CERTAIN EQUILIBRIUM PROPERTIES OF GASES AND GAS MIXTURES ON STEEPER LENNARD-JONES AND STOCKMAYER TYPE POTENTIALS

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The discussion on second virial and zero pressure Joule-Thomson coefficients of non-polar gases and gas mixtures is given on the Lennard-Jones type potentials with the choice of the repulsive index as 12 and 18. These studies are also extended to polar gases and gas mixtures by including the electric dipole-dipole moment term in the two potentials. The tabulations are given for the (18-6-3) potential to enable computations of second virial and Joule-Thomson coefficients.

The success achieved in predicting the various macroscopic properties of gases on the basis of expressions derived from statistical mechanics, in conjunction with a suitable intermolecular potential energy function, has recently created a lot of interest in the study of the latter. The Lennard-Jones type (12—6) potential is only moderately successful[1] for this purpose. The modified Buckingham exp-six potential has proved relatively superior when properties such as diffusion and thermal diffusion are considered [2,3]. After detailed investigations[4] the recently introduced[5] Morse potential proved only of limited success and probably a bit inferior to the exp-six potential. Some other investigations [6—8] indicated that a choice of repulsive force index in the *L-J* potential greater than 12 will be useful. In view of the various evidences Hamann & Lambert [9] suggested a (28—7) potential. Recently this potential has been further studied [10]. The attempts of using three [11,12] and even six [13] parameters in the molecular potentials are getting more popular. The degree of success which can be achieved even for such complicated potentials still remains to be established. Here we report the results obtained, on a two parameter Lennard-Jones type (18—6) potential, while studying the equilibrium properties of gases and gas mixtures. This potential which was introduced by Saxena & Joshi [14] is defined as

$$\phi(r) = 4\epsilon_0 \left[\left(\frac{\sigma_0}{r}\right)^{18} - \left(\frac{\sigma_0}{r}\right)^{6} \right] \qquad (1)$$

where $\phi(r)$ is the potential energy of interaction between two molecules at a separation distance r, ϵ_0 is related to the depth of the potential energy minimum ϵ, by the relation

$$\epsilon = 8\,\epsilon_0 / 3\sqrt{3} \qquad (2)$$

σ_0 is the value of r at which $\phi(r)$ is equal to zero.

Saxena & Joshi[14] studied the second virial data of Neopentane, Silicon tetrafluoride, Sulphur hexafluoride, Cynogen, Propadine, Ethane and Methane. For all the gases except Neopentane (18—6), (12—6) and (28—7) potentials were found to be equally good. For Neopentane, (12—6) potential was found to be inadequate while (18—6), (28—7) and the potential of Pollara & Funke [11] was successful in explaining the observed data. They [14] also interpreted the zero-pressure isothermal Joule-Thomson coefficient data for Methane and Ethane. For Methane, (12—6) and (18—6) potentials lead to identical results though for Ethane the latter was found preferable.

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We [15] have extended such studies to Carbon dioxide, Nitrous oxide, Ethylene and Nitrogen and considered their available second virial and zero-pressure isothermal Joule-Thomson coefficients data. The limiting values of the pressure derivative of molar specific heat at constant pressure are also calculated for Carbon dioxide and Nitrogen. This work indicated that though in many respects (12—6) and (18—6) potentials yield identical results yet at several places the distinct improvement on the basis of (18—6) potential is evident.

Similar conclusions also follow from a detailed study made by the authors on the second virial data of the binary systems : Methane-Ethane, Methane-Carbon dioxide Methane-Neopentane, Methane-Sulphur hexaflouride, Ethane-Carbon dioxide, Ethane-Nitrogen and Carbon dioxide-Nitrogen; and on the zero-pressure isothermal Joule-Thomson coefficient data of the systems : Carbon dioxide-Nitrous oxide, Carbon dioxide-Ethylene, Ethylene-Nitrous oxide, Ethane-Methane and Nitrous oxide-Nitrogen. The details of all these works will be published in due course.

In this connection, it is important to note the results reported on the second virial and third virial coefficients by Dymond, Rigby & Smith[16]. They found that amongst the Lennard-Jones type (n-6) potentials, where n has the values 12,16,18 and 20; 18 is preferable on the basis of low temperature second virial data of Argon, Krypton and Oxygen. They further found a preference for this potential while carefully considering the third virial coefficient data.

Hamann & Lambert [9] suggested a criterion to judge the adequacy of a potential on the basis of the following relation :

$$\sigma \approx 2\,\rho_{AB} + 0{\cdot}75\,r^* \qquad (3)$$

Here σ is the value of r at which $\phi(r)$ is minimum, ρ_{AB} is the radius of the sphere on which the outer atoms of a quasi-spherical molecule are distributed and r^* is the equilibrium separation between the atoms of the molecules. When calculations were performed for σ on the (12—6), (18—6), (∞ — 6) and (28— 7) potentials for the gases Neopentane, Silicon tetrafluoride and Sulphur hexafluoride, it was found that (18— 6) potential is better than (12—6) and (∞—6) potentials though (28—7) potential is a bit more preferable.

Further confirmation on the adequacy of this potential can be obtained by an indirect method. This consists in generalising this potential for polar gases and then studying the properties of such gases and gas mixtures. This was done by Saxena & Joshi[17] for second virial, and Saxena, Joshi & Ramaswami[18] for zero-pressure Joule-Thomson coefficient of pure polar gases. We[19] have further studied a few more gases and several gas mixtures on the basis of this potential. Improvement was noticed in several cases which suggested a preference for this potential over the familiar (12—6—3) potential. The details of these investigations will be published subsequently.

Thus, on the basis of these experimental evidences Lennard-Jones type (18—6) and (18—6—3) potentials appear attractive for studying the properties of complicated polyatomic non-polar and polar gases and gas mixtures. Detailed tabulations in this connections for the quantities which are pertinent for calculation of equilibrium properties have been given earlier [15] for non-polar gases. We report here the computed quantities needed for the polar gases on the Stockmayer type (18—6—3) potential. The earlier efforts [17,18] get superseded by the present work as the tabulations are correct to more significant figures and further these are reported at closer intervals of the independent parameter.

The second virial coefficient, B, is given by

$$B = (2/3)\,\pi N \sigma_0^3 F^*(y, t^*) \quad (4)$$

Here N is Avogadro's number, σ_0 the characteristic length parameter in the potential and y and t^* are defined as

$$y = 2(\epsilon_0/\kappa T)^{1/2} \quad (5)$$

and

$$t^* = \mu^2/(\sqrt{8}\,\epsilon_0\,\sigma_0^3) \quad (6)$$

ϵ_0 is a parameter related to the maximum depth of the potential energy, κ the Boltzmann constant, T the temperature in °K, and μ the dipole moment. Computed values of $F^*(y,t^*)$ are given in Table 1 for values of y ranging from 0·04 to 2·90 and for twenty values of t^* in the range 0·1 to 2·0.

TABLE 1

VALUE OF THE REDUCED SECOND VIRIAL CO-EFFICIENT, $F^*(y,t^*)$, FOR (18—6—3) POTENTIAL.

