909**	11,724452	**0,194597332**	-18
88	8,39478	**0,192530936**	11,728803	**0,194533766**	-18
89	8,395876	**0,192512903**	11,725323	**0,194584606**	-18
90	8,402019	**0,192411843**	11,726944	**0,194560924**	-18
⋮	⋮	⋮	⋮	⋮	⋮
21.958	-17,672984	**2,099479981**	-17,847481	**2,48438724**	-18
21.959	-17,678256	**2,106538526**	-17,852175	**2,497963301**	-18
21960	-17,683528	**2,113713691**	-17,856869	**2,511977483**	-18
21.961	-17,6888	**2,121009394**	-17,861563	**2,52645901**	-18
21.962	-17,694072	**2,128429755**	-17,866257	**2,541440128**	-18
21963	-17,699344	**2,135979107**	-17,870951	**2,556956545**	-18
21.964	-17,704616	**2,143662015**	-17,875645	**2,573047937**	-18
21.965	-17,709888	**2,15148329**	-17,880339	**2,589758561**	-18
21966	-17,71516	**2,159448006**	-17,885033	**2,60713799**	-18
21.967	-17,720432	**2,167561523**	-17,889727	**2,625241999**	-18
21.968	-17,725704	**2,175829508**	-17,894421	**2,644133645**	-18
21969	-17,730976	**2,184257957**	-17,899115	**2,663884591**	-18
21.970	-17,736248	**2,192853221**	-17,903809	**2,684576749**	-18
21.971	-17,74152	**2,201622038**	-17,908503	**2,706304334**	-18
21972	-17,746792	**2,21057156**	-17,913197	**2,729176454**	-18
21.973	-17,752064	**2,219709392**	-17,917891	**2,753320426**	-18
21.974	-17,757336	**2,229043631**	-17,922585	**2,778886071**	-18
21975	-17,762608	**2,238582903**	-17,927279	**2,806051347**	-18
21.976	-17,76788	**2,248336421**	-17,931973	**2,83502987**	-18
21.977	-17,773152	**2,258314028**	-17,936667	**2,866081128**	-18
21978	-17,778424	**2,268526265**	-17,941361	**2,899524633**	-18
21.979	-17,783696	**2,278984432**	-17,946055	**2,935759991**	-18
21.980	-17,788968	**2,289700668**	-17,950749	**2,975296136**	-18
21981	-17,79424	**2,300688031**	-17,955443	**3,018795247**	-18
21.982	-17,799512	**2,311960599**	-17,960137	**3,067141209**	-18
21.983	-17,804784	**2,323533573**	-17,964831	**3,121551169**	-18
21984	-17,810056	**2,335423403**	-17,969525	**3,183767475**	-18

DIFUSIVIDAD EN CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “SOLOMILLO”					
Numero de Ts registradas C/ 2seg	**Temperatura R1**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura R2**	**Log(1,6((Ta-To)/(Ta-T)))**	**Temperatura medio**
21.988	-17,831144	**2,386532486**	-17,988301	**3,599562448**	-18
21.989	-17,836416	**2,400308159**	-17,992995	**3,822303049**	-18
21990	-17,841688	**2,414535147**	-17,997689	**4,303911243**	-18
21.991	-17,84696	**2,429244026**	-18,002383		-18
21.992	-17,852232	**2,444468587**	-18,002383		-18
21993	-17,857504	**2,460246309**	-18,002383		-18
21.994	-17,862776	**2,476618908**	-18,002383		-18
21.995	-17,868048	**2,493633005**	-18,002383		-18
21996	-17,87332	**2,511340928**	-18,002383		-18
21.997	-17,878592	**2,529801678**	-18,002383		-18
21.998	-17,883864	**2,549082119**	-18,002383		-18
21999	-17,889136	**2,569258439**	-18,002383		-18
22.000	-17,894408	**2,590417967**	-18,002383		-18
22.001	-17,89968	**2,612661459**	-18,002383		-18
22002	-17,904952	**2,636106**	-18,002383		-18
22.003	-17,910224	**2,660888731**	-18,002383		-18
22.004	-17,915496	**2,687171716**	-18,002383		-18
22005	-17,920768	**2,715148364**	-18,002383		-18
22.006	-17,92604	**2,74505208**	-18,002383		-18
22.007	-17,931312	**2,777168112**	-18,002383		-18
22008	-17,936584	**2,811850138**	-18,002383		-18
22.009	-17,941856	**2,849544077**	-18,002383		-18
22.010	-17,947128	**2,890823244**	-18,002383		-18
22011	-17,9524	**2,93644203**	-18,002383		-18
22.012	-17,957672	**2,987421234**	-18,002383		-18
22.013	-17,962944	**3,045190445**	-18,002383		-18
22014	-17,968216	**3,111840431**	-18,002383		-18
22.015	-17,973488	**3,190606492**	-18,002383		-18
22.016	-17,97876	**3,28689447**	-18,002383		-18
22017	-17,984032	**3,410798459**	-18,002383		-18
22.018	-17,989304	**3,584827588**	-18,002383		-18
22.019	-17,994576	**3,879729302**	-18,002383		-18
22020	-17,999848	**5,432205394**	-18,002383		-18

