

The Table of NMR Frequencies* (By Mass)

Isotope	Spin	2.35 T	4.70 T	7.05 T	9.39 T	11.74 T	14.09 T	16.45T	17.61T	18.80T	21.14T	Natural abundance	Relative sensitivity	Absolute sensitivity
1 H	1/2	100.000	200.057	299.949	399.952	499.843	599.944	700.000	749.948	800.449	900.080	99.989	62.899	5877.739
2 H	1	15.351	30.710	46.044	61.395	76.729	92.095	107.454	115.122	122.874	138.168	0.015	0.228	0.003
3 H	1/2	106.664	213.389	319.938	426.605	533.152	639.924	746.648	799.924	853.791	960.061	0	73.330	0.000
3 He	-1/2	76.179	152.402	228.499	304.681	380.778	457.034	533.256	571.306	609.778	685.676	0.000	27.807	0.004
6 Li	1	14.716	29.441	44.141	58.857	73.557	88.288	103.013	110.363	117.795	132.457	7.59	0.200	1.422
7 Li	3/2	38.864	77.750	116.572	155.437	194.258	233.161	272.047	291.458	311.085	349.805	92.41	3.692	318.871
9 Be	-3/2	14.052	28.112	42.148	56.201	70.237	84.303	98.363	105.381	112.478	126.478	100.0	0.175	16.310
10 B	3	10.744	21.493	32.225	42.969	53.701	64.456	75.206	80.572	85.998	96.702	19.9	0.078	1.451
11 B	3/2	32.084	64.186	96.236	128.320	160.369	192.486	224.588	240.613	256.816	288.781	80.1	2.077	155.509
13 C	1/2	25.145	50.304	75.422	100.568	125.686	150.856	176.015	188.575	201.273	226.325	1.07	1.000	1.000
14 N	1	7.226	14.457	21.675	28.902	36.120	43.354	50.584	54.194	57.843	65.043	99.632	0.024	2.211
15 N	-1/2	10.137	20.279	30.405	40.542	50.668	60.815	70.957	76.020	81.140	91.239	0.368	0.066	0.023
17 O	-5/2	13.556	27.121	40.662	54.219	67.761	81.331	94.895	101.666	108.513	122.019	0.038	0.157	0.006
19 F	1/2	94.094	188.242	282.234	376.331	470.322	564.511	658.658	705.656	753.175	846.921	100.0	52.400	4897.181
21 Ne	-3/2	7.895	15.794	23.680	31.574	39.460	47.363	55.262	59.205	63.192	71.057	0.27	0.031	0.008
23 Na	3/2	26.452	52.919	79.342	105.795	132.218	158.697	185.163	198.376	211.734	238.088	100.0	1.164	108.801
25 Mg	-5/2	6.122	12.247	18.362	24.484	30.599	36.726	42.852	45.909	49.001	55.010	10	0.014	0.135
27 Al	5/2	26.057	52.129	78.157	104.215	130.244	156.327	182.398	195.413	208.572	234.533	100.0	1.113	103.999
29 Si	-1/2	19.867	39.746	59.591	79.459	99.305	119.192	139.070	148.994	159.027	178.821	4.683	0.493	2.159
31 P	1/2	40.481	80.985	121.422	161.904	202.340	242.862	283.365	303.585	324.028	364.359	100.0	4.172	389.947
33 S	3/2	7.676	15.356	23.024	30.700	38.368	46.052	53.732	57.566	61.443	69.090	0.76	0.028	0.020
35 Cl	3/2	9.798	19.601	29.389	39.187	48.974	58.782	68.586	73.479	78.427	88.189	75.78	0.059	4.190
37 Cl	3/2	8.156	16.316	24.463	32.619	40.766	48.930	57.090	61.164	65.283	73.408	24.22	0.034	0.772
39 K	3/2	4.666	9.336	13.997	18.663	23.325	27.996	32.665	34.996	37.352	42.002	93.258	0.006	0.557
40 K	-4	5.802	11.607	17.403	23.205	29.001	34.809	40.614	43.512	46.442	52.223	0.012	0.012	0.000
41 K	3/2	2.561	5.124	7.683	10.244	12.803	15.367	17.929	19.209	20.502	23.054	6.730	0.001	0.007
43 Ca	-7/2	6.730	13.464	20.187	26.917	33.639	40.376	47.110	50.471	53.870	60.575	0.135	0.019	0.002
45 Sc	7/2	24.292	48.597	72.863	97.155	121.420	145.737	170.042	182.175	194.443	218.645	100.0	0.902	84.263
47 Ti	-5/2	5.638	11.278	16.910	22.548	28.179	33.822	39.463	42.279	45.126	50.743	7.44	0.011	0.078
49 Ti	-7/2	5.639	11.281	16.914	22.554	28.187	33.831	39.474	42.290	45.138	50.756	5.41	0.011	0.057
