

# Introductory Chemistry

SIXTH EDITION in SI Units

Nivaldo J. Tro



#### **Periodic Table of the Elements**

		GROUP								
		1A					1		Atomic nu	mber
	1	1 H 1.01 hydrogen	2 2A				H 1.01 hydrogen		Element sy Atomic ma	vmbol ss*
	2	3 Li 6.94 lithium	4 Be 9.01 beryllium						Element na	ame
	3	11 <b>Na</b> 22.99 sodium	12 Mg 24.31 magnesium	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B
PERIOD	4	19 K 39.10 potassium	20 Ca 40.08 calcium	21 Sc 44.96 scandium	22 Ti 47.88 titanium	23 V 50.94 vanadium	24 Cr 52.00 chromium	25 Mn 54.94 manganese	26 Fe 55.85 iron	27 Co 58.93 cobalt
	5	37 <b>Rb</b> 85.47 rubidium	38 Sr 87.62 strontium	39 Y 88.91 yttrium	40 Zr 91.22 zirconium	41 <b>Nb</b> 92.91 niobium	42 Mo 95.95 molybdenum	43 Tc (99) technetium	44 <b>Ru</b> 101.07 ruthenium	45 <b>Rh</b> 102.91 rhodium
	6	55 Cs 132.91 cesium	56 <b>Ba</b> 137.33 barium	57 La 138.91 lanthanum	72 <b>Hf</b> 178.49 hafnium	73 <b>Ta</b> 180.95 tantalum	74 W 183.85 tungsten	75 <b>Re</b> 186.21 rhenium	76 <b>Os</b> 190.23 osmium	77 <b>Ir</b> 192.22 iridium
	7	87 Fr (223) francium	88 <b>Ra</b> (226) radium	89 Ac (227) actinium	104 <b>Rf</b> (261) rutherfordium	105 <b>Db</b> (262) dubnium	106 Sg (263) seaborgium	107 <b>Bh</b> (262) bohrium	108 Hs (265) hassium	109 Mt (266) meitnerium
Lanthanide series			58 <b>Ce</b> 140.12 cerium	59 Pr 140.91 praseodymium	60 Nd 144.24 neodymium	61 <b>Pm</b> (147) promethium	62 Sm 150.36 samarium	63 Eu 151.97 europium		
Actinide series			90 Th (232) thorium	91 Pa (231) protactinium	92 U (238) uranium	93 Np (237) neptunium	94 <b>Pu</b> (244) plutonium	95 Am (243) americium		

\*The mass number of an important radioactive isotope—not the atomic mass is shown in parentheses for those elements with no stable isotopes.

Ν	<i>I</i> etals								
Ν	Metalloids							18 8A	
1	Nonmetals		13 3A	14 4A	15 5A	16 6A	17 7A	2 He 4.00 helium	
			5 <b>B</b> 10.81 boron	6 C 12.01 carbon	7 N 14.01 nitrogen	8 O 16.00 oxygen	9 F 19.00 fluorine	10 Ne 20.18 neon	
10 8B	11 1B	12 2B	13 Al 26.98 aluminum	14 <b>Si</b> 28.09 silicon	15 P 30.97 phosphorus	16 S 32.06 sulfur	17 Cl 35.45 chlorine	18 Ar 39.95 argon	
28 Ni 58.69 nickel	29 Cu 63.55 copper	30 Zn 65.39 zinc	31 Ga 69.72 gallium	32 Ge 72.63 germanium	33 As 74.92 arsenic	34 <b>Se</b> 78.97 selenium	35 Br 79.90 bromine	36 Kr 83.80 krypton	
46 <b>Pd</b> 106.42 palladium	47 Ag 107.87 silver	48 Cd 112.41 cadmium	49 <b>In</b> 114.82 indium	50 <b>Sn</b> 118.71 tin	51 <b>Sb</b> 121.75 antimony	52 <b>Te</b> 127.60 tellurium	53 I 126.90 iodine	54 Xe 131.29 xenon	
78 Pt 195.08 platinum	79 Au 196.97 gold	80 Hg 200.59 mercury	81 Tl 204.38 thallium	82 <b>Pb</b> 207.2 lead	83 Bi 208.98 bismuth	84 Po (209) polonium	85 At (210) astatine	86 <b>Rn</b> (222) radon	
110 Ds (281) darmstadtium	111 <b>Rg</b> (280) roentgenium	112 Cn (285) copernicium	113 <b>Nh</b> (284) nihonium	114 Fl (289) flerovium	115 <b>Mc</b> (289) moscovium	116 Lv (293) livermorium	117 <b>Ts</b> (294) tennessine	118 Og (294) oganesson	
46 Pd 106.42 palladium 78 Pt 195.08 platinum 110 Ds (281)	47 Ag 107.87 silver 79 Au 196.97 gold 111 <b>Rg</b> (280)	48 Cd 112.41 cadmium 80 Hg 200.59 mercury 112 Cn (285)	49 In 114.82 indium 81 Tl 204.38 thallium 113 Nh (284)	50 Sn 118.71 tin 82 Pb 207.2 lead 114 Fl (289)	51 Sb 121.75 antimony 83 Bi 208.98 bismuth 115 Mc (289)	52 Te 127.60 tellurium 84 Po (209) polonium 116 Lv (293)	53 I 126.90 iodine 85 At (210) astatine 117 Ts (294)	54 Xe 131.29 xenon 86 Rn (222) radon 118 Og (294)	