y \ t^*	0·1	0·2	0·3	0·4	0·5
0·04	+0·381652	+0·381652	+0·381652	+0·381652	+0·381652
0·08	+0·472476	+0·472475	+0·472474	+0·472473	+0·472472
0·12	+0·529374	+0·529372	+0·529369	+0·529364	+0·529358
0·16	+0·568379	+0·568373	+0·568363	+0·568349	+0·568333
0·20	+0·595387	+0·595374	+0·595352	+0·595321	+0·595281
0·24	+0·613309	+0·613283	+0·613239	+0·613179	+0·613101
0·28	+0·623832	+0·623786	+0·623709	+0·623601	+0·623462
0·32	+0·628017	+0·627940	+0·627813	+0·627634	+0·627405
0·36	+0·626586	+0·626465	+0·626267	+0·625988	+0·625630
0·40	+0·620021	+0·619844	+0·619547	+0·619132	+0·618598
0·44	+0·608691	+0·608438	+0·608012	+0·607415	+0·606647
0·48	+0·592866	+0·592609	+0·591913	+0·591079	+0·590007
0·52	+0·572724	+0·572238	+0·571427	+0·570291	+0·568831
0·56	+0·548395	+0·547747	+0·546666	+0·545151	+0·543203
0·60	+0·519978	+0·519129	+0·517713	+0·515729	+0·513179
0·64	+0·487531	+0·486436	+0·484611	+0·482054	+0·473465
0·68	+0·451076	+0·449685	+0·447465	+0·444112	+0·439928
0·72	+0·410627	+0·408879	+0·405963	+0·401877	+0·396618
0·76	+0·366153	+0·363980	+0·360356	+0·355277	+0·348736
0·80	+0·317627	+0·314925	+0·310489	+0·304234	+0·296176
0·84	+0·265005	+0·261740	+0·256293	+0·248653	+0·238809
0·88	+0·208189	+0·204234	+0·197634	+0·188375	+0·176440
0·92	+0·147106	+0·142348	+0·134406	+0·123261	+0·108888
0·96	+0·0816622	+0·0759738	+0·0664760	+0·0531428	+0·0359378
1·00	+0·0117243	+0·00496184	−0·00633275	−0·0221954	−0·0426769
1·02	−0·0249808	−0·0323397	−0·0446325	−0·0619014	−0·0842058
1·04	−0·0628527	−0·0708509	−0·0842139	−0·102991	−0·127252
1·06	−0·101922	−0·110605	−0·125115	−0·145508	−0·171868
1·08	−0·142202	−0·151618	−0·167355	−0·189481	−0·218090
1·10	−0·183736	−0·193936	−0·210986	−0·234966	−0·265985
1·12	−0·226521	−0·237558	−0·256013	−0·281977	−0·315577
1·14	−0·270607	−0·282539	−0·302496	−0·330581	−0·366943
1·16	−0·316004	−0·328892	−0·350451	−0·380804	−0·420121
1·18	−0·362723	−0·376630	−0·399901	−0·432676	−0·475153
1·20	−0·410809	−0·425805	−0·450903	−0·486265	−0·532119
1·22	−0·460025	−0·476179	−0·503227	−0·541350	−0·590814
1·24	−0·511215	−0·528606	−0·557729	−0·598800	−0·652119
1·26	−0·563589	−0·582296	−0·613635	−0·657849	−0·715285
1·28	−0·617460	−0·637569	−0·671267	−0·718834	−0·780665
1·30	−0·672853	−0·694455	−0·730666	−0·781806	−0·848329
1·32	−0·729834	−0·753024	−0·791911	−0·846861	−0·918391
1·34	−0·788394	−0·813272	−0·855009	−0·914017	−0·990889

TABLE 1—*contd.*

y \ t^*	0·1	0·2	0·3	0·4	0·5
1·36	—0·848604	—0·875279	—0·920047	—0·983379	—1·06595
1·38	—0·910511	—0·939094	—0·987092	—1·05503	—1·14368
1·40	—0·974136	—1·00475	—1·05618	—1·12902	—1·22415
1·42	—1·03950	—1·07228	—1·12735	—1·20542	—1·30746
1·44	—1·10671	—1·14178	—1·20074	—1·28436	—1·39378
1·46	—1·17585	—1·21335	—1·27643	—1·36598	—1·48326
1·48	—1·24683	—1·28691	—1·35438	—1·45023	—1·57589
1·50	—1·31980	—1·36264	—1·43476	—1·53732	—1·67193
1·52	—1·39488	—1·44063	—1·51772	—1·62741	—1·77156
1·54	—1·47194	—1·52079	—1·60314	—1·72043	—1·87474
1·56	—1·55124	—1·60338	—1·69232	—1·81669	—1·98185
1·58	—1·63272	—1·68834	—1·78223	—1·91621	—2·09294
1·60	—1·71648	—1·77581	—1·87601	—2·01915	—2·20822
1·62	—1·80260	—1·86586	—1·97278	—2·12567	—2·32789
1·64	—1·89116	—1·95859	—2·07264	—2·23591	—2·45218
1·66	—1·98220	—2·05405	—2·17568	—2·34999	—2·28125
1·68	—2·07586	—2·15241	—2·28208	—2·46815	—2·71541
1·70	—2·17215	—2·25368	—2·39191	—2·59050	—2·85483
1·72	—2·27123	—2·35806	—2·50539	—2·71731	—2·99987
1·74	—2·37313	—2·46555	—2·62253	—2·84865	—3·15069
1·76	—2·47786	—2·57624	—2·74346	—2·98472	—3·30755
1·78	—2·58578	—2·69047	—2·86863	—3·12596	—3·47102
1·80	—2·69676	—2·80816	—2·99789	—3·27239	—3·64121
1·82	—2·81109	—2·92960	—3·13167	—3·42445	—3·81866
1·84	—2·92861	—3·05467	—3·26989	—3·58210	—4·00345
1·86	—3·04978	—3·18385	—3·41295	—3·74599	—4·19638
1·88	—3·17445	—3·31702	—3·56609	—3·91611	—4·39758
1·90	—3·30287	—3·45446	—3·71412	—4·09292	—4·60765
1·92	—3·43516	—3·59634	—3·87275	—4·27675	—4·82709
1·94	—3·57146	—3·74281	—4·03704	—4·46792	—5·05641
1·96	—3·71191	—3·89406	—4·20724	—4·66680	—5·29616
1·98	—3·85669	—4·05031	—4·38368	—4·87386	—5·54703
2·00	—4·00587	—4·21166	—4·56649	—5·08937	—5·80951
2·02	—4·15973	—4·37846	—4·75615	—5·31394	—6·08447
2·04	—4·31843	—4·55090	—4·95294	—5·54804	—6·37264
2·06	—4·48212	—4·72919	—5·15714	—5·79212	—6·67477
2·08	—4·65099	—4·91351	—5·36880	—6·04569	—6·98919
2·10	—4·82539	—5·10446	—5·58943	—6·31261	—7·32461
2·12	—5·00531	—5·30189	—5·81821	—6·59013	—7·67416
2·14	—5·19106	—5·50628	—6·05599	—6·88009	—8·04157
2·16	—5·38287	—5·71789	—6·30323	—7·18317	—8·42798
2·18	—5·58122	—5·93729	—6·56062	—7·60035	—8·83488
2·20	—5·78602	—6·16449	—6·82833	—7·83212	—9·26326
2·22	—5·99763	—6·39993	—7·10699	—8·17941	—9·71466
2·24	—6·21644	—6·64409	—7·39728	—8·54327	—10·1908
2·26	—6·44268	—6·89731	—7·69975	—8·92463	—10·6932
2·28	—6·67669	—7·16004	—8·01506	—9·32457	—11·2238
2·30	—6·91886	—7·43278	—8·34396	—9·74429	—11·7845
2·34	—7·42910	—8·01024	—9·04556	—10·6481	—13·0054
2·38	—7·97598	—8·63339	—9·81058	—11·6466	—14·3747
2·42	—8·55814	—9·30719	—10·6466	—12·7524	—15·9147
2·46	—9·19449	—10·0371	—11·5625	—13·9813	—17·6546
2·50	—9·87395	—10·8286	—12·5674	—15·3492	—19·6236
2·54	—10·6061	—11·6885	—13·6723	—16·8759	—21·8598
2·58	—11·3958	—12·6237	—14·8893	—18·5844	—24·4075
2·62	—12·2492	—13·6431	—16·2330	—20·5010	—27·3182
2·66	—13·1727	—14·7565	—17·7210	—22·6596	—30·6611
2·70	—14·1729	—15·9738	—19·3707	—25·0944	—34·5057
2·74	—15·2578	—17·3072	—21·2042	—27·8492	—38·9448
2·78	—16·4367	—18·7709	—23·2474	—30·9757	—44·0888
2·82	—17·7194	—20·3805	—25·5292	—34·5340	—50·0696
2·86	—19·1170	—22·1535	—28·0833	—38·5953	—57·0475
2·90	—20·6423	—24·1106	—30·9493	—43·2447	65·2176