50 V	6	9.970	19.946	29.906	39.876	49.836	59.816	69.792	74.772	79.807	89.741	0.25	0.062	0.015
51 V	7/2	26.303	52.621	78.895	105.199	131.474	157.803	184.121	197.259	210.542	236.748	99.75	1.145	106.705
53 Cr	-3/2	5.653	11.308	16.955	22.607	28.254	33.912	39.568	42.391	45.245	50.877	9.501	0.011	0.101
55 Mn	5/2	24.789	49.592	74.355	99.144	123.906	148.720	173.523	185.905	198.424	223.121	100.0	0.958	89.545
57 Fe	1/2	3.238	6.477	9.712	12.950	16.184	19.425	22.664	24.282	25.917	29.143	2.119	0.002	0.004
59 Co	7/2	23.727	47.468	71.169	94.897	118.598	142.349	166.089	177.941	189.923	213.563	100.0	0.840	78.522
61 Ni	-3/2	8.936	17.877	26.804	35.740	44.666	53.611	62.552	67.016	71.529	80.432	1.134	0.045	0.048
63 Cu	3/2	26.515	53.046	79.533	106.049	132.536	159.078	185.608	198.852	212.243	238.660	69.17	1.173	75.801
65 Cu	3/2	28.404	56.824	85.196	113.601	141.974	170.406	198.826	213.013	227.357	255.656	30.83	1.441	41.529
67 Zn	5/2	6.257	12.517	18.767	25.024	31.274	37.537	43.798	46.923	50.083	56.316	4.1	0.015	0.059
69 Ga	3/2	24.001	48.016	71.992	95.993	119.969	143.994	168.009	179.997	192.118	216.030	60.108	0.870	48.853
71 Ga	3/2	30.497	61.011	91.474	121.972	152.435	182.962	213.476	228.708	244.110	274.494	39.892	1.784	66.512
73 Ge	-9/2	3.488	6.979	10.463	13.952	17.436	20.928	24.418	26.161	27.922	31.398	7.73	0.003	0.019
75 As	3/2	17.123	34.255	51.359	68.483	85.587	102.727	119.859	128.411	137.059	154.118	100.0	0.316	29.510
77 Se	1/2	19.072	38.154	57.205	76.277	95.328	114.418	133.501	143.026	152.658	171.659	7.63	0.436	3.111
79 Br	3/2	25.054	50.123	75.151	100.206	125.233	150.313	175.381	187.895	200.548	225.510	50.69	0.989	46.864
81 Br	3/2	27.007	54.029	81.007	108.015	134.993	162.027	189.049	202.539	216.177	243.085	49.31	1.239	57.099
83 Kr	-9/2	3.848	7.697	11.541	15.389	19.232	23.083	26.933	28.855	30.798	34.631	11.49	0.004	0.038
85 Rb	5/2	9.655	19.316	28.961	38.616	48.261	57.926	67.586	72.409	77.285	86.904	72.17	0.057	3.818
87 Rb	3/2	32.721	65.461	98.147	130.869	163.555	196.309	229.049	245.392	261.917	294.517	27.83	2.204	57.314
87 Sr	-9/2	4.334	8.670	12.999	17.333	21.662	26.000	30.337	32.501	34.690	39.008	7	0.005	0.033
89 Y	-1/2	4.900	9.803	14.698	19.598	24.493	29.398	34.301	36.749	39.224	44.106	100.0	0.007	0.692
91 Zr	-5/2	9.296	18.598	27.884	37.181	46.467	55.773	65.074	69.717	74.412	83.674	11.22	0.050	0.527
93 Nb	9/2	24.476	48.966	73.416	97.893	122.343	146.843	171.333	183.559	195.919	220.305	100.0	0.922	86.197
95 Mo	5/2	6.157	12.317	18.468	24.625	30.775	36.938	43.099	46.174	49.283	55.417	15.92	0.017	0.259
97 Mo	-5/2	6.654	13.311	19.958	26.612	33.258	39.919	46.576	49.899	53.260	59.889	9.55	0.019	0.165
99 Ru	-3/2	4.605	9.213	13.813	18.418	23.019	27.628	32.236	34.536	36.862	41.450	12.76	0.006	0.073
101 Ru	-5/2	5.161	10.326	15.481	20.643	25.799	30.965	36.130	38.708	41.314	46.456	17.06	0.009	0.138
103 Rh	-1/2	3.186	6.375	9.558	12.744	15.927	19.117	22.305	23.897	25.506	28.681	100.0	0.002	0.190
105 Pd	-5/2	4.576	9.155	13.726	18.302	22.873	27.454	32.033	34.318	36.629	41.189	22.33	0.006	0.126
107 Ag	-1/2	4.048	8.098	12.141	16.189	20.233	24.285	28.335	30.357	32.401	36.434	51.839	0.004	0.202
