

Electron Configurations

- Electrons are arranged around the nucleus in a regular order. The first electrons fill the energy sublevel closest to the nucleus.
- Electrons continue filling each sublevel until it is full and start filling the next closest sublevel.
- A partial list of sublevels in order of increasing energy is:
 - $1s < 2s < 2p < 3s < 3p < 4s < 3d < 4p < 5s < 4d \dots$

Writing Electron Configurations

- First, determine how many electrons are in the atom. Iron (Fe) has 26 electrons.
- Arrange the energy sublevels according to increasing energy:
– $1s\ 2s\ 2p\ 3s\ 3p\ 4s\ 3d\ \dots$
- Fill each sublevel with electrons until you have used all the electrons in the atom:
– Fe: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^6$
- The sum of the superscripts equals the atomic number of iron (26)

Blocks and Sublevels

- We can use the periodic table to predict which sublevel is being filled by a particular element.

Preview Page 16

	1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
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1
1s

2
← 2s →

3
← 3s →

4
← 4s →

5
← 5s →

6
← 6s →

7
← 7s →

3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIII	9 VIII	10 VIII	11 IB	12 IIB
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← 3d →

← 4d →

← 5d →

← 6d →

← 2p →

← 3p →

← 4p →

← 5p →

← 6p →

← 7p →

← 4f →														
← 5f →														

Representative s-block elements

Transition d-block elements

Representative p-block elements

Inner Transition f-block elements

Ionization Energy Trend

Preview from Notesale.co

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	1 IA	2 IIA											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA																												
2	3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18																												
3	11 Na 22.99	12 Mg 24.31	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95																																						
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80																												
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (99)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29																												
6	55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)																												
7	87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (271)	111 — (272)	112 — (277)	114 — (285)	116 — (289)																																
<table><tr><td>58 Ce 140.12</td><td>59 Pr 140.91</td><td>60 Nd 144.24</td><td>61 Pm (147)</td><td>62 Sm 150.36</td><td>63 Eu 151.97</td><td>64 Gd 157.25</td><td>65 Tb 158.93</td><td>66 Dy 162.50</td><td>67 Ho 164.93</td><td>68 Er 167.26</td><td>69 Tm 168.93</td><td>70 Yb 173.04</td><td>71 Lu 174.97</td></tr><tr><td>90 Th 232.04</td><td>91 Pa (231)</td><td>92 U 238.03</td><td>93 Np (237)</td><td>94 Pu (244)</td><td>95 Am (243)</td><td>96 Cm (247)</td><td>97 Bk (247)</td><td>98 Cf (251)</td><td>99 Es (252)</td><td>100 Fm (257)</td><td>101 Md (258)</td><td>102 No (259)</td><td>103 Lr (260)</td></tr></table>																			58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (147)	62 Sm 150.36	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	90 Th 232.04	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)
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Ionization energy increases 

- This figure shows the first ionization trend for all elements

Assigned Readings

Chapter 4 – Section 4.7 (Pages 108-111)

Chapter 9 – Section 9.6 – 9.9 (Pages 295 – 312) (In Section 9.6, ignore shapes of orbitals and orbital diagrams)

End of Chapter Problems:

Chapter 4 – 81, 83, 85

Chapter 9 – 23, 25, 27, 45, 49, 53, 55, 57, 61, 63, 67, 73, 75, 77, 81, 85, 89, 93,