Presenting Data in Tables

TABLE III. Caption of a fictitious table illustrating the types of problems that may arise in preparing tables as part of a manuscript. *

Author	Renormalized atom ρ_{1s}	Renormalized atom ρ_{2s}	T (s)	Cross section ($10^{-\wedge}$ cm^2)	Assignment
Clement[a]	11.2888	2.420 300	55 019	1.383 ± 0.002	ν_{11}, CH_2 wag
Roth et al.[b]	9.5992	2.420 300	43 300	1.389 ± 0.006	ν_{16}, SiH stretch
Manchester[c]	10	...[d]	9 502	...[d]	Lattice vibration
Stark and Auluch[e]	9.0933	2.942 2	47 226	0.98 ± 0.03	a = 32, c = 4.9
This work	10.04	2.788 84	21 736	0.87 ± 0.01	$\nu_9 - \nu_{17} = 241$, CH_3 symmetric deformation

[a] Michael J. Clement, J. Phys. Solids 28, 16–21 (1967).
[b] Reference 9.
[c] References 11 and 13.
[d] See Table II and Ref. 4.
[e] Reference 15.

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* *from* the AIP Style Manual, 4th ed.

Tables are usually used to present exact numerical data

- Use tables to present sets of data concisely and efficiently
- Arrange columns and rows to show trends or reveal relationships
- Most tables will have at least three columns

"Tables" having fewer than three columns are more precisely called a "box," but I digress

Think about how the reader is going to use your data

Table I. The *trans* contents of polyacetylene prepared at different temperatures. Catalyst: $Ti(O\text{-}n\text{-}C_4H_9)_4\text{-}(C_2H_5)_3Al$, Ti/Al=4, [Ti]=10 mmol/l.

Temperature (°C)	*trans* content (%)
150	100.0
100	92.5
50	67.6
18	40.7
0	21.4
–18	4.6
–78	1.9

Do you want to simply show a trend or relationship? A plot might be better. Present data in a table if the reader will want to know exact numerical values.

Follow AIP formatting style

header / data

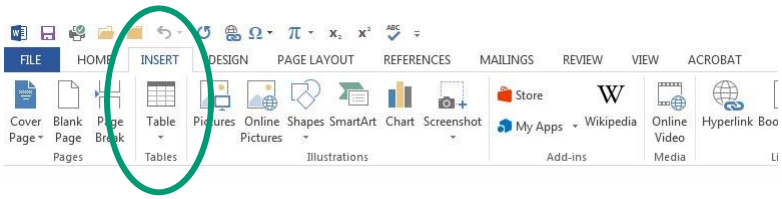
Category	ε (%)	*w* (%)	Δ*w* (%)	*Q* (%)
Lepton	10.9	8.9	0.9	7.4
Kaon	35.8	17.6	–1.9	15.0

Double line at top and bottom of the table

Single line separating header row from data

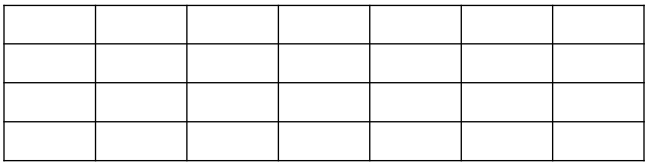
No vertical lines; no internal horizontal lines

Follow AIP formatting style—how to do it in Word:



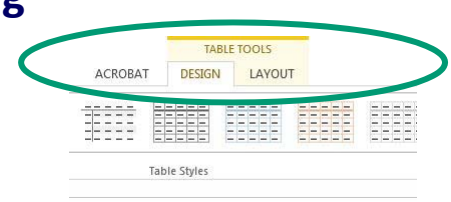
Find the "Insert" tab and click on "Table"

Highlight the cells in the drop-down box to specify the number of columns and rows, and Word draws your table



The Word default is to put single lines around every cell in the table and to make every cell the same height and width