109 Ag	-1/2	4.654	9.310	13.958	18.612	23.260	27.919	32.575	34.899	37.249	41.886	48.161	0.006	0.285
111 Cd	-1/2	21.215	42.443	63.636	84.852	106.044	127.281	148.508	159.105	169.819	190.956	12.8	0.601	7.185
113 Cd	-1/2	22.193	44.399	66.568	88.762	110.931	133.147	155.352	166.437	177.645	199.756	12.22	0.689	7.866
113 In	9/2	21.866	43.744	65.586	87.452	109.294	131.182	153.060	163.981	175.023	196.808	4.29	0.658	2.636

(Continued on page 2)

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The Table of NMR Frequencies* (By Mass) (Continued)

Isotope	Spin	2.35 T	4.70 T	7.05 T	9.39 T	11.74 T	14.09 T	16.45T	17.61T	18.80T	21.14T	Natural abundance	Relative sensitivity	Absolute sensitivity
115 In	9/2	21.913	43.838	65.726	87.640	109.528	131.463	153.388	164.333	175.399	197.230	95.71	0.662	59.196
115 Sn	-1/2	32.719	65.456	98.140	130.859	163.542	196.294	229.031	245.374	261.897	294.495	0.34	2.203	0.700
117 Sn	-1/2	35.632	71.285	106.879	142.512	178.105	213.774	249.426	267.223	285.218	320.719	7.68	2.846	20.424
119 Sn	-1/2	37.291	74.603	111.853	149.145	186.395	223.723	261.034	279.660	298.492	335.646	8.59	3.262	26.185
121 Sb	5/2	23.931	47.875	71.780	95.711	119.615	143.570	167.514	179.467	191.552	215.395	57.21	0.862	46.089
123 Sb	7/2	12.959	25.925	38.870	51.829	64.774	77.746	90.712	97.185	103.729	116.640	42.79	0.137	5.474
123 Te	-1/2	26.170	52.354	78.496	104.666	130.808	157.004	183.188	196.259	209.475	235.549	0.89	1.127	0.938
125 Te	-1/2	31.550	63.118	94.633	126.184	157.699	189.281	220.848	236.607	252.540	283.973	7.07	1.975	13.052
127 I	5/2	20.009	40.029	60.016	80.025	100.012	120.041	140.060	150.054	160.159	180.094	100.0	0.504	47.088
129 Xe	-1/2	27.810	55.636	83.416	111.227	139.007	166.846	194.671	208.562	222.606	250.314	26.44	1.353	33.433
131 Xe	3/2	8.245	16.494	24.730	32.976	41.211	49.465	57.714	61.832	65.996	74.211	21.18	0.035	0.698
133 Cs	7/2	13.116	26.240	39.342	52.459	65.560	78.690	91.813	98.365	104.989	118.056	100.0	0.142	13.264
135 Ba	3/2	9.934	19.874	29.798	39.733	49.656	59.601	69.541	74.503	79.520	89.418	6.592	0.062	0.380
137 Ba	3/2	11.113	22.232	33.333	44.446	55.547	66.671	77.790	83.341	88.953	100.025	11.23	0.086	0.906
138 La	5	13.194	26.396	39.576	52.771	65.951	79.158	92.360	98.950	105.613	118.759	0.09	0.144	0.012
139 La	7/2	14.126	28.259	42.370	56.496	70.606	84.746	98.879	105.935	113.068	127.142	99.91	0.177	16.553
141 Pr	5/2	30.620	61.257	91.844	122.465	153.052	183.703	214.340	229.634	245.097	275.604	100.0	1.806	168.763
143 Nd	-7/2	5.450	10.903	16.347	21.797	27.241	32.697	38.150	40.872	43.624	49.054	12.18	0.010	0.116
145 Nd	-7/2	3.360	6.722	10.078	13.438	16.795	20.158	23.520	25.198	26.895	30.243	8.3	0.002	0.019
147 Sm	-7/2	4.170	8.342	12.508	16.678	20.843	25.018	29.190	31.273	33.379	37.533	14.97	0.005	0.064
149 Sm	-7/2	3.440	6.882	10.318	13.758	17.195	20.638	24.080	25.798	27.535	30.963	13.83	0.003	0.033
151 Eu	5/2	24.860	49.734	74.567	99.428	124.261	149.146	174.020	186.437	198.992	223.760	47.82	0.966	43.189
153 Eu	5/2	10.980	21.966	32.934	43.915	54.883	65.874	76.860	82.344	87.889	98.829	52.18	0.083	4.060
155 Gd	-3/2	3.070	6.142	9.208	12.279	15.345	18.418	21.490	23.023	24.574	27.632	14.73	0.002	0.025
157 Gd	-3/2	4.030	8.062	12.088	16.118	20.144	24.178	28.210	30.223	32.258	36.273	15.65	0.004	0.060