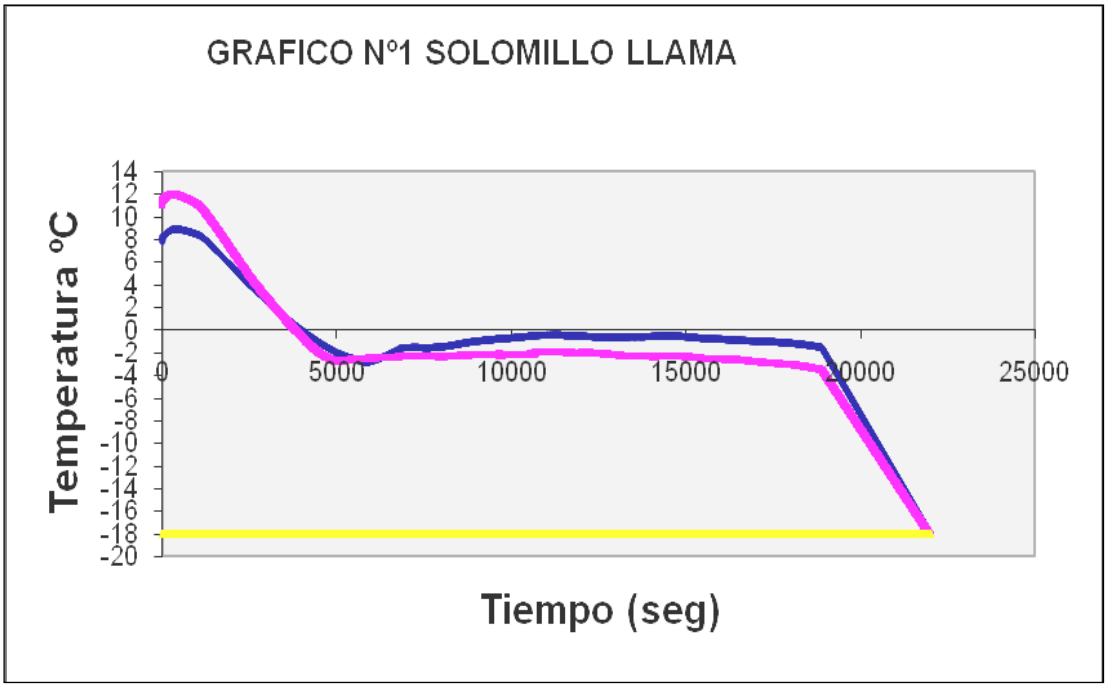


GRAFICO N°1 SOLOMILLO LLAMA
Temperatura °C
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
5000
10000
15000
20000
25000
Tiempo (seg)

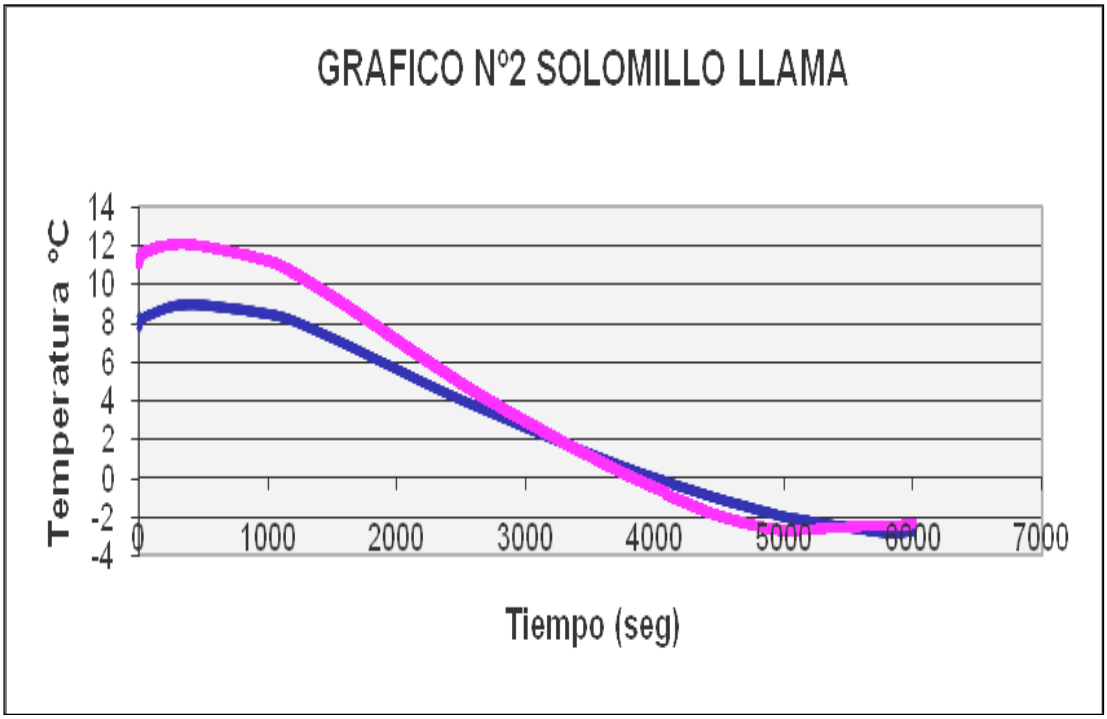
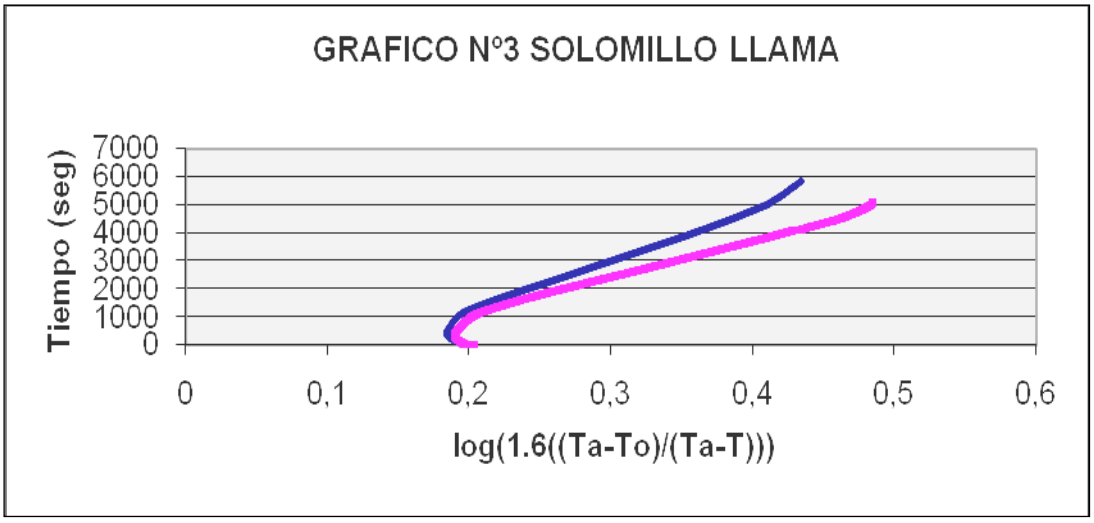
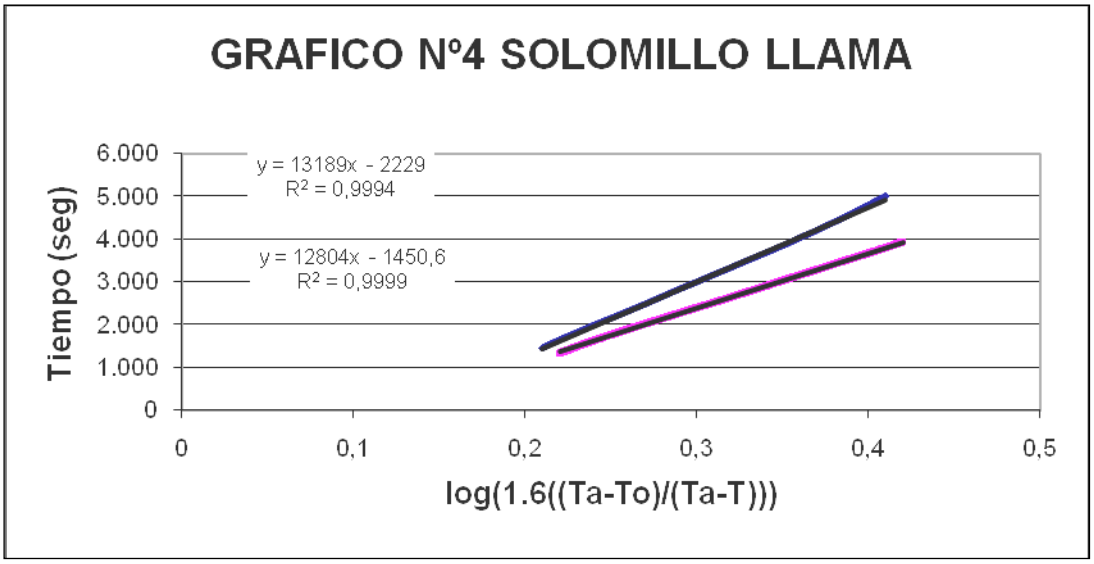