TABLE 1—*contd.*

y \ t^*	0·6	0·7	0·8	0·9	1·0
0·04	+0·381652	+0·381652	+0·381652	+0·381651	+0·381651
0·08	+0·472470	+0·472468	+0·472466	+0·472464	+0·472461
0·12	+0·529351	+0·529342	+0·529332	+0·529321	+0·529308
0·16	+0·568312	+0·568287	+0·568258	+0·568225	+0·568189
0·20	+0·595233	+0·595176	+0·595109	+0·595035	+0·594952
0·24	+0·613006	+0·612893	+0·612763	+0·612616	+0·612451
0·28	+0·623292	+0·623091	+0·622859	+0·622598	+0·622304
0·32	+0·627125	+0·626793	+0·626411	+0·625978	+0·625493
0·36	+0·625193	+0·624676	+0·624079	+0·623403	+0·622647
0·40	+0·617946	+0·617175	+0·616284	+0·615275	+0·614147
0·44	+0·605708	+0·604598	+0·603317	+0·601865	+0·600241
0·48	+0·588696	+0·581746	+0·585357	+0·583328	+0·581058
0·52	+0·567045	+0·564933	+0·562495	+0·559729	+0·556635
0·56	+0·540821	+0·538004	+0·534749	+0·531058	+0·526927
0·60	+0·510058	+0·506366	+0·502101	+0·497261	+0·491844
0·64	+0·474738	+0·469976	+0·464473	+0·458225	+0·451229
0·68	+0·434806	+0·428744	+0·421738	+0·413779	+0·404865
0·72	+0·390179	+0·382556	+0·373739	+0·363723	+0·352496
0·76	+0·340726	+0·331238	+0·320261	+0·307782	+0·293786
0·80	+0·286305	+0·274606	+0·261064	+0·245659	+0·228369
0·84	+0·226745	+0·212439	+0·195868	+0·177004	+0·155815
0·88	+0·161805	+0·144439	+0·124310	+0·101376	+0·0755898
0·92	+0·0912518	+0·0703118	+0·0460181	−0·0183127	−0·0128713
0·96	+0·0148135	−0·0102886	−0·0394385	−0·0727182	−0·110222
1·00	−0·0678429	−0·0977752	−0·132571	−0·172346	−0·217232
1·02	−0·111623	−0·144249	−0·182199	−0·225608	−0·274632
1·04	−0·157088	−0·192609	−0·233954	−0·281279	−0·334771
1·06	−0·204299	−0·242934	−0·287931	−0·339475	−0·397785
1·08	−0·253307	−0·295284	−0·344207	−0·400295	−0·463802
1·10	−0·304189	−0·349754	−0·402898	−0·463878	−0·532989
1·12	−0·356981	−0·406398	−0·464078	−0·530321	−0·605474
1·14	−0·411777	−0·465324	−0·527878	−0·599785	−0·681452
1·16	−0·468628	−0·526605	−0·594391	−0·672392	−0·761079
1·18	−0·527592	−0·590317	−0·663722	−0·748277	−0·844532
1·20	−0·588766	−0·656580	−0·736017	−0·827622	−0·932034
1·22	−0·651962	−0·725229	−0·811141	−0·910327	−1·02353
1·24	−0·718084	−0·797192	−0·890052	−0·997394	−1·12008
1·26	−0·786399	−0·871764	−0·972083	−1·08819	−1·22110
1·28	−0·857285	−0·949352	−1·05767	−1·18322	−1·32715
1·30	−0·930834	−1·03008	−1·14699	−1·28269	−1·43851
1·32	−1·00719	−1·11412	−1·24025	−1·37687	−1·55552
1·34	−1·08641	−1·20157	−1·33759	−1·49596	−1·67846
1·36	−1·16866	−1·29263	−1·43927	−1·61029	−1·80774
1·38	−1·25406	−1·38747	−1·54552	−1·73015	−1·94375
1·40	−1·34274	−1·48626	−1·65655	−1·85586	−2·08691
1·42	−1·43482	−1·58916	−1·77260	−1·98772	−2·23763
1·44	−1·53050	−1·69645	−1·89401	−2·12616	−2·39647
1·46	−1·62999	−1·80836	−2·02111	−2·27161	−2·56401
1·48	−1·73333	−1·92501	−2·15407	−2·42438	−2·74068
1·50	−1·84079	−2·04675	−2·29335	−2·58502	−2·92723
1·52	−1·95265	−2·17389	−2·43936	−2·75411	−3·12439
1·54	−2·06889	−2·30655	−2·59231	−2·93198	−3·33274
1·56	−2·18998	−2·44522	−2·75284	−3·11944	−3·55326
1·58	−2·31602	−2·59013	−2·92127	−3·31699	−3·78674
1·60	−2·44728	−2·74164	−3·09813	−3·52536	−4·03416
1·62	−2·58405	−2·90017	−3·28397	−3·74531	−4·29660
1·64	−2·72664	−3·06611	−3·47937	−3·97766	−4·57522
1·66	−2·87530	−3·23986	−3·68490	−4·22325	−4·87123
1·68	−3·03044	−3·42196	−3·90131	−4·48310	−5·18607
1·70	−3·19233	−3·61284	−4·12925	−4·75821	−5·52121
1·72	−3·36144	−3·81314	−4·36959	−5·04980	−5·87838
1·74	−3·53805	−4·02331	−4·62307	−5·35898	−6·25928

TABLE 1—*contd.*

y \ t*	0·6	0·7	0·8	0·9	1·0
1·76	—3·72256	—4·24397	—4·89059	—5·68710	—6·66590
1·78	—3·91569	—4·47603	—5·17338	—6·03589	—7·56589
1·80	—4·11770	—4·71999	—5·47230	—6·40674	—8·06434
1·82	—4·32931	—4·97685	—5·78875	—6·80163	—8·59869
1·84	—4·55077	—5·24714	—6·12368	—7·22218	—8·59869
1·86	—4·78309	—5·53217	—6·47891	—7·67096	—9·17266
1·88	—5·02663	—5·83263	—6·85563	—8·14998	—9·78953
1·90	—5·28221	—6·14967	—7·25564	—8·66193	—10·4534
1·92	—5·55062	—6·48471	—7·68084	—9·20980	—11·1690
1·94	—5·83263	—6·83872	—8·13311	—9·79656	—11·9411
1·96	—6·12911	—7·21319	—8·61465	—10·4257	—12·7575
1·98	—6·44109	—7·60966	—9·12791	—11·1011	—13·6774
2·00	—6·76945	—8·02963	—9·67534	—11·8269	—14·6547
2·02	—7·11543	—8·47499	—10·2599	—12·6075	—15·7146
2·04	—7·48024	—8·94774	—10·8849	—13·4491	—16·8661
2·06	—7·86510	—9·44986	—11·5537	—14·3564	—18·1183
2·08	—8·26615	—9·97380	—12·2529	—15·3082	—19·4382
2·10	—8·70089	—10·5518	—13·0383	—16·3955	—20·9696
2·12	—9·15488	—11·1569	—13·8629	—17·5421	—22·5941
2·14	—9·63531	—11·8019	—14·7489	—18·7848	—24·3710
2·16	—10·1441	—12·4901	—15·7021	—20·1335	—26·3174
2·18	—10·6835	—13·2254	—16·7289	—21·5992	—28·4526
2·20	—11·2556	—14·0114	—17·8359	—23·1938	—30·7981
2·22	—11·8629	—14·8524	—19·0308	—24·9310	—33·3786
2·24	—12·5082	—15·7534	—20·3222	—26·8262	—36·2220
2·26	—13·1943	—16·7195	—21·7193	—28·8965	—39·3597
2·28	—13·9246	—17·7565	—23·2327	—31·1609	—42·8273
2·30	—14·7026	—18·8707	—24·8741	—33·6414	—46·6655
2·34	—16·4172	—21·3596	—28·5939	—39·3502	—55·6441
2·38	—18·3728	—24·2508	—33·0006	—46·2557	—66·7458
2·42	—20·6101	—27·6203	—38·0539	—54·6377	—80·5175
2·46	—23·1847	—31·5766	—44·5247	—64·9312	—97·8485
2·50	—26·1523	—36·2282	—52·0733	—77·5711	..
2·54	—29·5880	—41·7266	—61·1959	—93·2073	..
2·58	—33·5806	—48·2547	—72·2767	..	..
2·62	—38·2342	—56·0289	—85·7760	..	..
2·66	—43·6958	—65·3695	..	..	..
2·70	—50·1125	—76·5968	..	..	..
2·74	—57·6876	—90·1707	..	..	..
2·78	—66·6676	..	..	..	..
2·82	—77·3551	..	..	..	..
2·86	—90·1264	..	..	..	..
2·90	..	..	..	..	..