159 Tb	3/2	24.040	48.094	72.108	96.148	120.162	144.227	168.280	180.287	192.428	216.379	100.0	0.874	81.670
161 Dy	-5/2	3.440	6.882	10.318	13.758	17.195	20.638	24.080	25.798	27.535	30.963	18.88	0.003	0.045
163 Dy	5/2	4.820	9.643	14.458	19.278	24.092	28.917	33.740	36.147	38.582	43.384	24.97	0.007	0.164
165 Ho	7/2	21.340	42.692	64.009	85.350	106.666	128.028	149.380	160.039	170.816	192.077	100.0	0.611	57.127
167 Er	-7/2	2.880	5.762	8.639	11.519	14.395	17.278	20.160	21.599	23.053	25.922	22.95	0.002	0.032
169 Tm	-1/2	8.290	16.585	24.866	33.156	41.437	49.735	58.030	62.171	66.357	74.617	100.0	0.036	3.350
171 Yb	1/2	17.499	35.009	52.489	69.989	87.469	104.986	122.495	131.236	140.073	157.508	14.31	0.337	4.508
173 Yb	-5/2	4.821	9.645	14.461	19.282	24.097	28.923	33.747	36.155	38.590	43.393	16.12	0.007	0.106
175 Lu	7/2	11.404	22.815	34.206	45.611	57.002	68.418	79.828	85.524	91.283	102.645	97.41	0.093	8.493
176 Lu	7	8.131	16.267	24.389	32.520	40.642	48.781	56.917	60.978	65.085	73.186	2.59	0.034	0.082
177 Hf	7/2	4.007	8.016	12.019	16.026	20.029	24.040	28.049	30.050	32.074	36.066	18.6	0.004	0.070
179 Hf	-9/2	2.517	5.035	7.550	10.067	12.581	15.101	17.619	18.876	20.147	22.655	13.62	0.001	0.013
181 Ta	7/2	11.990	23.986	35.963	47.953	59.929	71.931	83.927	89.916	95.971	107.916	99.988	0.108	10.131
183 W	1/2	4.166	8.335	12.497	16.664	20.825	24.996	29.165	31.246	33.350	37.501	14.31	0.005	0.061
185 Re	5/2	22.525	45.062	67.562	90.088	112.588	135.135	157.672	168.923	180.298	202.739	37.4	0.719	25.125
187 Re	5/2	22.752	45.516	68.243	90.995	113.722	136.497	159.261	170.625	182.115	204.783	62.6	0.741	43.338
187 Os	1/2	2.282	4.566	6.846	9.128	11.408	13.693	15.976	17.116	18.269	20.543	1.96	0.001	0.001
189 Os	3/2	7.765	15.535	23.292	31.058	38.815	46.588	54.358	58.236	62.158	69.895	16.15	0.029	0.445
191 Ir	3/2	1.718	3.437	5.153	6.871	8.587	10.307	12.026	12.884	13.752	15.463	37.3	0.000	0.011
193 Ir	3/2	1.871	3.743	5.612	7.483	9.352	11.225	13.097	14.032	14.976	16.840	62.7	0.000	0.024
195 Pt	1/2	21.497	43.006	64.479	85.977	107.450	128.969	150.477	161.215	172.071	193.488	33.832	0.625	19.756
197 Au	3/2	1.729	3.459	5.186	6.915	8.642	10.373	12.103	12.967	13.840	15.562	100.0	0.000	0.031
199 Hg	1/2	17.911	35.832	53.723	71.635	89.526	107.455	125.376	134.322	143.367	161.212	16.87	0.361	5.697
201 Hg	-3/2	6.611	13.227	19.831	26.442	33.047	39.665	46.280	49.582	52.921	59.508	13.18	0.018	0.224
203 Tl	1/2	57.123	114.279	171.340	228.465	285.526	342.707	399.862	428.394	457.242	514.154	29.524	11.724	323.499
205 Tl	1/2	57.684	115.401	173.022	230.708	288.329	346.071	403.787	432.599	461.730	519.201	70.476	12.073	795.177
207 Pb	1/2	20.921	41.853	62.751	83.672	104.570	125.512	146.444	156.894	167.459	188.302	22.1	0.576	11.895
209 Bi	9/2	16.069	32.148	48.200	64.269	80.321	96.407	112.485	120.511	128.626	144.636	100.0	0.261	24.393
235 U	7/2	1.841	3.684	5.523	7.365	9.204	11.047	12.890	13.810	14.739	16.574	0.72	0.000	0.000

*Based on "Provisional Recommendations for NMR Nomenclature:Nuclear Spin Properties and Conventions Chemical Shifts", Commission I.5, Molecular Structure and Spectroscopy, IUPAC, Nov. 2001

The Leader in Design. The Leader in Performance.