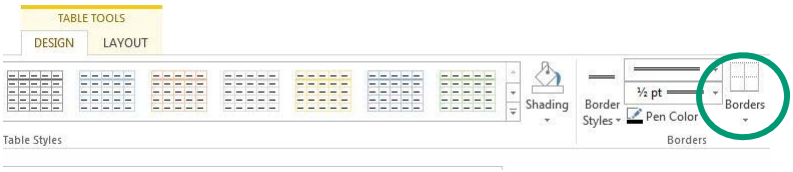
To impose AIP border rules on MS, do the following



Find the “Table Tools” tab; it should open up if you put your cursor in the table you just created

Activate the “Design” tab

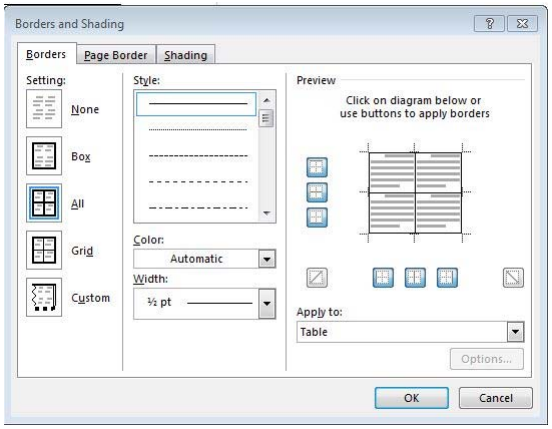
Next find the “Borders” drop down menu at the right of the ribbon



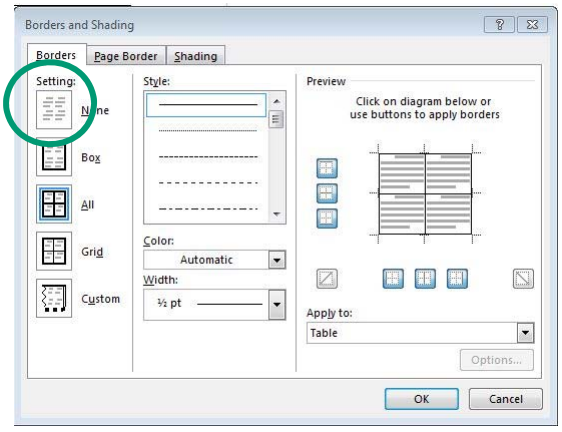
Click on the down arrow to open the menu

Click on the last item on the menu, “Borders and Shading” to open a dialog box

Here's the dialog box:

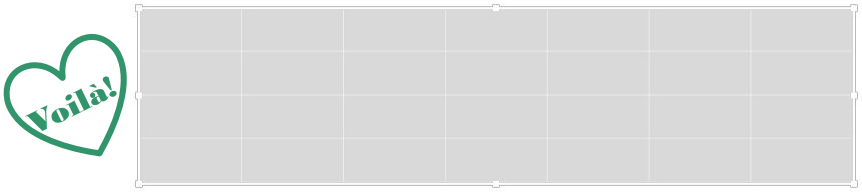


First, get rid of the default borders



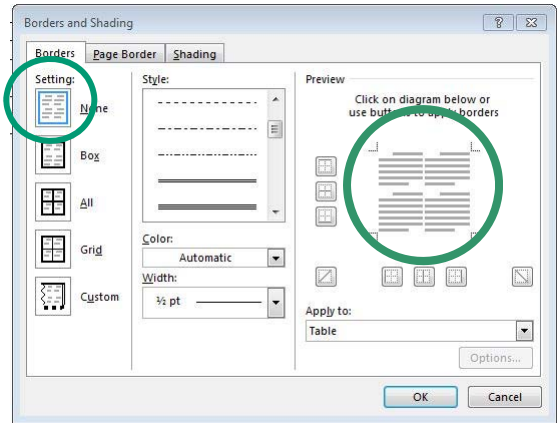
Find the "None" option and click on it

Now you've got *no* borders

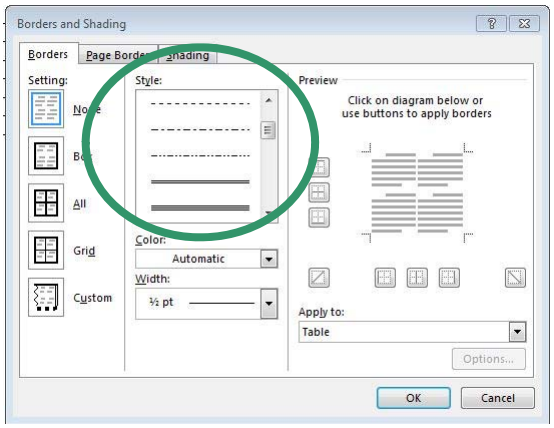


Use the dialog box to redraw the borders

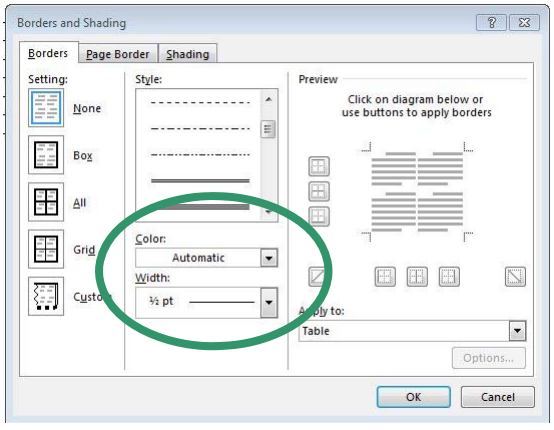
Now you've got *no* borders



Use the sliders to choose the border style and weight

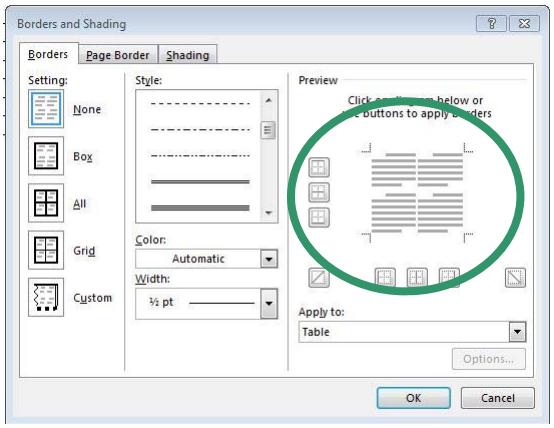


Use the sliders to choose the border style and width of the line

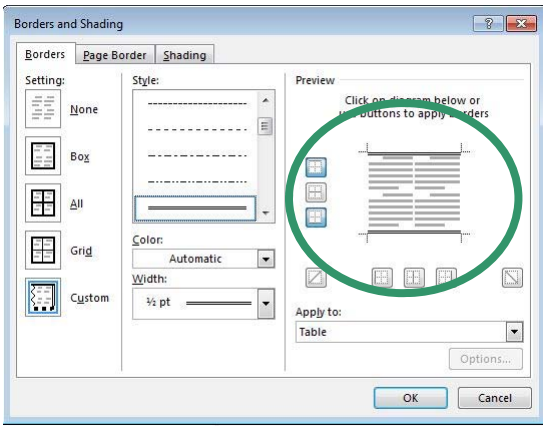


Even the color of the lines if you want to get fancy

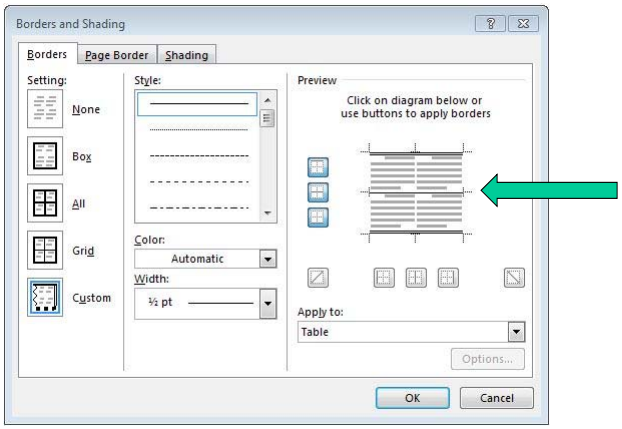
You can also add and erase borders by clicking on the desired line in the diagram