GRAFICO N°2 SOLOMILLO LLAMA
Temperatura °C
14
12
10
8
6
4
2
0
-2
-4
0
1000
2000
3000
4000
5000
6000
7000
Tiempo (seg)





$$t = 0.398\frac{r^2}{\alpha}\log\left(1.6\frac{Ta-To}{Ta-T}\right)$$

$$\alpha = \frac{0.398r^2}{f*60}$$

REPETICIONES	*fc*	*α*
R1	13189,00	9,09839E-09
R2	12804,00	9,37197E-09

ANEXOS IV

RESULTADOS DE LA DETERMINACIÓN DE LA CONDUCTIVIDAD TÉRMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACIÓN PARA FILETE

CONDUCTIVIDAD TERMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “FILETE”

Nº Total de Ts registradas	1800
Tiempo total (seg)	60

Tiempo (seg)	ln T	T R1 promedio c/30 datos	T R2 promedio c/30 datos	T R3 promedio c/30 datos
1	0	-2,12078279	-2,16844349	-2,18866619
2	0,69314718	-2,07419821	-2,12185891	-2,14208161
3	1,09861229	-2,0593639	-2,1070246	-2,1272473
4	1,38629436	-2,05468244	-2,10234314	-2,12256584
5	1,60943791	-2,0179374	-2,0655981	-2,0858208
6	1,79175947	-1,92743033	-1,97509103	-1,99531373
7	1,94591015	-1,90324332	-1,95090402	-1,97112672
8	2,07944154	-1,87473063	-1,92239133	-1,94261403
9	2,19722458	-1,86330177	-1,91096247	-1,93118517
10	2,30258509	-1,76518873	-1,81284943	-1,83307213
11	2,39789527	-1,74382157	-1,79148227	-1,81170497
12	2,48490665	-1,70543031	-1,75309101	-1,77331371
13	2,56494936	-1,66920752	-1,71686822	-1,73709092
14	2,63905733	-1,64743577	-1,69509647	-1,71531917
15	2,7080502	-1,60722541	-1,65488611	-1,67510881
16	2,77258872	-1,59588305	-1,64354375	-1,66376645
17	2,83321334	-1,59837003	-1,64603073	-1,66625343
18	2,89037176	-1,56966377	-1,61732447	-1,69242317
19	2,94443898	-1,51800557	-1,56566627	-1,58588897
20	2,99573227	-1,51000018	-1,55766088	-1,57788358
21	3,04452244	-1,44629341	-1,49395411	-1,51417681
22	3,09104245	-1,37503887	-1,42269957	-1,44292227
23	3,13549422	-1,28169999	-1,32936069	-1,34958339
24	3,17805383	-1,28140466	-1,32906536	-1,34928806
25	3,21887582	-1,26111863	-1,30877933	-1,32900203
26	3,25809654	-1,17229857	-1,21995927	-1,24018197

Tiempo (seg)	ln T	T R1 promedio c/30 datos	T R2 promedio c/30 datos	T R3 promedio c/30 datos
27	3,29583687	-1,17026215	-1,21792285	-1,23814555
28	3,33220451	-1,15301807	-1,20067877	-1,27577747
29	3,36729583	-1,13221508	-1,17987578	-1,20009848
30	3,40119738	-0,99889337	-1,04655407	-1,06677677
31	3,4339872	-0,98660853	-1,03426923	-1,05449193
32	3,4657359	-0,97959497	-1,02725567	-1,04747837
33	3,49650756	-0,9614971	-1,0091578	-1,0293805
34	3,52636052	-0,82631597	-0,87397667	-0,89419937
35	3,55534806	-0,89946018	-0,94712088	-0,96734358
36	3,58351894	-0,8655187	-0,9131794	-0,9334021
37	3,61091791	-0,84772403	-0,89538473	-0,91560743
38	3,63758616	-0,82864999	-0,87631069	-0,89653339
39	3,66356165	-0,739186	-0,7868467	-0,8619454
40	3,68887945	-0,73847943	-0,78614013	-0,80636283
41	3,71357207	-0,7169619	-0,7646226	-0,7848453
42	3,73766962	-0,65204667	-0,69970737	-0,71993007
43	3,76120012	-0,67922147	-0,72688217	-0,74710487
44	3,78418963	-0,6608807	-0,7085414	-0,7287641
45	3,80666249	-0,6316435	-0,6793042	-0,6995269
46	3,8286414	-0,55733007	-0,60499077	-0,62521347
47	3,8501476	-0,52066015	-0,56832085	-0,58854355
48	3,87120101	-0,51128283	-0,55894353	-0,57916623
49	3,8918203	-0,49540793	-0,54306863	-0,56329133
50	3,91202301	-0,46916534	-0,51682604	-0,53704874
51	3,93182563	-0,44899493	-0,49665563	-0,32681198
52	3,95124372	-0,44327941	-0,49094011	-0,51116281
53	3,97029191	-0,44035725	-0,48801795	-0,56311665
54	3,98898405	-0,3725156	-0,4201763	-0,440399
55	4,00733319	-0,22805408	-0,27571478	-0,29593748
56	4,02535169	-0,04860831	-0,09626901	-0,17267253
57	4,04305127	-0,05121795	-0,09887865	-0,08330271
58	4,06044301	0,02037933	-0,02728137	-0,13687389
59	4,07753744	0,0313273	-0,0163334	-0,0914321
60	4,09434456	0,0511695	0,0035088	-0,027438