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Isotope	Spin	2.35 T	4.70 T	7.05 T	9.39 T	11.74 T	14.09 T	16.45T	17.61T	18.80T	21.14T	Natural abundance	Relative sensitivity	Absolute sensitivity
3 H	1/2	106.664	213.389	319.938	426.605	533.152	639.924	746.648	799.924	853.791	960.061	0	73.330	0.000
1 H	1/2	100.000	200.057	299.949	399.952	499.843	599.944	700.000	749.948	800.449	900.080	99.989	62.899	5877.739
19 F	1/2	94.094	188.242	282.234	376.331	470.322	564.511	658.658	705.656	753.175	846.921	100.0	52.400	4897.181
3 He	-1/2	76.179	152.402	228.499	304.681	380.778	457.034	533.256	571.306	609.778	685.676	0.000	27.807	0.004
205 Tl	1/2	57.684	115.401	173.022	230.708	288.329	346.071	403.787	432.599	461.730	519.201	70.476	12.073	795.177
203 Tl	1/2	57.123	114.279	171.340	228.465	285.526	342.707	399.862	428.394	457.242	514.154	29.524	11.724	323.499
31 P	1/2	40.481	80.985	121.422	161.904	202.340	242.862	283.365	303.585	324.028	364.359	100.0	4.172	389.947
7 Li	3/2	38.864	77.750	116.572	155.437	194.258	233.161	272.047	291.458	311.085	349.805	92.41	3.692	318.871
119 Sn	-1/2	37.291	74.603	111.853	149.145	186.395	223.723	261.034	279.660	298.492	335.646	8.59	3.262	26.185
117 Sn	-1/2	35.632	71.285	106.879	142.512	178.105	213.774	249.426	267.223	285.218	320.719	7.68	2.846	20.424
87 Rb	3/2	32.721	65.461	98.147	130.869	163.555	196.309	229.049	245.392	261.917	294.517	27.83	2.204	57.314
115 Sn	-1/2	32.719	65.456	98.140	130.859	163.542	196.294	229.031	245.374	261.897	294.495	0.34	2.203	0.700
11 B	3/2	32.084	64.186	96.236	128.320	160.369	192.486	224.588	240.613	256.816	288.781	80.1	2.077	155.509
125 Te	-1/2	31.550	63.118	94.633	126.184	157.699	189.281	220.848	236.607	252.540	283.973	7.07	1.975	13.052
141 Pr	5/2	30.620	61.257	91.844	122.465	153.052	183.703	214.340	229.634	245.097	275.604	100.0	1.806	168.763
71 Ga	3/2	30.497	61.011	91.474	121.972	152.435	182.962	213.476	228.708	244.110	274.494	39.892	1.784	66.512
65 Cu	3/2	28.404	56.824	85.196	113.601	141.974	170.406	198.826	213.013	227.357	255.656	30.83	1.441	41.529
129 Xe	-1/2	27.810	55.636	83.416	111.227	139.007	166.846	194.671	208.562	222.606	250.314	26.44	1.353	33.433
81 Br	3/2	27.007	54.029	81.007	108.015	134.993	162.027	189.049	202.539	216.177	243.085	49.31	1.239	57.099
63 Cu	3/2	26.515	53.046	79.533	106.049	132.536	159.078	185.608	198.852	212.243	238.660	69.17	1.173	75.801
23 Na	3/2	26.452	52.919	79.342	105.795	132.218	158.697	185.163	198.376	211.734	238.088	100.0	1.164	108.801
51 V	7/2	26.303	52.621	78.895	105.199	131.474	157.803	184.121	197.259	210.542	236.748	99.75	1.145	106.705
123 Te	-1/2	26.170	52.354	78.496	104.666	130.808	157.004	183.188	196.259	209.475	235.549	0.89	1.127	0.938
27 Al	5/2	26.057	52.129	78.157	104.215	130.244	156.327	182.398	195.413	208.572	234.533	100.0	1.113	103.999
13 C	1/2	25.145	50.304	75.422	100.568	125.686	150.856	176.015	188.575	201.273	226.325	1.07	1.000	1.000
79 Br	3/2	25.054	50.123	75.151	100.206	125.233	150.313	175.381	187.895	200.548	225.510	50.69	0.989	46.864
151 Eu	5/2	24.860	49.734	74.567	99.428	124.261	149.146	174.020	186.437	198.992	223.760	47.82	0.966	43.189
55 Mn	5/2	24.789	49.592	74.355	99.144	123.906	148.720	173.523	185.905	198.424	223.121	100.0	0.958	89.545
93 Nb	9/2	24.476	48.966	73.416	97.893	122.343	146.843	171.333	183.559	195.919	220.305	100.0	0.922	86.197
45 Sc	7/2	24.292	48.597	72.863	97.155	121.420	145.737	170.042	182.175	194.443	218.645	100.0	0.902	84.263
159 Tb	3/2	24.040	48.094	72.108	96.148	120.162	144.227	168.280	180.287	192.428	216.379	100.0	0.874	81.670