First add your top and bottom double lines



Then underline your header row



Tables must have a concise title and be consecutively numbered

- The title should *stand alone*
  (be understandable without referring to the text)
- The title is placed *above* the table
- Tables are numbered in consecutive order as they are called out in the text
- Use a consistent numbering style for all tables (all Roman or all Arabic numerals)
  - If a style is not specified by the publisher, use Roman numerals (I, II, III) for tables and Arabic numerals (1, 2, 3) for figures

Provide a clear concise heading for each column and include units

- Put the name of the thing that was measured on the first line
- Put the unit of measure immediately beneath it or to the right of it

Participant	Age, yr	Height, cm	Weight, kg
James	10.1	125	46
Herco	8.7	110	39
Sam	9.3	117	62

- It is not sufficient to put only the parameter, or only the unit—you must provide both

Follow standard conventions

- First column on the left is the "samples"
- Other vertical columns are the "parameters" that were measured
- Provide a clear, concise heading for each column; a unit of measure by itself is *not* sufficient
- Indicate "data not taken" by a raised ellipsis (⋯)—no blank cells
- Use *SI* units of measure
- Use units that give values near unity; powers of 10 should not be needed for most entries
- Align numbers by the decimal point

What's wrong with this table?

TABLE I. Lattice parameters, cell volume, total energy, and formation energy of the seven structures, compared with c-BN and graphite.

Structure	1	2	3	4	5	6	7	c-BN	Graphite
a (Å)	3.572	3.570	3.589	3.596	3.931	3.690	3.604	3.595	2.460
b (Å)	3.607	3.566	3.589	3.598	3.593	3.690	3.604	3.595	
c (Å)	3.572	3.610	3.635	3.596	3.931	3.691	4.126	3.595	6.800
α (°)	90	90	90	89.77	78.26	85.92	78.40	90	90
β (°)	90.58	90	90	90.47	102.53	94.07	101.60	90	90
γ (°)	90	90	90	90.23	101.74	94.29	90.35	90	120
Symmetry	$Pmm2$	$P222_1$	$P\bar{4}m2$	Cm	Cm	C2	$C2/m$	$F\bar{4}3m$	$P6_3/mmc$
Volume (Å^3)	46.008	45.964	46.829	46.540	49.016	49.875	51.384	46.462	35.638
E_t (eV/atom)	−165.59	−165.58	−165.12	−165.23	−165.30	−165.21	−165.48	−176.20	−155.96
E_f (eV/atom)	0.390	0.395	0.853	0.744	0.679	0.769	0.495		

It's off by 90°!

Why are some values in whole numbers and others are given to three decimal places???

Numbers not aligned by the decimal point

How are the bottom values related to the top values???

Present information concisely and unambiguously

TABLE I. Characteristics of field-linked states and the photoassociation yield subject to an $\mathcal{E} = 15$ V/cm ac electric field, at a collision energy $E = 100$ μK. Numbers in parentheses denote the power of 10 by which the numbers are to be multiplied.

$\mathcal{E}$ kV/cm	ΔE K	Γ μK		γ μK	K_{loss} cm^3/s	
0		$a = 69$	$a = -400$		$a = 69$	$a = -400$
2	4.3(−3)	4.3(−1)	1.1(−1)	90.9	7.4(−12)	1.9(−12)
	2.1(−4)	3.6(−1)	6.5(−3)	10.1	5.3(−11)	1.0(−12)
4	2.5(−2)	1.3(−2)	1.6(−1)	2691.2	7.4(−15)	9.3(−14)
	5.1(−3)	1.5(−3)	1.5(−1)	719.3	3.2(−15)	3.3(−13)
	4.5(−4)	3.3(−7)	5.4(−2)	90.0	5.8(−18)	9.5(−13)
8	2.3(−2)	12.0	4.4(−2)	225.7	7.6(−11)	3.1(−13)
	4.6(−3)	5.2(−3)	1.3(−2)	29.6	2.8(−13)	6.9(−13)
	4.4(−4)	1.3(−3)	3.5(−3)	10.6	1.9(−13)	5.2(−13)
10	3.3(−2)	7.2(−5)	1.1(−2)	8850.1	1.3(−17)	1.9(−15)
	7.5(−3)	1.6(−4)	4.8(−3)	2383.0	1.0(−16)	3.2(−15)
	9.8(−4)	6.8(−5)	1.4(−3)	580.2	1.9(−16)	3.9(−15)