y \ t*	1·1	1·2	1·3	1·4	1·5
0·04	+0·381651	+0·381651	+0·381650	+0·381640	+0·381649
0·08	+0·472458	+0·472454	+0·472451	+0·472447	+0·472422
0·12	+0·529294	+0·529279	+0·529263	+0·529245	+0·529226
0·16	+0·568148	+0·568104	+0·568056	+0·568004	+0·567749
0·20	+0·594859	+0·594758	+0·594648	+0·594529	+0·594402
0·24	+0·612269	+0·612069	+0·611853	+0·611619	+0·611367
0·28	+0·621980	+0·621525	+0·621239	+0·620822	+0·620374
0·32	+0·624957	+0·624371	+0·623733	+0·623044	+0·622304
0·36	+0·621811	+0·620895	+0·619899	+0·618824	+0·617668
0·40	+0·612899	+0·611533	+0·610046	+0·608439	+0·606713
0·44	+0·598445	+0·596477	+0·594336	+0·592022	+0·589535
0·48	+0·578548	+0·575596	+0·572803	+0·569567	+0·566087
0·52	+0·553212	+0·549459	+0·545374	+0·540957	+0·536207
0·56	+0·522356	+0·517342	+0·511884	+0·505957	+0·499625
0·60	+0·485946	+0·479266	+0·472099	+0·464342	+0·455992
0·64	+0·443461	+0·434975	+0·425707	+0·415670	+0·404858

TABLE 1—*contd.*

y \ t^*	1·1	1·2	1·3	1·4	1·5
0·68	+0·394987	+0·384137	+0·372307	+0·359488	+0·345569
0·72	+0·340047	+0·326365	+0·311437	+0·295247	+0·277781
0·76	+0·278258	+0·261177	+0·242525	+0·222279	+0·200413
0·80	+0·209169	+0·188034	+0·164930	+0·139825	+0·112682
0·84	+0·132264	+0·106309	+0·0779083	+0·0470089	+0·0135569
0·88	+0·0468994	+0·0152452	+0·0194389	−0·0572264	−0·081978
0·92	−0·0476097	−0·0859880	−0·128102	−0·174057	−0·223971
0·96	−0·152059	−0·198349	−0·249231	−0·304855	−0·365390
1·00	−0·267381	−0·322965	−0·384177	−0·451233	−0·524376
1·02	−0·329452	−0·390269	−0·457315	−0·530845	−0·611148
1·04	−0·394638	−0·461124	−0·534498	−0·615066	−0·703171
1·06	−0·463108	−0·535729	−0·615969	−0·704189	−0·800798
1·08	−0·535020	−0·614284	−0·701972	−0·798513	−0·904389
1·10	−0·610576	−0·697031	−0·792801	−0·898392	−1·01437
1·12	−0·689940	−0·784179	−0·888719	−1·00415	−1·13116
1·14	−0·773349	−0·876017	−0·990074	−1·11622	−1·25527
1·16	−0·861004	−0·972799	−1·09719	−1·23500	−1·38719
1·18	−0·953129	−1·07481	−1·21042	−1·36094	−1·52748
1·20	−1·05000	−1·18239	−1·33019	−1·49456	−1·67879
1·22	−1·15163	−1·29562	−1·45667	−1·63613	−1·83556
1·24	−1·25912	−1·41569	−1·59115	−1·78709	−2·00532
1·26	−1·37197	−1·54218	−1·73333	−1·94725	−2·18610
1·28	−1·49082	−1·67583	−1·88404	−2·11762	−2·37909
1·30	−1·61603	−1·81710	−2·04390	−2·29898	−2·58529
1·32	−1·74802	−1·96655	−2·21362	−2·49222	−2·80585
1·34	−1·88710	−2·12463	−2·39387	−2·69825	−3·04192
1·36	−2·03407	−2·29217	−2·58549	−2·91814	−3·29491
1·38	−2·18914	−2·46967	−2·78937	−3·15303	−3·56631
1·40	−2·35296	−2·65793	−3·00650	−3·40425	−3·85785
1·42	−2·52611	−2·85771	−3·23787	−3·61312	−4·17129
1·44	−2·70932	−3·06996	−3·48473	−3·96127	−4·50881
1·46	−2·90333	−3·29566	−3·74839	−4·27047	−4·87273
1·48	−3·10879	−3·53575	−4·03017	−4·60250	−5·26552
1·50	−3·32666	−3·79149	−4·33173	−4·95962	−5·69017
1·52	−3·55795	−4·06422	−4·65488	−5·34425	−6·15000
1·54	−3·80347	−4·35515	−5·00136	−5·75886	−6·64846
1·56	−4·06456	−4·66605	−5·37352	−6·20662	−7·18987
1·58	−4·34233	−4·99849	−5·77361	−6·69073	−7·77872
1·60	−4·63816	−5·35440	−6·20434	−7·21494	−8·42029
1·62	−4·95354	−5·73589	−6·66865	−7·78343	−9·12045
1·64	−5·29013	−6·14531	−7·16986	−8·40091	−9·88593
1·66	−5·64967	−6·58515	−7·71161	−9·07261	−10·7242
1·68	−6·03422	−7·05835	−8·29808	−9·80454	−11·6441
1·70	−6·44591	−7·56803	−8·93382	−10·6034	−12·6551
1·72	−6·88724	−8·11783	−9·62413	−11·4768	−13·7687
1·74	−7·36077	−8·71153	−10·3746	−12·4333	−14·9974
1·76	−7·86943	−9·35353	−11·1919	−13·4825	−16·3558
1·78	−8·41680	−10·0490	−12·0837	−14·6359	−17·8609
1·80	−9·00628	−10·8033	−13·0579	−15·9059	−19·5316
1·82	−9·64216	−11·6227	−14·1242	−17·3070	−21·3902
1·84	−10·3286	−12·5139	−15·2929	−18·8554	−23·4617
1·86	−11·0712	−13·4851	−16·5768	−20·5702	−25·7759
1·88	−11·8750	−14·5446	−17·9889	−22·4727	−28·3664
1·90	−12·7466	−15·7025	−19·5449	−24·5870	−31·2713
1·92	−13·6934	−16·9705	−21·2634	−26·9437	−34·5398
1·94	−14·7227	−18·3605	−23·1638	−29·5732	−38·2211
1·96	−15·8437	−19·8871	−25·2695	−32·5140	−42·3779
1·98	−17·0664	−21·5666	−27·6072	−35·8097	−47·0824
2·00	−18·4017	−23·4172	−30·2069	−39·5105	−52·4179
2·02	−19·8623	−25·4594	−33·1029	−43·6731	−58·4798
2·04	−21·4632	−27·7188	−36·3382	−48·3708	−65·3931
2·06	−23·2196	−30·2208	−39·9558	−53·6769	−73·2829
2·08	−25·0830	−32·8971	−43·8627	−59·4693	−81·9966

TABLE 1—*contd.*

y \ t*	1·1	1·2	1·3	1·4	1·5
2·10	—27·2749	—36·0829	—48·5623	—66·5021	—92·6675
2·12	—29·6177	—39·5189	—53·6837	—74·2535	..
2·14	—32·2049	—43·3519	—59·4568	—83·0858	..
2·16	—35·0668	—47·6354	—65·9769	—93·1708	..
2·18	—38·2377	—52·4308	—73·3554	..	..
2·20	—41·7565	—57·8089	—81·7215	..	..
2·22	—45·6678	—63·8514	—91·2257	..	..
2·24	—50·0228	—70·6529	..	..	..
2·26	—54·8799	—78·3228	..	..	.
2·28	—60·3059	—86·9872	..	..	..
2·30	—66·3779	—96·7936	..	..	..
2·34	—80·8256	..	..	..	..
2·38	—99·1018	..	..	..	..