65	66	67	68	69	70	71
Tb	Dy	Но	Er	Tm	Yb	Lu
158.93 terbium	162.50 dysprosium	164.93 holmium	167.26 erbium	168.93 thulium	173.04 ytterbium	174.97 lutetium
97	98	99	100	101	102	103
Bk	Cf	Es	Fm	Md	No	Lr
(247) berkelium	(251) californium	(252) einsteinium	(257) fermium	(258) mendelevium	(259) nobelium	(260) lawrencium
	<b>Tb</b> 158.93 terbium 97 <b>Bk</b> (247)	Tb Dy   158.93 162.50   terbium 97   97 98   Bk Cf   (247) (251)	TbDyHo158.93 terbium162.50 dysprosium164.93 holmium979899BkCfEs(247)(251)(252)	TbDyHoEr158.93162.50164.93167.26terbiumdysprosiumholmiumerbium979899100BkCfEsFm(247)(251)(252)(257)	TbDyHoErTm158.93 terbium162.50 dysprosium164.93 holmium167.26 erbium168.93 thulium979899100101BkCfEsFmMd(247)(251)(252)(257)(258)	TbDyHoErTmYb158.93 terbium162.50 dysprosium164.93 holmium167.26 erbium168.93 thulium173.04 ytterbium979899100101102 NoBkCfEsFmMdNo (247)1051)(252)(257)(258)(259)

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## INTRODUCTORY CHENISTRY SIXTH EDITION in SI Units

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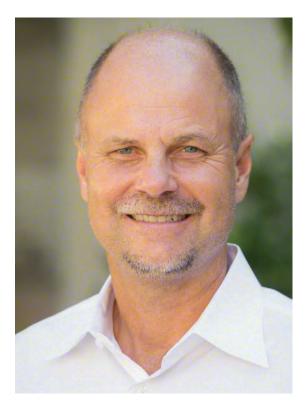
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### **About the Author**



**Nivaldo Tro** has been teaching college Chemistry since 1990. He received his Ph.D. in chemistry from Stanford University for work on developing and using optical techniques to study the adsorption and desorption of molecules to and from surfaces in ultrahigh vacuum. He then went on to the University of California at Berkeley, where he did postdoctoral research on ultrafast reaction dynamics in solution. Professor Tro has been awarded grants from the American Chemical Society Petroleum Research Fund, from the Research Corporation, and from the National Science Foundation to study the dynamics of various processes occurring in thin adlayer films adsorbed on dielectric surfaces. Professor Tro lives in Santa Barbara with his wife, Ann, and their four children, Michael, Ali, Kyle, and Kaden. In his leisure time, Professor Tro enjoys mountain biking, surfing, and being outdoors with his family.

To Annie

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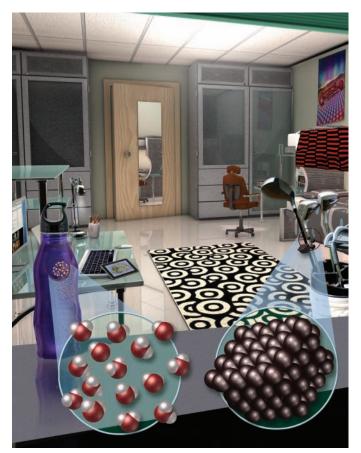
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