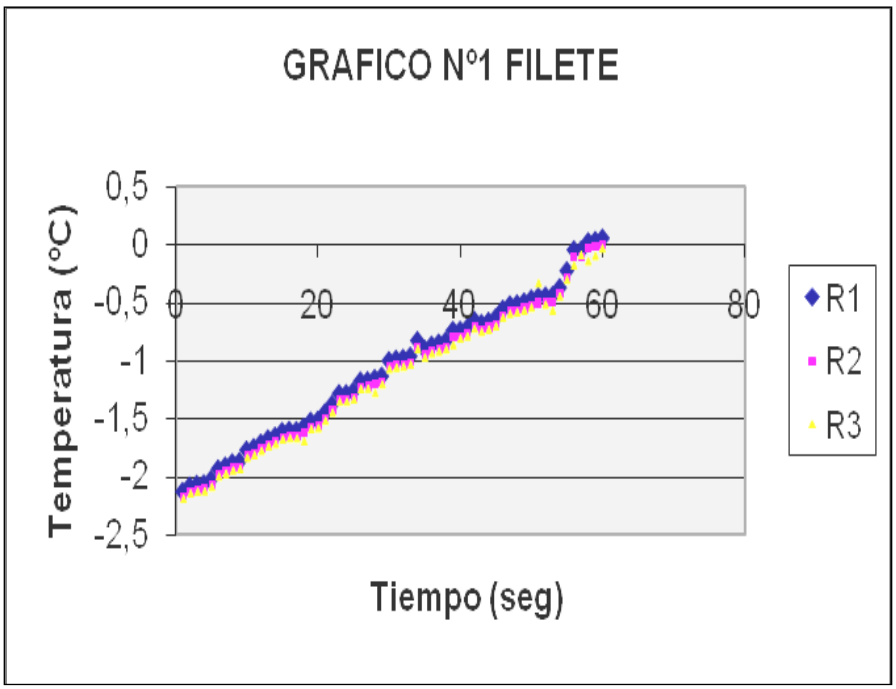


GRAFICO N°1 FILETE
Temperatura (°C)
0,5
0
-0,5
-1
-1,5
-2
-2,5
0
20
40
60
80
Tiempo (seg)
R1
R2
R3

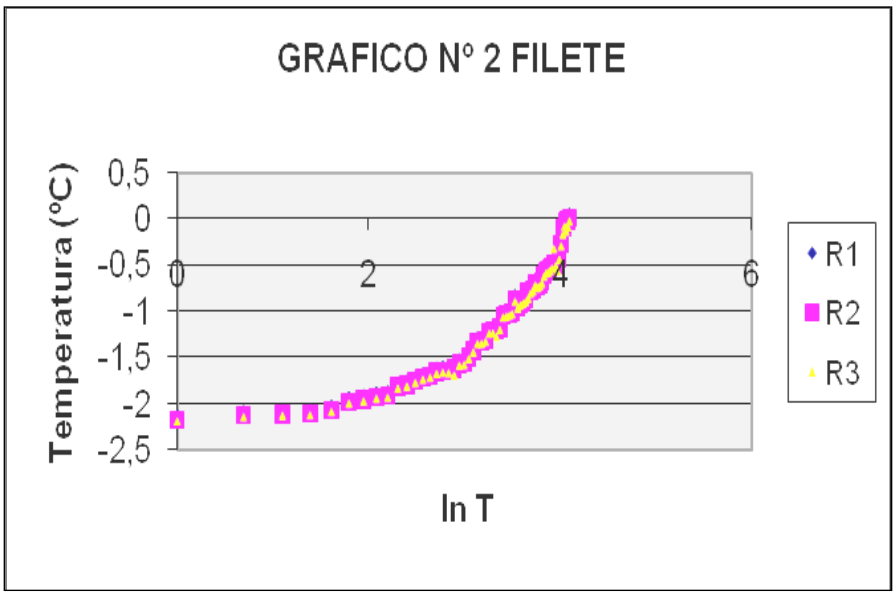
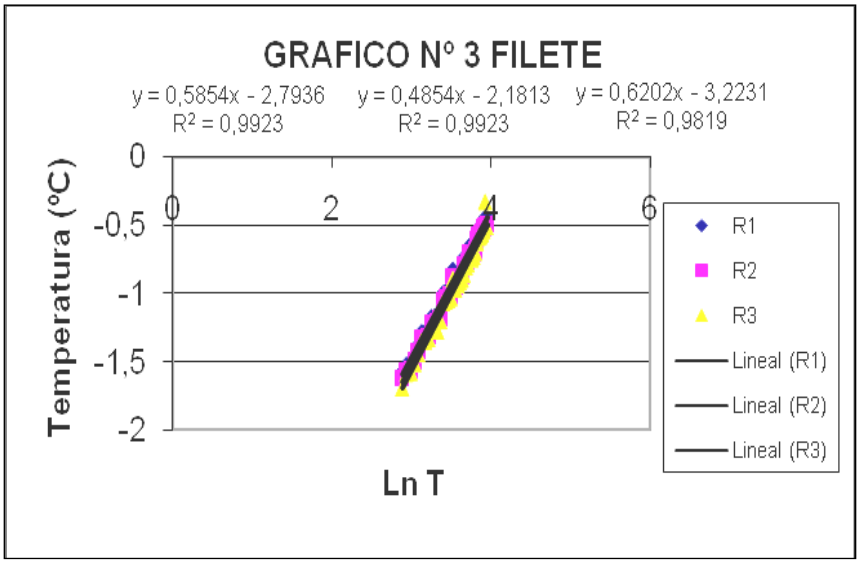