What's wrong with this table?*

TABLE I. Columns 2–5, total energy (with respect to the TM^{2+} configuration) in eV, of $Zn_{15/16}TM_{1/16}O_{1-y}N_y$ for TM^{2+}, TM^{3+}, TM^{4+}, and LSD configurations, with TM = Mn or Co and $y = 0$, 1/16, and 2/16. Column 6, the Fermi level (with respect to the VBM) as obtained in the TM^{3+} configuration. Column 7, the donor level (+/0) with respect to the VBM (given in eV).

	Mn^{2+}	Mn^{3+}	Mn^{4+}	Mn^{7+}	ϵ_F (d^4)	Mn(+/0)
y=0	**0.00**	0.52	1.10	3.01	3.22	2.70
y=1/16	0.00	**−1.77**	−1.18		1.28	3.04
y=2/16	0.00	**−1.20**	−1.15		0.60	1.80
	Co^{2+}	Co^{3+}	Co^{4+}	Co^{9+}	ϵ_F (d^6)	Co(+/0)
y=0	**0.00**	0.64	1.34	5.66	3.51	2.87
y=1/16	0.00	**−1.59**	−0.94		1.06	2.64
y=2/16	0.00	**−1.73**	−1.51		0.54	2.27

Tables should "stand alone"—a reader should be able to understand the data being presented in the table without referring to the text

***Hint: What is TM^{2+}, LSD, VBM, TM^{3+}?**

What's wrong with this table?

TABLE I. The FLAPW calculated total energy (relative to the lowest energy *N*440 FM case), the AFM and FM energy difference, for the different Mn locations from the $Ge_{62}Mn_2$ supercell. One Mn is put at (0, 0, 0), while the other is listed in the table. The expression of exchange constants for the AFM and FM energy difference is listed in the last column.

System	Mn2 position (a)	Mn-Mn dist (Å)	E_{FM} (meV/Mn)	E_{AFM} (meV/Mn)	$E_{AFM} - E_{FM}$ (meV/Mn)	$= \sum J(r)$
*N*111	(1/4, 1/4, 1/4)	2.45	290.3	2.7	−287.6	J_{111}
*N*220	(1/2, 1/2, 0)	4.00	12.2	93.6	81.4	J_{220}
*N*400	(1, 0, 0)	5.66	67.9	45.5	−22.4	$2J_{400}$
*N*224	(1/2, 1/2, 1)	6.93	75.9	68.8	−7.1	$2J_{224}$
*N*440	(1, 1, 0)	8.00	0	103.1	103.1	$4J_{440}$
*N*444	(1, 1, 1)	9.80	106.8	69.3	−37.5	$8J_{444}$

Once again, the table doesn't "stand alone"; what is FLAPW? AFM? FM?

Read the second sentence: "One Mn (manganese atom) is put at (0,0,0), while the other is listed in the table."