y \ t*	1·6	1·7	1·8	1·9	2·0
0·04	+0·381649	+0·381649	+0·381648	+0·381648	+0·381648
0·08	+0·472438	+0·472433	+0·472428	+0·472422	+0·472415
0·12	+0·529205	+0·529183	+0·529159	+0·529135	+0·529109
0·16	+0·567889	+0·567826	+0·567759	+0·567688	+0·567613
0·20	+0·594266	+0·594121	+0·593967	+0·593804	+0·593633
0·24	+0·611098	+0·610812	+0·610508	+0·610187	+0·609849
0·28	+0·619895	+0·619385	+0·618845	+0·618273	+0·617669
0·32	+0·621512	+0·620669	+0·619975	+0·618829	+0·617832
0·36	+0·616432	+0·615115	+0·613718	+0·612241	+0·610683
0·40	+0·604867	+0·602900	+0·600813	+0·598605	+0·596275
0·44	+0·596874	+0·584039	+0·581029	+0·577845	+0·574484
0·48	+0·562363	+0·558395	+0·554179	+0·549718	+0·545009
9·52	+0·531121	+0·525699	+0·519938	+0·513837	+0·507393
0·56	+0·492819	+0·485561	+0·477844	+0·469668	+0·461029
0·60	+0·447043	+0·43792	+0·427333	+0·416561	+0·405172
0·64	+0·393265	+0·380881	+0·367701	+0·353715	+0·338914
0·68	+0·330839	+0·314987	+0·298099	+0·280161	+0·261159
0·72	+0·259019	+0·238945	+0·217537	+0·194773	+0·170632
0·76	+0·176903	+0·151718	+0·124827	+0·061977	+0·0657928
0·80	+0·0834604	+0·0521164	+0·0186025	—0·0171326	—0·0551442
0·84	—0·0225082	—0·0612517	—0·102748	—0·147066	—0·194297
0·88	—0·142442	—0·190056	—0·241145	—0·295825	—0·354222
0·92	—0·277974	—0·336207	—0·398825	—0·466001	—0·537918
0·96	—0·431024	—0·501964	—0·578435	—0·660688	—0·748997
1·00	—0·603872	—0·690019	—0·783147	—0·883619	—0·991838
1·02	—0·698544	—0·793388	—0·896076	—1·00705	—1·12678
1·04	—0·799195	—0·904563	—1·01675	—1·13928	—1·27174
1·06	—0·906248	—1·02105	—1·14577	—1·28104	—1·42756
1·08	—1·02014	—1·14638	—1·28378	—1·43309	—1·59519
1·10	—1·14139	—1·28017	—1·43152	—1·59635	—1·77569
1·12	—1·27051	—1·42305	—1·58976	—1·77173	—1·97019
1·14	—1·40811	—1·57577	—1·75941	—1·96035	—2·18005
1·16	—1·55481	—1·73909	—1·94142	—2·16336	—2·40669
1·18	—1·71132	—1·91389	—2·13685	—2·38209	—2·65174
1·20	—2·87842	—2·10114	—2·34693	—2·61803	—2·91703
1·22	—2·05671	—2·30165	—2·57271	—2·87269	—3·20438
1·24	—2·24795	—2·51741	—2·81649	—3·14841	—3·51691
1·26	—2·45237	—2·74893	—3·07912	—3·44679	—3·85644
1·28	—2·67141	—2·99796	—3·36273	—3·77035	—4·22621
1·30	—2·90632	—3·26611	—3·66939	—4·12172	—4·62959
1·32	—3·15858	—3·55525	—4·00149	—4·50394	—5·07044
1·34	—3·42972	—3·86736	—4·36158	—4·92034	—5·55307
1·36	—3·7253	—4·20477	—4·75268	—5·37479	—6·08249
1·38	—4·03595	—4·57000	—5·17806	—5·87156	—6·66427
1·40	—3·37528	—4·96609	—5·64173	—6·41596	—7·30539
1·42	—4·74184	—5·39609	—6·14772	—7·01329	—8·01285

TABLE 1—*contd*

y \ t^*	1·6	1·7	1·8	1·9	2·0
1·44	—5·13849	—5·86378	—6·70106	—7·67022	—8·79552
1·46	—5·56835	—6·37336	—7·30734	—8·39423	—9·66341
1·48	—6·03478	—6·92939	—7·97275	—9·19372	—10·6279
1·50	—6·54183	—7·53729	—8·70465	—10·0787	—11·7025
1·52	—7·09397	—8·20321	—9·51137	—11·0604	—12·9029
1·54	—7·69604	—8·93385	—10·4022	—12·1519	—14·2468
1·56	—8·35393	—9·73729	—11·3884	—13·3686	—15·7557
1·58	—9·07397	—10·6224	—12·4824	—14·7279	—17·4541
1·60	—9·86354	—11·5996	—13·6986	—16·2505	—19·3711
1·62	—10·7309	—12·6807	—15·0541	—17·9602	—21·5406
1·64	—11·6858	—13·8793	—16·5682	—19·8849	—24·0029
1·66	—12·7390	—15·2111	—18·2636	—22·0575	—26·8052
1·68	—13·9029	—16·6943	—20·1666	—24·5162	—30·0037
1·70	—15·1920	—18·3497	—22·3079	—27·3061	—23·6647
1·72	—16·6227	—20·2018	—24·7237	—30·4807	—37·8674
1·74	—18·2137	—22·2784	—27·4555	—34·1025	—42·7056
1·76	—19·9870	—24·6125	—30·5529	—38·2459	—48·2923
1·78	—21·9681	—27·2425	—34·0742	—42·9997	—54·7619
1·80	—24·1859	—30·2128	—38·0874	—48·4684	—62·2762
1·82	—26·6745	—33·5759	—42·6735	—54·7776	—71·0298
1·84	—29·4729	—37·3927	—47·9277	—62·0761	—81·2566
1·86	—32·6277	—41·7358	—53·9640	—70·5438	—93·2411
1·88	—36·1917	—46·6892	—60·9165	—80·3947	..
1·90	—40·2258	—52·3499	—68·9398	..	..
1·92	—44·8094	—58·8468	—78·2442	..	..
1·94	—50·0220	—66·3091	—89·0399	..	..
1·96	—55·9668	—74·9067	..	..	..
1·98	—62·7629	—84·8374	..	..	..
2·00	—70·5501	—96·3366	..	..	..
2·02	—79·4887	..	..	..	..
2·04	—89·7935	..	..	..	

The zero-pressure Joule-Thomson coefficient μ° is given by

$$\mu^\circ = \frac{(2/3)\,\pi\, N\, \sigma_\circ^{\,3}}{C^\circ_p}\left[F_1^*(y, t^*) - F^*(y, t^*)\right] \qquad (7)$$

Here $C^\circ p$ is the zero pressure value of the molar specific heat. Computed values of the quantity $[F_1^*(y, t^*) - F^*(y, t^*)]$, again as a function of y and t^* are reported in Table 2.

TABLE 2

VALUES OF THE REDUCED ISOTHERMAL JOULE-THOMSON COEFFICIENT, $[F_1^*(y, t^*) - F^*(y, t^*)]$, FOR (18—6—3) POTENTIAL

y \ t^*	0·1	0·2	0·3	0·4	0·5
0·08	—0·542820	—0·542819	—0·542817	—0·542814	—0·542809
0·12	—0·599454	—0·599448	—0·599438	—0·599423	—0·599409
0·16	—0·633218	—0·633202	—0·633175	—0·633136	—0·633085
0·20	—0·650716	—0·650678	—0·650613	—0·650528	—0·650415
0·24	—0·655361	—0·655288	—0·655165	—0·654991	—0·654767
0·28	—0·649083	—0·648947	—0·648726	—0·648409	—0·648016
0·32	—0·633155	—0·632935	—0·632573	—0·632075	—0·631393
0·36	—0·608279	—0·607941	—0·607359	—0·606489	—0·605520
0·40	—0·575045	—0·574524	—0·573669	—0·572498	—0·570917
0·44	—0·533819	—0·533074	—0·531826	—0·530099	—0·527849
0·48	—0·484815	—0·483773	—0·482031	—0·479592	—0·476461