69 Ga	3/2	24.001	48.016	71.992	95.993	119.969	143.994	168.009	179.997	192.118	216.030	60.108	0.870	48.853
121 Sb	5/2	23.931	47.875	71.780	95.711	119.615	143.570	167.514	179.467	191.552	215.395	57.21	0.862	46.089
59 Co	7/2	23.727	47.468	71.169	94.897	118.598	142.349	166.089	177.941	189.923	213.563	100.0	0.840	78.522
187 Re	5/2	22.752	45.516	68.243	90.995	113.722	136.497	159.261	170.625	182.115	204.783	62.6	0.741	43.338
185 Re	5/2	22.525	45.062	67.562	90.088	112.588	135.135	157.672	168.923	180.298	202.739	37.4	0.719	25.125
113 Cd	-1/2	22.193	44.399	66.568	88.762	110.931	133.147	155.352	166.437	177.645	199.756	12.22	0.689	7.866
115 In	9/2	21.913	43.838	65.726	87.640	109.528	131.463	153.388	164.333	175.399	197.230	95.71	0.662	59.196
113 In	9/2	21.866	43.744	65.586	87.452	109.294	131.182	153.060	163.981	175.023	196.808	4.29	0.658	2.636
195 Pt	1/2	21.497	43.006	64.479	85.977	107.450	128.969	150.477	161.215	172.071	193.488	33.832	0.625	19.756
165 Ho	7/2	21.340	42.692	64.009	85.350	106.666	128.028	149.380	160.039	170.816	192.077	100.0	0.611	57.127
111 Cd	-1/2	21.215	42.443	63.636	84.852	106.044	127.281	148.508	159.105	169.819	190.956	12.8	0.601	7.185
207 Pb	1/2	20.921	41.853	62.751	83.672	104.570	125.512	146.444	156.894	167.459	188.302	22.1	0.576	11.895
127 I	5/2	20.009	40.029	60.016	80.025	100.012	120.041	140.060	150.054	160.159	180.094	100.0	0.504	47.088
29 Si	-1/2	19.867	39.746	59.591	79.459	99.305	119.192	139.070	148.994	159.027	178.821	4.683	0.493	2.159
77 Se	1/2	19.072	38.154	57.205	76.277	95.328	114.418	133.501	143.026	152.658	171.659	7.63	0.436	3.111
199 Hg	1/2	17.911	35.832	53.723	71.635	89.526	107.455	125.376	134.322	143.367	161.212	16.87	0.361	5.697
171 Yb	1/2	17.499	35.009	52.489	69.989	87.469	104.986	122.495	131.236	140.073	157.508	14.31	0.337	4.508
75 As	3/2	17.123	34.255	51.359	68.483	85.587	102.727	119.859	128.411	137.059	154.118	100.0	0.316	29.510
209 Bi	9/2	16.069	32.148	48.200	64.269	80.321	96.407	112.485	120.511	128.626	144.636	100.0	0.261	24.393
2 H	1	15.351	30.710	46.044	61.395	76.729	92.095	107.454	115.122	122.874	138.168	0.015	0.228	0.003
6 Li	1	14.716	29.441	44.141	58.857	73.557	88.288	103.013	110.363	117.795	132.457	7.59	0.200	1.422
139 La	7/2	14.126	28.259	42.370	56.496	70.606	84.746	98.879	105.935	113.068	127.142	99.91	0.177	16.553
9 Be	-3/2	14.052	28.112	42.148	56.201	70.237	84.303	98.363	105.381	112.478	126.478	100.0	0.175	16.310
17 O	-5/2	13.556	27.121	40.662	54.219	67.761	81.331	94.895	101.666	108.513	122.019	0.038	0.157	0.006
138 La	5	13.194	26.396	39.576	52.771	65.951	79.158	92.360	98.950	105.613	118.759	0.09	0.144	0.012
133 Cs	7/2	13.116	26.240	39.342	52.459	65.560	78.690	91.813	98.365	104.989	118.056	100.0	0.142	13.264
123 Sb	7/2	12.959	25.925	38.870	51.829	64.774	77.746	90.712	97.185	103.729	116.640	42.79	0.137	5.474
181 Ta	7/2	11.990	23.986	35.963	47.953	59.929	71.931	83.927	89.916	95.971	107.916	99.988	0.108	10.131
175 Lu	7/2	11.404	22.815	34.206	45.611	57.002	68.418	79.828	85.524	91.283	102.645	97.41	0.093	8.493
137 Ba	3/2	11.113	22.232	33.333	44.446	55.547	66.671	77.790	83.341	88.953	100.025	11.23	0.086	0.906
153 Eu	5/2	10.980	21.966	32.934	43.915	54.883	65.874	76.860	82.344	87.889	98.829	52.18	0.083	4.060
10 B	3	10.744	21.493	32.225	42.969	53.701	64.456	75.206	80.572	85.998	96.702	19.9	0.078	1.451
15 N	-1/2	10.137	20.279	30.405	40.542	50.668	60.815	70.957	76.020	81.140	91.239	0.368	0.066	0.023
50 V	6	9.970	19.946	29.906	39.876	49.836	59.816	69.792	74.772	79.807	89.741	0.25	0.062	0.015

(Continued on page 4)

The Leader in Design. The Leader in Performance.