GRAFICO N° 2 FILETE
Temperatura (°C)
0,5
0
-0,5
-1
-1,5
-2
-2,5
0
2
4
6
ln T
R1
R2
R3



$$k = \frac{Q}{4\pi}\frac{\Delta T}{\ln \Delta t}$$

V (v)	I (mA)	ln t/T (ºC)	k(Wm-1ºC-1)
3,55	0,47	1,70823369	0,26414987
3,55	0,47	2,06015657	0,2190269
3,55	0,47	1,6123831	0,27985267

ANEXOS V

RESULTADOS DE LA DETERMINACIÓN DE LA CONDUCTIVIDAD TÉRMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACIÓN PARA LOMO

CONDUCTIVIDAD TERMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “LOMO”

Nº Total de Ts registradas	1800
Tiempo total (seg)	60

Tiempo (seg)	ln T	T R1 promedio c/30 datos	T R2 promedio c/30 datos	T R3 promedio c/30 datos
1	0	-2,102699	-2,2195230	-2,149741
2	0,69314718	-2,0852226	-2,1408310	-2,1016568
3	1,09861229	-2,0518945	-2,1331530	-2,08115375
4	1,38629436	-2,02112	-2,1102480	-2,054314
5	1,60943791	-1,98481147	-2,0105180	-1,98629474
6	1,79175947	-1,9637054	-1,9526214	-1,9467934
7	1,94591015	-1,9210122	-1,9062479	-1,90226005
8	2,07944154	-1,91194547	-1,8523100	-1,87075774
9	2,19722458	-1,87072565	-1,7962380	-1,82211183
10	2,30258509	-1,852048	-1,7562170	-1,7927625
11	2,39789527	-1,825228	-1,7526210	-1,7775545
12	2,48490665	-1,7837935	-1,7323590	-1,74670625
13	2,56494936	-1,753717	-1,7026213	-1,71679917
14	2,63905733	-1,732094	-1,6562559	-1,68280494
15	2,7080502	-1,686694	-1,6393146	-1,6516343
16	2,77258872	-1,677993	-1,6315647	-1,6472838
17	2,83321334	-1,6638118	-1,6493310	-1,6452014
18	2,89037176	-1,63582	-1,5799540	-1,596517
19	2,94443898	-1,600208	-1,5553547	-1,56641135
20	2,99573227	-1,570834	-1,5495782	-1,5488361
21	3,04452244	-1,550791	-1,5282233	-1,52813715
22	3,09104245	-1,490834	-1,4992526	-1,48367329
23	3,13549422	-1,456068	-1,4792116	-1,45626982
24	3,17805383	-1,442938	-1,4462547	-1,43322635
25	3,21887582	-1,400828	-1,4182255	-1,39815674
26	3,25809654	-1,3841167	-1,4083110	-1,38484385

Tiempo (seg)	ln T	T R1 promedio c/30 datos	T R2 promedio c/30 datos	T R3 promedio c/30 datos
27	3,29583687	-1,346101	-1,4007212	-1,36204112
28	3,33220451	-1,3032347	-1,3666470	-1,32357085
29	3,36729583	-1,295587	-1,3493148	-1,3110809
30	3,40119738	-1,264167	-1,3395120	-1,2904695
31	3,4339872	-1,223234	-1,3393140	-1,269904
32	3,4657359	-1,2150428	-1,3062457	-1,24927425
33	3,49650756	-1,055794	-1,3039521	-1,16850305
34	3,52636052	-0,983305	-1,2893148	-1,1249399
35	3,55534806	-0,821128	-1,2395780	-1,018983
36	3,58351894	-0,809276	-1,2062465	-0,99639124
37	3,61091791	-0,7837979	-1,1756480	-0,96835295
38	3,63758616	-0,6985523	-1,0755657	-0,875689
39	3,66356165	-0,66279444	-0,9756497	-0,80785207
40	3,68887945	-0,6213691	-0,8962354	-0,74743225
41	3,71357207	-0,59709433	-0,8553479	-0,71485112
42	3,73766962	-0,5347315	-0,8162347	-0,6641131
43	3,76120012	-0,501244	-0,7493147	-0,61390934
44	3,78418963	-0,4751389	-0,6993130	-0,57585595
45	3,80666249	-0,42512112	-0,6662157	-0,53429841
46	3,8286414	-0,3649958	-0,6393145	-0,49078515
47	3,8501476	-0,338194	-0,5953145	-0,45538425
48	3,87120101	-0,306231	-0,5393146	-0,4114028
49	3,8918203	-0,285024	-0,4493147	-0,35579935
50	3,91202301	-0,269869	-0,4173140	-0,3322215
51	3,93182563	-0,260894	-0,4062467	-0,32220035
52	3,95124372	-0,257867	-0,3782255	-0,30667624
53	3,97029191	-0,227097	-0,3661130	-0,285235
54	3,98898405	-0,218947	-0,3562457	-0,27622635
55	4,00733319	-0,184265	-0,3493147	-0,25541985
56	4,02535169	-0,177905	-0,3362457	-0,24570535
57	4,04305127	-0,165885	-0,3253450	-0,234245
58	4,06044301	-0,165765	-0,3180680	-0,2305465
59	4,07753744	-0,162255	-0,3152265	-0,22737074
60	4,09434456	-0,126876	-0,2962547	-0,20019535