In general, table titles should be shorter than the table itself

TABLE I. Simulated unit-cell parameters, computational cell sizes, and numbers of molecules and atoms in simulations for pentane, heptane, and nonane monolayers. Note that an asterisk (*) refers to a fully commensurate monolayer, in which cell parameters are taken from experimental work (Ref. 10). Other cell parameters are those proposed by Matthies (Ref. 6). Initial HB rotations for those monolayers given by Matthies is ±3° and ±6° for the C5 and C7 monolayers, respectively.

	a(Å)	b(Å)	Cell size (Å)	N_m	N_a
Pentane	16.98	4.66	67.92×74.56	128	640
Pentane*	17.1	4.26	68.88×68.3	128	640
Heptane	21.9	4.57	65.7×73.12	96	672
Heptane*	22.0	4.26	66.0×76.68	108	756
Nonane*	27.0	4.26	81.0 X 68.16	96	864

Putting references in table titles is considered by some editors to be bad form

Tables can also be used informally to organize and present non-numeric information

- Categorize technical information
- Itemize important points
- Show steps in a process
- List specific characteristics

Here's an example of an "itemize-important-points" box table—

TABLE I. Schematic stack sequence of a monolithic, two-wavelength QC laser with integrated resonant optical nonlinearities. Under operation electrons are traversing the stack from top to bottom. Thin (typically ~25 nm) transition regions were inserted between individual building blocks to smooth out band discontinuities.

Layer type, doping level, and function	Thickness (μm)
InGaAs, 6×10^{18} cm^{-3}, outermost top waveguide cladding layer	0.5
AlInAs, 2×10^{17} cm^{-3}, top waveguide cladding layer	0.8
AlInAs, 1×10^{17} cm^{-3}, inner top waveguide cladding layer	2.8
InGaAs, 3×10^{16} cm^{-3}, top waveguide core layer	0.2
19 QC-laser active regions and injectors for emission at 9.5 μm wavelength [16], 1.9×10^{11} cm^{-2} per period	0.95
27-period modulated SL, 3×10^{16} cm^{-3}, includes resonant IS	0.22
16 QC-laser active regions and injectors for emission at 7.1 μm wavelength [16], 2.0×10^{11} cm^{-2} per period, includes resonant IS nonlinearity for SFG and SHG	0.75
InGaAs, 5×10^{16} cm^{-3}, buffer and bottom waveguide core layer	0.5
InP substrate, $\leq 4 \times 10^{17}$ cm^{-3}, bottom waveguide cladding	~200

It's more concise and easier for the reader to find what he wants to know than sifting through running text

Here's another one:

TABLE II. Material parameters for $Ba_2YCu_3O_{6.9}$. "GL" denotes Ginzburg-Landau.

Measured parameters	
Transition temperature midpoint	$T_c = 92.5$ K
Resistivity in the normal state	$\rho_{300} = 600-700\ \mu\Omega$ cm
	$\rho_{95} = 200-250\ \mu\Omega$ cm
Lower critical field slope	$dH_{c1}/dT = -7$ Oe K^{-1}
Upper critical field slope[a]	$dH_{c2}/dT = -13$ kOe K^{-1}
Critical current density (77 K, $H = 0$)	$j_c > 1100$ A cm^{-2}
Dominant carrier type (300 K)	p type
Derived parameters	
Sommerfeld parameter	$\gamma = 3-5$ mJ (mole Cu)$^{-1}$ K^{-2}
GL coherence length	$\xi(0) \sim 22$ Å
GL penetration depth	$\lambda(0) \sim 1400$ Å
GL κ	$\kappa \sim 62$
Thermodynamic critical field	$H_c(0) = 10 \pm 2$ kOe

[a]Reference 6.

Always consider what your audience wants to know, and make that information easy to find

Use footnotes for explanatory info

- Use superscript Roman letters in alphabetical order, e.g., [a,b,c], to number footnotes in a table, beginning again with [a] for subsequent tables
- Footnote callouts are ordered from left to right across the top row, then left to right across the second row
- Footnotes themselves are placed outside and just beneath the table, not at the bottom of the page of text
- Nonstandard abbreviations or symbols used in tables may be defined in footnotes

Here's an example of a properly footnoted table

TABLE I. Some structural parameters of Cu-DTH above and below the phase transition.