TABLE 2—*contd.*

y \ t^*	0·1	0·2	0·3	0·4	0·5
0·52	—0·428064	—0·426639	—0·424263	—0·420927	—0·416630
0·56	—0·363695	—0·361784	—0·358594	—0·354125	—0·348391
0·60	—0·291706	—0·289183	—0·284994	—0·279125	—0·271567
0·64	—0·211874	—0·208629	—0·203198	—0·195590	—0·185795
0·68	—0·124281	—0·120123	—0·113182	—0·103458	—0·0909385
0·72	—0·0285013	—0·0232463	—0·0144968	—0·00222375	+0·0136042
0·76	+0·0755701	+0·0821297	+0·0930877	+0·108427	+0·128211
0·80	+0·187929	+0·196045	+0·209579	+0·228604	+0·253122
0·84	+0·309435	+0·319398	+0·336034	+0·359389	+0·389518
0·88	+0·440119	+0·452262	+0·472541	+0·501016	+0·537778
0·92	+0·580179	+0·594874	+0·619429	+0·653931	+0·698518
0·96	+0·730326	+0·748008	+0·777563	+0·819120	+0·872866
1·00	+0·891283	+0·912440	+0·947826	+0·997616	+1·06207
1·02	+0·975671	+0·998774	+1·03742	+1·09183	+1·16228
1·04	+1·06309	+1·08829	+1·13047	+1·18981	+1·26677
1·06	+1·15301	+1·18046	+1·21640	+1·29116	+1·37508
1·08	+1·246682	+1·27672	+1·32671	+1·39722	+1·48868
1·10	+1·34280	+1·37526	+1·42966	+1·50638	+1·60599
1·12	+1·44267	+1·47794	+1·53709	+1·62047	+1·72882
1·14	+1·54577	+1·58408	+1·64821	+1·73881	+1·85659
1·16	+1·65144	+1·69292	+1·76251	+1·86081	+1·98874
1·18	+1·76090	+1·80591	+1·88136	+1·98798	+2·12679
1·20	+1·87428	+1·92298	+2·00467	+2·12018	+2·27079
1·22	+1·99140	+2·04404	+2·13240	+2·25756	+2·42076
1·24	+2·11198	+2·16890	+2·26456	+2·39995	+2·57676
1·26	+2·23692	+2·29841	+2·40174	+2·54823	+2·73963
1·28	+2·36513	+2·43154	+2·54315	+2·70143	+2·90856
1·30	+2·49919	+2·57085	+2·69131	+2·86238	+3·08641
1·32	+2·63580	+2·71298	+2·84304	+3·02770	+3·26987
1·34	+2·77745	+2·86072	+3·00083	+3·20014	+3·46182
1·36	+2·92447	+3·01407	+3·16527	+3·38038	+3·66307
1·38	+3·07606	+3·17245	+3·33544	+3·56710	+3·87226
1·40	+3·23076	+3·33496	+3·50972	+3·76012	+4·08925
1·42	+3·39168	+3·50344	+3·69246	+3·96131	+4·31703
1·44	+3·56227	3·68239	3·88520	4·17564	4·55917
1·46	3·73204	3·86006	4·07835	4·39095	4·80421
1·48	3·90855	4·04933	4·28450	4·62054	5·06672
1·50	4·09683	4·24564	4·49793	4·85986	5·34109
1·52	4·28573	4·44254	4·71352	5·10324	5·62112
1·54	4·48121	4·65475	4·94568	5·36439	5·92302
1·56	4·68525	4·86947	5·18259	5·63336	6·23535
1·58	4·89568	5·09347	5·42900	5·91368	6·56253
1·60	5·11341	5·32538	5·68631	6·20735	6·90545
1·62	5·33994	5·56722	5·95423	6·51466	7·26751
1·64	5·57156	5·81478	6·23048	6·83239	7·64346
1·66	5·81517	6·07640	6·52336	7·16876	8·04275
1·68	6·06324	6·34254	6·80993	7·51627	8·45737
1·70	6·32348	6·62406	7·17019	7·88511	8·89883
1·72	6·59348	6·91352	7·44574	8·26696	9·36075
1·74	6·86324	7·20723	7·79675	8·66011	9·83302
1·76	7·15689	7·52488	8·15819	9·08693	10 3675
1·78	7·45782	7·85169	8·53022	9·52157	10·8827
1·80	7·76684	8·18918	8·91653	9·99100	11·4632
1·82	8·07897	8·53099	9·31095	10·4647	12·0510
1·84	8·42116	8·90487	9·74162	10·9739	12·6918
1·86	8·76312	9·28089	10·1770	11·5107	13·3549
1·88	9·12120	9·76495	10·6369	12·0673	14·0585
1·90	9·49362	10·0873	11·1183	12·6558	14·8046
1·92	9·88036	10·5153	11·6211	13·2742	15·5935
1·94	10·2807	10·9603	12·1449	13·9220	16·4249
1·96	10·7003	11·4280	12·7003	14·6115	17·3139
1·98	11·1294	11·9074	13·2703	15·3269	18·2447
2·00	11·5805	12·4139	13·8759	16·0874	19·2395

TABLE 2—*contd.*

y \ t^*	0·1	0·2	0·3	0·4	0·5
2·02	12·0510	12·9429	14·5123	16·8922	20·2980
2·04	12·5369	13·4914	15·1740	17·7362	21·4173
2·06	13·0456	14·0681	15·8727	18·6301	22·6102
2·08	13·5749	14·6691	16·6062	19·5756	23·8804
2·10	14·1224	15·2926	17·3721	20·5686	25·2270
2·12	14·6946	15·9492	18·1790	21·6237	26·6651
2·14	15·2839	16·6267	19·0218	22·7329	28·1907
2·16	15·9200	17·3570	19·9288	23·9278	29 8409
2·18	16·5639	18·1033	20·8641	25·1763	31·5831
2·20	17·2329	18·8820	21·8467	26·4961	33·4405
2·22	17·9402	19·7062	22·8908	27·9059	35·4418
2·26	19·4404	21·4675	25·1443	30·9848	39·8550
2·30	21·0889	23·4164	27·6648	34·4736	44·9407
2·34	22·8724	25·5462	30·4611	38·4157	50·7952
2·38	24·8255	27·8985	33·5826	42·8699	57·5058
2·42	26·9750	30·5140	37·1034	47·9944	65·3984
2·46	29·3254	33·3941	41·0412	53·8138	74·4996
2·50	31·9084	36·6009	45·4765	60·4661	85·1179
2·54	34·7336	40·1409	50·4631	68·1156	97·5785
2·58	37·8569	44·0892	56·0854	76·8577	112·053
2·62	41·3137	48·5199	62·5199	87·0719	129·405
2·66	45·1135	53·4423	69·7733	98·8040	149·688
2·70	49·3081	58·9409	78·0125	112·402	173·733
2·74	53·9731	65·1239	87·4414	128·255	202·384
2·78	59·1476	72·0774	98·2162	146·752	236·555

y \ t^*	0·6	0·7	0·8	0·9	1·0
0·08	—0·542805	—0·542799	—0·542793	—0·542786	—0·542778
0·12	—0·599389	—0·599364	—0·599336	—0·599303	—0·599268
0·16	—0·633025	—0·632954	—0·632869	—0·632778	—0·632676
0·20	—0·650278	—0·650113	—0·649927	—0·649713	—0·649473
0·24	—0·654491	—0·654167	—0·653792	—0·653375	—0·652899
0·28	—0·647529	—0·646951	—0·646288	—0·645533	—0·644688
0·32	—0·630585	—0·629631	—0·628527	—0·627276	—0·625881
0·36	—0·604257	—0·602764	—0·601033	—0·599075	—0·596888
0·40	—0·569019	—0·566776	—0·564193	—0·561263	—0·557986
0·44	—0·521150	—0·521882	—0·518151	—0·513917	—0·509175
0·48	—0·472625	—0·468087	—0·462855	—0·456908	—0·450263
0·52	—0·411387	—0·405187	—0·398006	—0·389878	—0·380770
0·56	—0·341362	—0·333042	—0·323432	—0·312518	—0·300307
0·60	—0·262309	—0·251359	—0·238706	—0·224333	—0·208223
0·64	—0·173803	—0·159600	—0·143192	—0·124514	—0·103601
0·68	—0·0756059	—0·0574484	—0·0364054	—0·0125195	+0·0142955
0·72	+0·0329898	0·0559727	0·0825775	0·112858	0·146858
0·76	0·152460	0·181236	0·214568	0·252539	0·295219
0·80	0·283192	0·318889	0·360303	0·407514	0·460621
0·84	0·426506	0·470468	0·521491	0·579734	0·645365
0·88	0·582965	0·636688	0·699418	0·770539	0·851093
0·92	0·753347	0·818626	0·894617	0·981598	1·07991
0·96	0·939028	1·01792	1·10987	1·21532	1·33474
1·00	1·14152	1·23636	1·34714	1·47439	1·61885
1·02	1·24922	1·35301	1·47439	1·61397	1·77266
1·04	1·36171	1·47533	1·60822	1·76121	1·93529
1·06	1·47877	1·60287	1·74816	1·91573	2·10662
1·08	1·60179	1·73723	1·89609	2·07944	2·28863
1·10	1·72918	1·87699	2·05041	2·25091	2·47999
1·12	1·86299	2·02404	2·21339	2·43248	2·68328
1·14	2·00256	2·17802	2·38444	2·62377	2·89809
1·16	2·14745	2·33839	2·56340	2·82462	3·12464