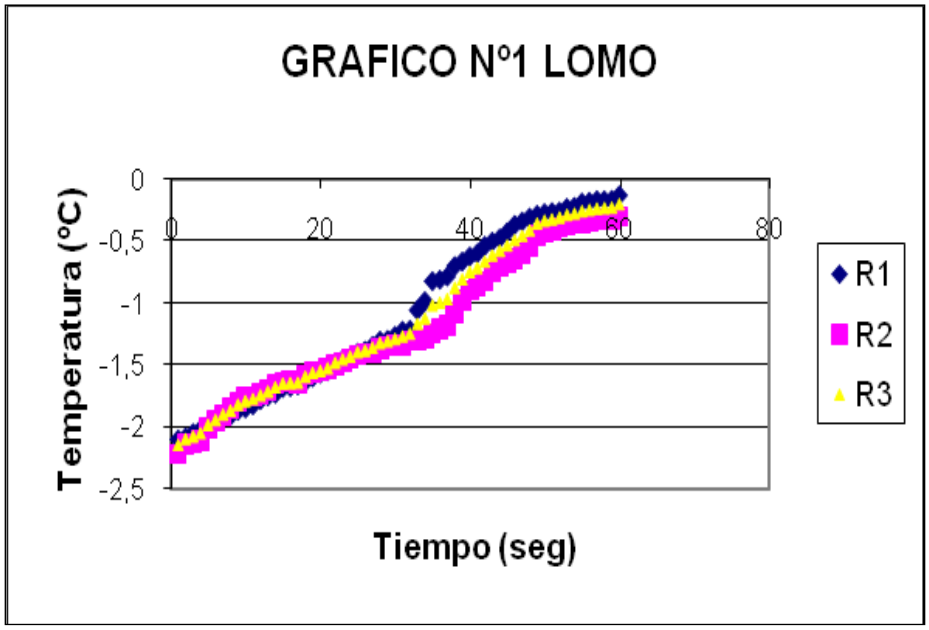


GRAFICO Nº1 LOMO
Temperatura (ºC)
0
-0,5
-1
-1,5
-2
-2,5
0
20
40
60
80
Tiempo (seg)
R1
R2
R3

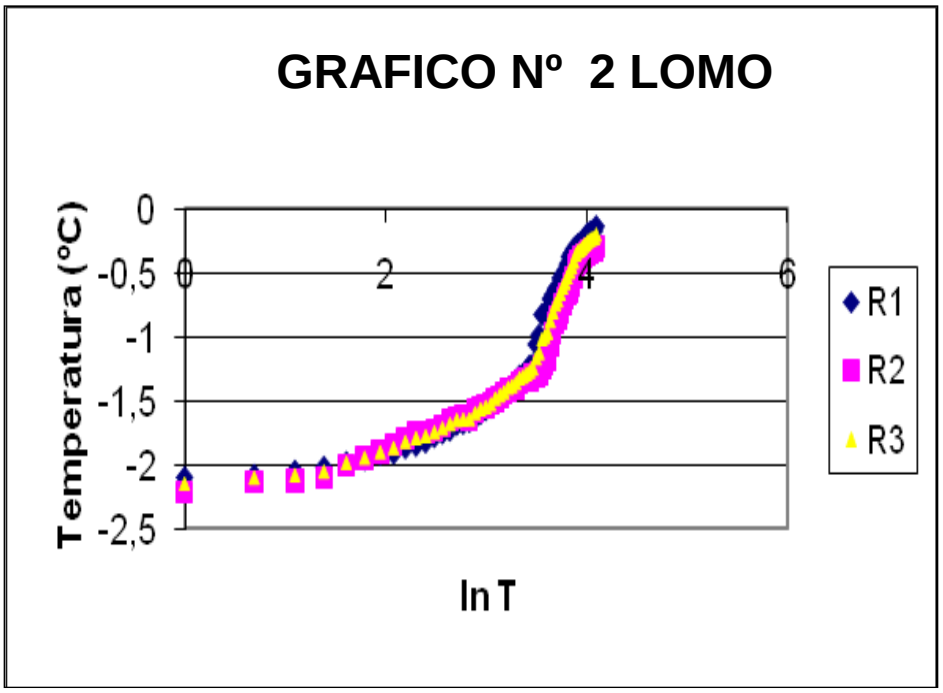
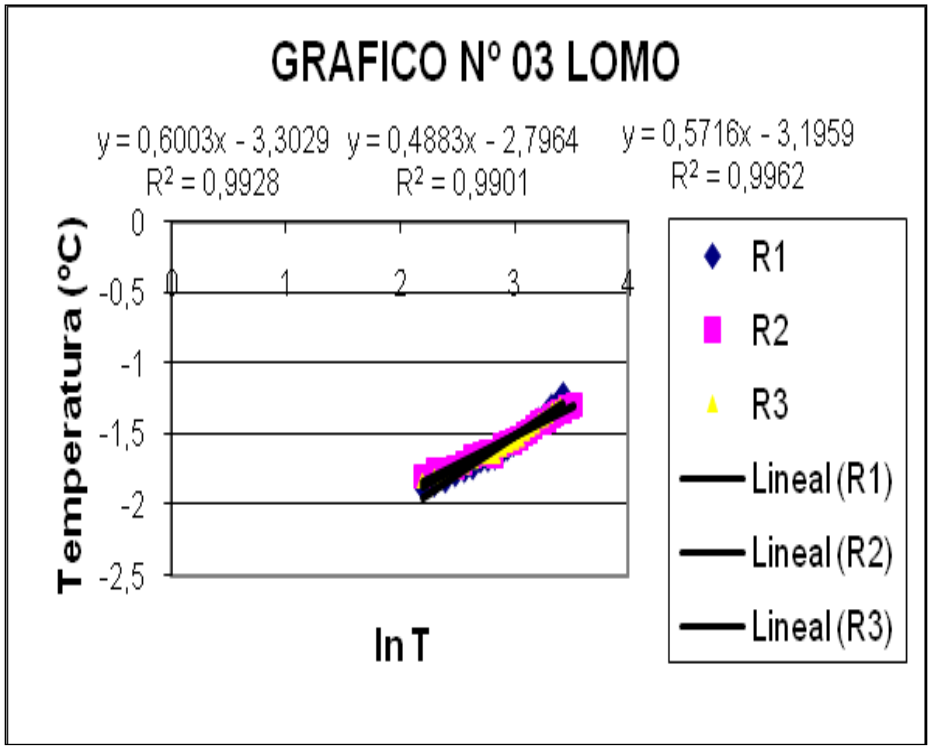


GRAFICO Nº 2 LOMO
Temperatura (ºC)
0
-0,5
-1
-1,5
-2
-2,5
0
2
4
6
ln T
R1
R2
R3



$$k = \frac{Q}{4\pi}\frac{\Delta T}{\ln \Delta t}$$

V (v)	I (mA)	T/ln t (ºC)	k(Wm-1ºC-1)
3,55	0,47	1,66583375	0,27087320
3,55	0,47	2,04792136	0,22033547
3,55	0,47	1,74947516	0,25792290