The Table of NMR Frequencies* (By Frequency) (Continued)

Isotope	Spin	2.35 T	4.70 T	7.05 T	9.39 T	11.74 T	14.09 T	16.45T	17.61T	18.80T	21.14T	Natural abundance	Relative sensitivity	Absolute sensitivity
135 Ba	3/2	9.934	19.874	29.798	39.733	49.656	59.601	69.541	74.503	79.520	89.418	6.592	0.062	0.380
35 Cl	3/2	9.798	19.601	29.389	39.187	48.974	58.782	68.586	73.479	78.427	88.189	75.78	0.059	4.190
85 Rb	5/2	9.655	19.316	28.961	38.616	48.261	57.926	67.586	72.409	77.285	86.904	72.17	0.057	3.818
91 Zr	-5/2	9.296	18.598	27.884	37.181	46.467	55.773	65.074	69.717	74.412	83.674	11.22	0.050	0.527
61 Ni	-3/2	8.936	17.877	26.804	35.740	44.666	53.611	62.552	67.016	71.529	80.432	1.134	0.045	0.048
169 Tm	-1/2	8.290	16.585	24.866	33.156	41.437	49.735	58.030	62.171	66.357	74.617	100.0	0.036	3.350
131 Xe	3/2	8.245	16.494	24.730	32.976	41.211	49.465	57.714	61.832	65.996	74.211	21.18	0.035	0.698
37 Cl	3/2	8.156	16.316	24.463	32.619	40.766	48.930	57.090	61.164	65.283	73.408	24.22	0.034	0.772
176 Lu	7	8.131	16.267	24.389	32.520	40.642	48.781	56.917	60.978	65.085	73.186	2.59	0.034	0.082
21 Ne	-3/2	7.895	15.794	23.680	31.574	39.460	47.363	55.262	59.205	63.192	71.057	0.27	0.031	0.008
189 Os	3/2	7.765	15.535	23.292	31.058	38.815	46.588	54.358	58.236	62.158	69.895	16.15	0.029	0.445
33 S	3/2	7.676	15.356	23.024	30.700	38.368	46.052	53.732	57.566	61.443	69.090	0.76	0.028	0.020
14 N	1	7.226	14.457	21.675	28.902	36.120	43.354	50.584	54.194	57.843	65.043	99.632	0.024	2.211
43 Ca	-7/2	6.730	13.464	20.187	26.917	33.639	40.376	47.110	50.471	53.870	60.575	0.135	0.019	0.002
97 Mo	-5/2	6.654	13.311	19.958	26.612	33.258	39.919	46.576	49.899	53.260	59.889	9.55	0.019	0.165
201 Hg	-3/2	6.611	13.227	19.831	26.442	33.047	39.665	46.280	49.582	52.921	59.508	13.18	0.018	0.224
67 Zn	5/2	6.257	12.517	18.767	25.024	31.274	37.537	43.798	46.923	50.083	56.316	4.1	0.015	0.059
95 Mo	5/2	6.157	12.317	18.468	24.625	30.775	36.938	43.099	46.174	49.283	55.417	15.92	0.017	0.259
25 Mg	-5/2	6.122	12.247	18.362	24.484	30.599	36.726	42.852	45.909	49.001	55.010	10	0.014	0.135
40 K	-4	5.802	11.607	17.403	23.205	29.001	34.809	40.614	43.512	46.442	52.223	0.012	0.012	0.000
53 Cr	-3/2	5.653	11.308	16.955	22.607	28.254	33.912	39.568	42.391	45.245	50.877	9.501	0.011	0.101
49 Ti	-7/2	5.639	11.281	16.914	22.554	28.187	33.831	39.474	42.290	45.138	50.756	5.41	0.011	0.057
47 Ti	-5/2	5.638	11.278	16.910	22.548	28.179	33.822	39.463	42.279	45.126	50.743	7.44	0.011	0.078
143 Nd	-7/2	5.450	10.903	16.347	21.797	27.241	32.697	38.150	40.872	43.624	49.054	12.18	0.010	0.116
101 Ru	-5/2	5.161	10.326	15.481	20.643	25.799	30.965	36.130	38.708	41.314	46.456	17.06	0.009	0.138
89 Y	-1/2	4.900	9.803	14.698	19.598	24.493	29.398	34.301	36.749	39.224	44.106	100.0	0.007	0.692
173 Yb	-5/2	4.821	9.645	14.461	19.282	24.097	28.923	33.747	36.155	38.590	43.393	16.12	0.007	0.106