TABLE 2—*contd.*

y \ t^*	0·6	0·7	0·8	0·9	1·0
1·18	2·29921	2·50694	2·75206	3·03711	3·36515
1·20	2·45799	2·68378	2·95065	3·26151	3·61974
1·22	2·62394	2·86933	3·15975	3·49882	3·89052
1·24	2·79705	3·06354	3·37963	3·74878	4·17671
1·26	2·97847	3·26776	3·61122	4·01404	4·48114
1·28	3·16723	3·48129	3·85489	4·29359	4·80374
1·30	3·36678	3·70731	4·11348	4·59127	5·14836
1·32	3·57316	3·94252	4·38364	4·90390	5·51239
1·34	3·79039	4·19066	4·66984	5·23671	5·90105
1·36	4·01795	4·45194	4·97298	5·58965	6·31526
1·38	4·25648	4·72701	5·29251	5·96488	6·75751
1·40	4·50491	5·01406	5·62844	6·36083	7·22660
1·42	4·76581	5·31835	5·98509	6·78265	7·72844
1·44	5·04401	5·64202	6·36704	7·23504	8·26969
1·46	5·33003	5·97733	6·76425	7·71087	8·84122
1·48	5·63048	6·33273	7·18737	8·21812	9·45529
1·50	5·95469	6·71366	7·64257	8·76689	10·1194
1·52	6·28240	7·10616	8·11453	9·34024	10·8223
1·54	6·63739	7·52859	8·62542	9·96211	11·5840
1·56	7·00733	7·97288	9·16418	10·6225	12·4002
1·58	7·39585	8·44156	9·73723	11·3291	13·2777
1·60	7·80561	8·93987	10·3482	12·0864	14·2238
1·62	8·23994	9·46846	11·0008	12·8993	15·2457
1·64	8·69399	10·0257	11·6929	13·7684	16·3454
1·66	9·17797	10·6215	12·4364	14·7049	17·5371
1·68	9·98411	11·2494	13·2261	15·7083	18·8234
1·70	10·2245	11·9228	14·0755	16·7936	20·2218
1·72	10·7927	12·6348	14·9817	17·9580	21·7343
1·74	11·3855	13·3858	15·9439	19·2065	23·3689
1·76	12·0304	14·2019	16·9934	20·5711	25·1640
1·78	12·7005	15·0583	18·1045	22·0319	27·1029
1·80	13·4251	15·9874	19·3143	23·6273	29·2319
1·82	14·1715	16·9572	20·5915	25·3313	31·5307
1·84	14·9867	18·0159	21·9906	27·2039	34·0680
1·86	15·8404	19·1369	23·4832	29·2226	36·8304
1·88	16·7497	20·3309	25·0938	31·4143	39·8500
1·90	17·721[illegible]	21·6309	26·8408	33·8112	43·1805
1·92	18·7544	23·0102	28·7235	36·4146	46·8346
1·94	19·8521	24·4917	30·7582	39·2518	50·8385
1·96	21·0307	26·0906	32·9693	42·3546	55·2634
1·98	22·2792	27·8014	35·3570	45·7494	60·1406
2·00	23·6179	29·6461	37·9477	49·4365	65·5101
2·02	25·0536	31·6420	40·7744	53·5328	71·2987
2·04	26·5847	33·7885	43·8487	57·9904	79·1923
2·06	28·2260	36·1026	47·1805	62·8848	81·9903
2·08	29·9904	38·6124	50·8358	68·2938	95·3682
2·10	31·8743	41·3251	54·8104	74·2295	103·108
2·12	33·9015	44·2581	59·1452	80·7759	112·589
2·14	36·0762	47·4289	63·8913	88·0107	123·807
2·16	38·4283	50·8953	69·1077	96·0233	136·342
2·18	40·9505	54·6449	74·8091	104·876	150·342
2·20	43·6643	58·7085	81·0621	114·685	166·023
2·22	46·5994	63·1489	87·9469	125·581	183·621
2·26	53·1791	73·2515	103·846	151·177	225·639
2·30	60·8799	85·2899	123·167	182·910	278·828
2·34	69·9318	99·7523	146·911	222·849	347·487
2·38	80·4668	116·841	175·403	271·500	—
2·42	93·1582	137·984	211·695	335·454	—
2·46	108·046	163·227	255·820	—	—
2·50	125·781	193·957	310·758	—	—
2·54	147·075	231·777	380·158	—	—
2·58	172·211	277·158	—	—	—

TABLE 2—*contd.*

y \ t^*	0·6	0·7	0·8	0·9	1·0
2·62	203·221	334·916	—	—	—
2·66	240·166	—	—	—	—
2·70	284·995	—	—	—	—
2·74	339·677	—	—	—	—
2·78	406·475	—	—	—	—

y \ t^*	1·1	1·2	1·3	1·4	1·5
0·08	—0·542769	—0·542759	—0·542749	—0·542739	—0·542726
0·12	—0·599227	—0·599184	—0·599137	—0·599086	—0 599032
0·16	—0·632559	—0·632434	—0·632295	—0·632146	—0·631989
0·20	—0·649210	—0·648919	—0·648607	—0·648269	—0·647902
0·24	—0·652379	—0·651808	—0·651185	—0·650514	—0·649792
0·28	—0·643754	—0·642737	—0·641626	—0·640425	—0·639139
0·32	—0·624337	—0·622639	—0·620798	—0·618815	—0·616677
0·36	—0·594466	—0·591819	—0·588934	—0·585811	—0·582463
0·40	—0·554362	—0·550389	—0·546066	—0·541393	—0·536372
0·44	—0·503937	—0·498186	—0·491943	—0·485187	—0·477913
0·48	—0·442904	—0·434838	—0·426048	—0·416546	—0·406333
0·52	—0·370697	—0·359636	—0·347599	—0·334565	—0·320529
0·56	—0·286767	—0·271921	—0·255734	—0·238207	—0·219337
0·60	—0·190380	—0·170770	—0·149398	—0·126231	—0·101252
0·64	—0·0804103	—0·0549117	—0·0270817	+0·00309333	+0·0356667
0·68	+0·0440706	+0·0768130	+0·112579	0·151428	0·193374
0·72	0·184606	0·226212	0·271698	0·321143	0·374658
0·76	0·342697	0·395005	0·452329	0·514732	0·582336
0·80	0·519763	0·585106	0·656732	0·734863	0·819667
0·84	0·718549	0·799490	0·888435	0·985624	1·09134
0·88	0·941073	1·04079	1·15057	1·27079	1·40189
0·92	1·18996	1·31215	1·44702	1·59508	1·75695
0·96	1·46869	1·61780	1·78278	1·96445	2·16371
1·00	1·78125	1·96256	2·16375	2·38599	2·63059
1·02	1·94624	2·15095	2·37288	2·61848	2·88929
1·04	2·13158	2·35133	2·59605	2·86736	3·16720
1·06	2·32219	2·56396	2·83363	3·13323	3·46504
1·08	2·52526	2·79110	3·08821	3·41904	3·78593
1·10	2·73956	3·03168	3·35892	3·72384	4·13008
1·12	2·96788	3·28887	3·64909	4·05201	4·50164
1·14	3·21007	3·56263	3·95928	4·40386	4·90125
1·16	3·46649	3·85368	4·29016	4·78097	5·33119
1·18	3·73945	4·16462	4·64525	5·18702	5·79591
1·20	4·03016	4·49671	5·02521	5·62328	6·29784
1·22	4·33956	4·85194	5·43436	6·09464	6·84233
1·24	4·66827	5·23083	5·87253	6·60154	7·43011
1·26	5·01951	5·63723	6·34333	7·14929	8·06812
1·28	5·39349	6·07140	6·84927	7·74061	8·75999
1·30	5·79372	6·53908	7·39641	8·38173	9·51461
1·32	6·21911	7·03780	7·98364	9·07449	10·3327
1·34	6·67607	7·57546	8·61800	9·82658	11·2260
1·36	7·16411	8·15278	9·30338	10·6419	12·1999
1·38	7·68709	8·77521	10·0469	11·5317	13·2681
1·40	8·24571	9·44318	10·8481	12·4968	14·4327
1·42	8·84686	10·1653	11·7187	13·5498	15·7125
1·44	9·49631	10·9484	12·6672	14·7043	17·1215
1·46	10·1879	11·7889	13·6930	15·9597	18·6656
1·48	10·9336	12·6999	14·8106	17·3370	20·3681
1 50	11·7450	13·5945	16·0361	18·8542	22·2553
1·52	12·6081	14·7619	17·3626	20·5098	24·3307
1·54	13·5495	15·9315	18·8222	22·3407	26·6397
1·56	14·5637	17·1993	20·4155	24·3551	29·1975