ANEXOS VI

RESULTADOS DE LA DETERMINACIÓN DE LA CONDUCTIVIDAD TÉRMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACIÓN PARA SOLOMILLO

CONDUCTIVIDAD TERMICA DE LA CARNE DE LLAMA DURANTE EL PROCESO DE CONGELACION “SOLOMILLO”

Nº Total de Ts registradas	1800
Tiempo total (seg)	60

Tiempo (seg)	ln T	T R1 promedio c/30 datos	T R2 promedio c/30 datos	T R3 promedio c/30 datos
1	0	-2,112959	-1,984271	-1,9748470
2	0,69314718	-2,0954826	-1,936187	-1,9114589
3	1,09861229	-2,0621545	-1,915684	-1,8973684
4	1,38629436	-2,03138	-1,888844	-1,8724960
5	1,60943791	-1,99507147	-1,820825	-1,7886214
6	1,79175947	-1,9739654	-1,781323	-1,7399224
7	1,94591015	-1,9312722	-1,736790	-1,6944690
8	2,07944154	-1,92220547	-1,705288	-1,6517489
9	2,19722458	-1,88098565	-1,656642	-1,5993899
10	2,30258509	-1,862308	-1,627293	-1,5647048
11	2,39789527	-1,835488	-1,612085	-1,5553028
12	2,48490665	-1,7940535	-1,581236	-1,5297476
13	2,56494936	-1,763977	-1,551329	-1,4999252
14	2,63905733	-1,742354	-1,517335	-1,4597454
15	2,7080502	-1,696954	-1,486164	-1,4356895
16	2,77258872	-1,688253	-1,479582	-1,4356878
17	2,83321334	-1,6740718	-1,479731	-1,4374812
18	2,89037176	-1,64608	-1,431047	-1,3784505
19	2,94443898	-1,610468	-1,400941	-1,3510980
20	2,99573227	-1,581094	-1,383366	-1,3394222
21	3,04452244	-1,561051	-1,362667	-1,3183952
22	3,09104245	-1,501094	-1,318203	-1,2816779
23	3,13549422	-1,466328	-1,290800	-1,2579557
24	3,17805383	-1,453198	-1,267756	-1,2299555
25	3,21887582	-1,411088	-1,232687	-1,1984061
26	3,25809654	-1,3943767	-1,219374	-1,1867924

Tiempo (seg)	ln T	T R1 promedio c/30 datos	T R2 promedio c/30 datos	T R3 promedio c/30 datos
27	3,29583687	-1,356361	-1,196571	-1,1715962
28	3,33220451	-1,3134947	-1,158101	-1,1353239
29	3,36729583	-1,305847	-1,145611	-1,1204129
30	3,40119738	-1,274427	-1,125000	-1,1052058
31	3,4339872	-1,233494	-1,104434	-1,0948240
32	3,4657359	-1,2253028	-1,083804	-1,0679750
33	3,49650756	-1,066054	-1,003033	-1,0264426
34	3,52636052	-0,993565	-0,959470	-0,9973423
35	3,55534806	-0,831388	-0,853513	-0,9194955
36	3,58351894	-0,819536	-0,830921	-0,8915339
37	3,61091791	-0,7940579	-0,802883	-0,8622155
38	3,63758616	-0,7088123	-0,710219	-0,7658424
39	3,66356165	-0,67305444	-0,642382	-0,6819659
40	3,68887945	-0,6316291	-0,581962	-0,6120488
41	3,71357207	-0,60735433	-0,549381	-0,5753145
42	3,73766962	-0,5449915	-0,498643	-0,5303889
43	3,76120012	-0,511504	-0,448439	-0,4718270
44	3,78418963	-0,4853989	-0,410386	-0,4277995
45	3,80666249	-0,43538112	-0,368828	-0,3904721
46	3,8286414	-0,3752558	-0,325315	-0,3552648
47	3,8501476	-0,348454	-0,289914	-0,3155644
48	3,87120101	-0,316491	-0,245933	-0,2655737
49	3,8918203	-0,295284	-0,190329	-0,1927720
50	3,91202301	-0,280129	-0,166752	-0,1649828
51	3,93182563	-0,271154	-0,156730	-0,1544385
52	3,95124372	-0,268127	-0,141206	-0,1326659
53	3,97029191	-0,237357	-0,119765	-0,1158890
54	3,98898405	-0,229207	-0,110756	-0,1064510
55	4,00733319	-0,194525	-0,089950	-0,0925823
56	4,02535169	-0,188165	-0,080235	-0,0811905
57	4,04305127	-0,176145	-0,068775	-0,0700100
58	4,06044301	-0,176025	-0,065077	-0,0645223
59	4,07753744	-0,172515	-0,061901	-0,0615136
60	4,09434456	-0,137136	-0,034725	-0,0384400