	$T = 300$ K	$T = 120$ K (chain 1)	$T = 120$ K (chain 2)
∠(Cl-Cu-Cl;S-Cu-S)[a]	37.16°	37.31°	35.29°
∠(S-Cu-S; **b**)[b]	17.87°	17.73°	10.92°
$\angle(\mathrm{Cu}\cdots\mathrm{Cu};\ \mathrm{S\text{-}C})_{\mathrm{intra}}$[c]	24.17°	29.44°	18.79°
Cu···Cu (intradimer)	3.948 Å	3.817 Å	4.117 Å
$\angle(\mathrm{Cu}\cdots\mathrm{Cu};\ \mathrm{S\text{-}C})_{\mathrm{inter}}$	7.28°	9.64°	11.51°
Cu···Cu (interdimer)	5.058 Å	4.956 Å	4.647 Å
S···S[d]	3.856 Å	3.629 Å	3.686 Å

[a]angle between the normal of the Cl-Cu-Cl plane and the S-Cu-S plane.
[b]angle between the normal of the S-Cu-S plane and **b**. The angle between the S-Cu-S planes of chain 1 and chain 2 is 8.34°.
[c]angle between the vector connecting the Cu ions and the S-CH_3 bond axis.
[d]$S(1)\cdots S(2^{iv})$ and $S(3)\cdots S(4^{iv})$ for chain 1 and 2, respectively, denote the shortest interchain contacts.

Place tables at the top or the bottom of the page, *after* they are mentioned in the text

Wide tables may extend across two columns of text

Very large tables should be positioned vertically, with the right edge of the table running along the top of the page

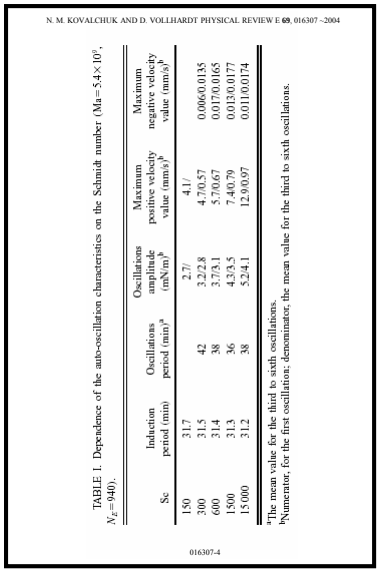


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TABLE I. Dependence of the auto-oscillation characteristics on the Schmidt number ($Ma=5.4\times10^3$, $N_g=940$).

Sc	Induction period (min)	Oscillations period (min)[a]	Oscillations amplitude (mN/m)[b]	Maximum positive velocity value (mm/s)[b]	Maximum negative velocity value (mm/s)[b]
150	31.7		2.7/	4.1/	
300	31.5	42	3.2/2.8	4.7/0.57	0.006/0.0135
600	31.4	38	3.7/3.1	5.7/0.67	0.017/0.0165
1500	31.3	36	4.3/3.5	7.4/0.79	0.013/0.0177
15 000	31.2	38	5.2/4.1	12.9/0.97	0.011/0.0174

[a]The mean value for the third to sixth oscillations.
[b]Numerator, for the first oscillation; denominator, the mean value for the third to sixth oscillations.

016307-4

Proofread all elements of your table

TABLE III. The ground state energy (in units of t) of the Hubbard-Peierls model as a function of the number of sites, N. $\omega=t$, $U=2.5t$, $V=U/4$, and $g=0.1$.

	Number of oscillator levels per site.						
N	1	2	3	4	5	6	7
16	−23.072	−23.506	−23.635	−23.668	−23.684	−23.685	−23.685
24	−34.859	−35.559	−35.775	−35.830	−35.860	−35.862	−35.862
40	−58.440	−59.671	−60.058	−60.162	−60.215	−60.220	−60.221

Avoid awkward line breaks

To recap…

- **Consider your audience—how are they going to use the data, and how are they going to find it in the paper?**
- **Call out tables first in the text and number them consecutively**
- **Use standard formatting conventions**
- **Provide both the name of the parameter and the unit in the column headings**
- **Give the table a concise but meaningful title, and put it *above* the table**
- **Make sure the table "stands alone"**

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