TABLE 2—*contd.*

y \ t*	1·1	1·2	1·3	1·4	1·5
1·58	15·6617	18·5803	22·1642	26·5793	32·0437
1·60	16·8516	20·0872	24·0841	29·0393	35·2125
1·62	18·1453	21·7366	26·1977	31·7667	38·7539
1·64	19·5469	23·5357	28·5232	34·7904	42·7046
1·66	21·0761	25·5110	31·0933	38·1547	47·1477
1·68	22·7379	27·6739	33·9284	41·9012	52·1160
1·70	24·5558	30·0574	37·0766	46·0819	57·7217
1·72	26·5381	32·6742	40·5567	50·7577	64·0321
1·74	28·6968	35·5512	44·4188	55·9772	71·1505
1·76	31·0804	38·7419	48·7408	61·8565	79·2267
1·78	33·6794	42·2615	53·5325	68·4553	88·3671
1·80	36·5511	46·1669	58·9013	75·8950	98·7713
1·82	39·6803	50·4771	64·8741	84·2716	110·588
1·84	43·1639	55·2923	71·6129	93·7564	124·092
1·86	46·9769	60·6268	79·1507	104·511	139·558
1·88	51·1807	66·5626	87·5896	116·627	157·123
1·90	55·8833	73·2341	97·1804	130·565	177·553
1·92	61·0494	80·6525	107·944	146·325	200·871
1·94	66·7903	88·9640	120·109	165·299	227·756
1·96	73·1827	98·2973	133·905	179·031	258·849
1·98	80·2816	108·789	149·561	226·435	294·907
2·00	88·1750	120·523	167·241	225·702	336·312
2·02	94·7692	133·466	186·984	262·919	383·882
2·04	108·634	151·430	214·412	308·229	449·634
2·06	112·815	158·134	225·639	327·515	483·122
2·08	133·235	189·318	273·449	401·278	—
2·10	145·216	208·213	303·763	450·584	—
2·12	160·013	231·710	341·617	512·335	—
2·14	177·683	259·963	387·386	587·492	—
2·16	197·628	292·177	440·172	—	—
2·18	220·157	328·975	501·145	—	—
2·20	245·648	371·076	571·686	—	—
2·22	274·556	419·337	—	—	—
2·26	344·791	538·679	—	—	—

y \ t*	1·6	1·7	1·8	1·9	2·0
0·08	—0·542713	—0·542698	—0·542682	—0·542667	—0·542650
0·12	—0·598973	—0·598911	—0·598846	—0·598776	—0·598702
0·16	—0·631821	—0·631639	—0·631448	—0·631244	—0·631032
0·20	—0·647512	—0·647097	—0·646655	—0·646190	—0·645702
0·24	—0·649021	—0·648199	—0·647332	—0·646412	—0·645435
0·28	—0·637759	—0·636292	—0·634735	—0·633087	—0·631353
0·32	—0·614393	—0·611957	—0·609372	—0·606644	—0·603766
0·36	—0·578883	—0·575066	—0·571018	—0·566731	—0·562206
0·40	—0·530996	—0·525269	—0·519189	—0·512757	—0·505963
0·44	—0·470130	—0·461841	—0·453021	—0·443693	—0·433853
0·48	—0·395391	—0·383716	—0·371317	—0·358170	—0·344274
0·52	—0·305489	—0·289452	—0·272384	—0·254297	—0·235177
0·56	—0·199093	—0·177474	—0·154463	—0·136038	—0·104205
0·60	—0·0744605	—0·0457908	—0·0152699	+0·0171496	+0·0515011
0·64	+0·0706603	+0·108100	+0·148047	0·190535	0·235615
0·68	0·238519	+0·286880	0·338541	0·393577	0·452031
0·72	0·432274	+0·494133	0·560319	0·630921	0·706087
0·76	0·655291	0·733734	0·817819	0·907724	1·00364
0·80	0·911358	1·01015	1·11629	1·23005	1·35170
0·84	1·20589	1·32962	1·46289	1·60611	1·75964
0·88	1·54431	1·69856	1·86521	2·04488	2·23822
0·92	1·93333	2·12499	2·33275	2·55753	2·80038
0·96	2·38153	2·61905	2·87754	3·15836	3·46305

TABLE 2—*contd.*

y \ t*	1·6	1·7	1·8	1·9	2·0
1·00	2·89907	3·19296	3·51419	3·86484	4·24707
1·02	3·18714	3·51398	3·87205	4·26368	4·69220
1·04	3·49763	3·86105	4·26019	4·69820	5·17800
1·06	3·83146	4·23568	4·68072	5·16994	5·70875
1·08	4·19247	4·64193	5·13826	5·68615	6·29038
1·10	4·58120	5·08097	5·63467	6·24759	6·92584
1·12	5·00191	5·55818	6·17604	6·86278	7·62509
1·14	5·45618	6·07537	6·76593	7·53014	8·39291
1·16	5·94775	6·63736	7·40792	8·27119	9·23733
1·18	6·48078	7·24936	8·11603	9·08456	10·1735
1·20	7·05789	7·91514	8·86971	9·95898	11·1878
1·22	7·68784	8·64422	9·73243	10·9576	12·3469
1·24	8·37081	9·43891	10·6547	12·0349	13·6074
1·26	9·11591	10·3098	11·6724	13·2296	15·0115
1·28	9·92685	11·2632	12·7947	14·5538	16·5772
1·30	10·8152	12·3123	14·0367	16·0259	18·3269
1·32	11·7852	13·4636	15·4067	17·6609	20·2818
1·34	12·8493	14·7343	16·9279	19·4861	22·4778
1·36	14·0145	16·1325	18·6102	21·5154	24·9334
1·38	15·3014	17·6873	20·4939	23·8053	27·7245
1·40	16·7125	19·4019	22·5830	26·3597	30·8571
1·42	18·2711	21·3063	24·9195	29·2349	34·4075
1·44	19·9976	23·4299	27·5406	32·4816	38·4437
1·46	21·9023	25·7899	30·4739	36·1409	43·0288
1·48	24·0177	28·4259	33·7746	40·2929	48·2605
1·50	26·3747	31·3839	37·5019	45·0045	54·2600
1·52	28·9881	34·6892	41·6972	50·3599	61·1179
1·54	31·9130	38·4129	46·4616	56·4837	69·0207
1·56	35·1785	42·6008	51·8675	63·4761	78·1245
1·58	38·8396	47·3312	58·0035	71·5022	88·6561
1·60	42·9385	52·6819	65·0153	80·7272	100·855
1·62	47·5706	58·7471	73·0224	91·3526	115·046
1·64	52·7709	65·6370	82·1983	103·642	131·578
1·66	58·6491	73·4913	92·7371	117·874	150·908
1·68	65·3091	82·4449	104·862	134·394	173·551
1·70	72·8669	92·7056	118·881	153·651	200·168
1·72	81·4441	104·452	135·073	176·122	231·526
1·74	91·2147	117·954	153·853	202·409	268·565
1·76	102·391	133·380	175·713	233·295	312·462
1·78	115·159	152·381	201·169	269·605	364·606
1·80	129·816	169·601	230·928	312·472	426·739
1·82	146·624	197·888	265·752	363·118	500·897
1·84	166·023	224·936	306·659	—	—
1·86	188·439	257·251	354·971	—	—
1·88	214·125	295·112	411·200	—	—
1·90	244·361	340·231	479·089	—	—
1·92	279·156	392·619	558·595	—	—
1·94	319·709	454·315	—	—	—
1·96	367·061	527·072	—	—	—
1·98	422·602	—	—	—	—
2·00	486·904	—	—	—	—

Unfortunately, there is no direct procedure possible for fixing the exponent of the repulsive part of the interaction potentials. The purpose of this article has been to summarise and establish the supremacy of the choice of eighteen in this connection.

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