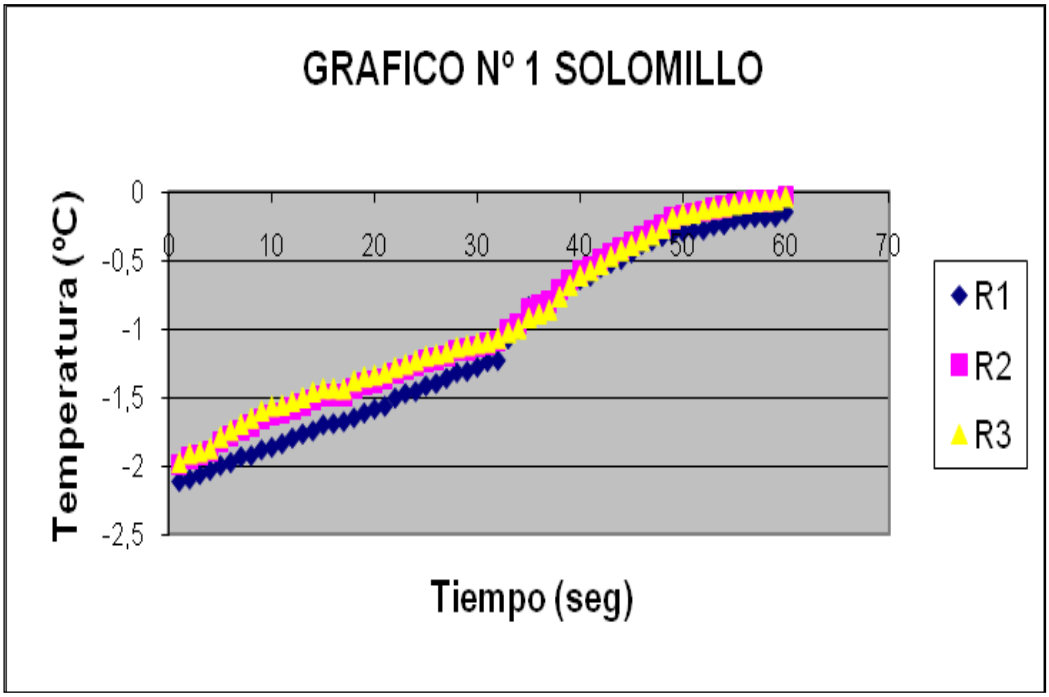


GRAFICO Nº 1 SOLOMILLO
Temperatura (ºC)
0
-0,5
-1
-1,5
-2
-2,5
0
10
20
30
40
50
60
70
Tiempo (seg)
R1
R2
R3

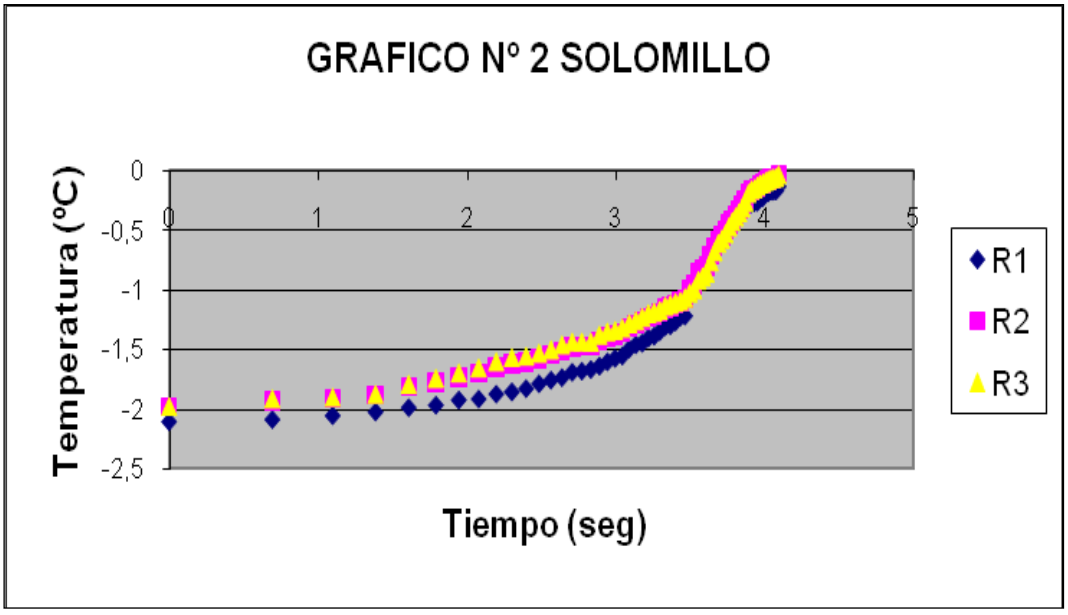
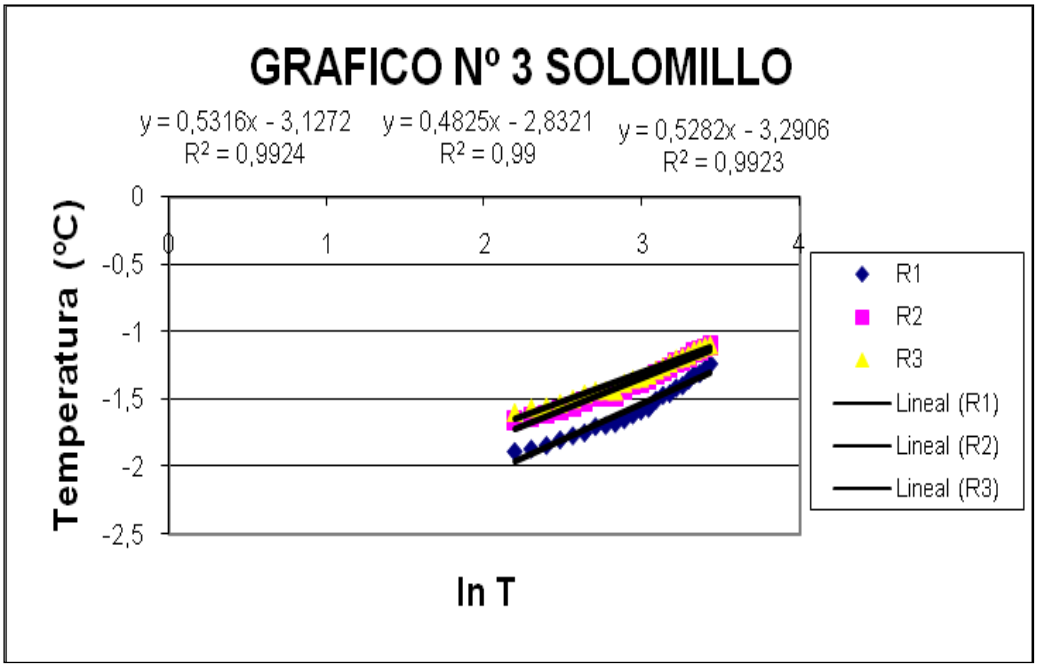


GRAFICO Nº 2 SOLOMILLO
Temperatura (ºC)
0
-0,5
-1
-1,5
-2
-2,5
0
1
2
3
4
5
Tiempo (seg)
R1
R2
R3



$$k = \frac{Q}{4\pi}\frac{\Delta T}{\ln \Delta t}$$

V (v)	I (mA)	T/ln t (ºC)	k(Wm-1ºC-1)
3,55	0,47	1,88111362	0,23987372
3,55	0,47	2,07253886	0,21771834
3,55	0,47	1,89322226	0,23833953