163 Dy	5/2	4.820	9.643	14.458	19.278	24.092	28.917	33.740	36.147	38.582	43.384	24.97	0.007	0.164
39 K	3/2	4.666	9.336	13.997	18.663	23.325	27.996	32.665	34.996	37.352	42.002	93.258	0.006	0.557
109 Ag	-1/2	4.654	9.310	13.958	18.612	23.260	27.919	32.575	34.899	37.249	41.886	48.161	0.006	0.285
99 Ru	-3/2	4.605	9.213	13.813	18.418	23.019	27.628	32.236	34.536	36.862	41.450	12.76	0.006	0.073
105 Pd	-5/2	4.576	9.155	13.726	18.302	22.873	27.454	32.033	34.318	36.629	41.189	22.33	0.006	0.126
87 Sr	-9/2	4.334	8.670	12.999	17.333	21.662	26.000	30.337	32.501	34.690	39.008	7	0.005	0.033
147 Sm	-7/2	4.170	8.342	12.508	16.678	20.843	25.018	29.190	31.273	33.379	37.533	14.97	0.005	0.064
183 W	1/2	4.166	8.335	12.497	16.664	20.825	24.996	29.165	31.246	33.350	37.501	14.31	0.005	0.061
107 Ag	-1/2	4.048	8.098	12.141	16.189	20.233	24.285	28.335	30.357	32.401	36.434	51.839	0.004	0.202
157 Gd	-3/2	4.030	8.062	12.088	16.118	20.144	24.178	28.210	30.223	32.258	36.273	15.65	0.004	0.060
177 Hf	7/2	4.007	8.016	12.019	16.026	20.029	24.040	28.049	30.050	32.074	36.066	18.6	0.004	0.070
83 Kr	-9/2	3.848	7.697	11.541	15.389	19.232	23.083	26.933	28.855	30.798	34.631	11.49	0.004	0.038
73 Ge	-9/2	3.488	6.979	10.463	13.952	17.436	20.928	24.418	26.161	27.922	31.398	7.73	0.003	0.019
149 Sm	-7/2	3.440	6.882	10.318	13.758	17.195	20.638	24.080	25.798	27.535	30.963	13.83	0.003	0.033
161 Dy	-5/2	3.440	6.882	10.318	13.758	17.195	20.638	24.080	25.798	27.535	30.963	18.88	0.003	0.045
145 Nd	-7/2	3.360	6.722	10.078	13.438	16.795	20.158	23.520	25.198	26.895	30.243	8.3	0.002	0.019
57 Fe	1/2	3.238	6.477	9.712	12.950	16.184	19.425	22.664	24.282	25.917	29.143	2.119	0.002	0.004
103 Rh	-1/2	3.186	6.375	9.558	12.744	15.927	19.117	22.305	23.897	25.506	28.681	100.0	0.002	0.190
155 Gd	-3/2	3.070	6.142	9.208	12.279	15.345	18.418	21.490	23.023	24.574	27.632	14.73	0.002	0.025
167 Er	-7/2	2.880	5.762	8.639	11.519	14.395	17.278	20.160	21.599	23.053	25.922	22.95	0.002	0.032
41 K	3/2	2.561	5.124	7.683	10.244	12.803	15.367	17.929	19.209	20.502	23.054	6.730	0.001	0.000
179 Hf	-9/2	2.517	5.035	7.550	10.067	12.581	15.101	17.619	18.876	20.147	22.655	13.62	0.001	0.013
187 Os	1/2	2.282	4.566	6.846	9.128	11.408	13.693	15.976	17.116	18.269	20.543	1.96	0.001	0.001
193 Ir	3/2	1.871	3.743	5.612	7.483	9.352	11.225	13.097	14.032	14.976	16.840	62.7	0.000	0.024
235 U	7/2	1.841	3.684	5.523	7.365	9.204	11.047	12.890	13.810	14.739	16.574	0.72	0.000	0.000
197 Au	3/2	1.729	3.459	5.186	6.915	8.642	10.373	12.103	12.967	13.840	15.562	100.0	0.000	0.031
191 Ir	3/2	1.718	3.437	5.153	6.871	8.587	10.307	12.026	12.884	13.752	15.463	37.3	0.000	0.011

*Based on "Provisional Recommendations for NMR Nomenclature:Nuclear Spin Properties and Conventions Chemical Shifts", Commission I.5, Molecular Structure and Spectroscopy, IUPAC, Nov. 2001

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