

TABLE 6 Electron Configurations of Atoms of Elements in the Fifth Period

Name	Symbol	Atomic number	Number of electrons in sublevels above 3d					Noble-gas notation
			4s	4p	4d	5s	5p	
Rubidium	Rb	37	2	6		1		*[Kr]5s ¹
Strontium	Sr	38	2	6		2		[Kr]5s ²
Yttrium	Y	39	2	6	1	2		[Kr]4d ¹ 5s ²
Zirconium	Zr	40	2	6	2	2		[Kr]4d ² 5s ²
Niobium	Nb	41	2	6	4	1		[Kr]4d ⁴ 5s ¹
Molybdenum	Mo	42	2	6	5	1		[Kr]4d ⁵ 5s ¹
Technetium	Tc	43	2	6	6	1		[Kr]4d ⁶ 5s ¹
Ruthenium	Ru	44	2	6	7	1		[Kr]4d ⁷ 5s ¹
Rhodium	Rh	45	2	6	8	1		[Kr]4d ⁸ 5s ¹
Palladium	Pd	46	2	6	10			[Kr]4d ¹⁰
Silver	Ag	47	2	6	10	1		[Kr]4d ¹⁰ 5s ¹
Cadmium	Cd	48	2	6	10	2		[Kr]4d ¹⁰ 5s ²
Indium	In	49	2	6	10	2	1	[Kr]4d ¹⁰ 5s ² 5p ¹
Tin	Sn	50	2	6	10	2	2	[Kr]4d ¹⁰ 5s ² 5p ²
Antimony	Sb	51	2	6	10	2	3	[Kr]4d ¹⁰ 5s ² 5p ³
Tellurium	Te	52	2	6	10	2	4	[Kr]4d ¹⁰ 5s ² 5p ⁴
Iodine	I	53	2	6	10	2	5	[Kr]4d ¹⁰ 5s ² 5p ⁵
Xenon	Xe	54	2	6	10	2	6	[Kr]4d ¹⁰ 5s ² 5p ⁶
*[Kr] = 1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 3d ¹⁰ 4s ² 4p ⁶								

SAMPLE PROBLEM BFor more help, go to the *Math Tutor* at the end of Chapter 5.

- a. Write both the complete electron-configuration notation and the noble-gas notation for iron, Fe.
- b. How many electron-containing orbitals are in an atom of iron? How many of these orbitals are completely filled? How many unpaired electrons are there in an atom of iron? In which sublevel are the unpaired electrons located?

SOLUTION

- a. The complete electron-configuration notation of iron is 1s²2s²2p⁶3s²3p⁶3d⁶4s². The periodic table inside the back cover of the text reveals that 1s²2s²2p⁶3s²3p⁶ is the electron configuration of the noble gas argon, Ar. Therefore, as shown in **Table 5**, iron's noble-gas notation is [Ar]3d⁶4s².
- b. An iron atom has 15 orbitals that contain electrons. They consist of one 1s orbital, one 2s orbital, three 2p orbitals, one 3s orbital, three 3p orbitals, five 3d orbitals, and one 4s orbital. Eleven of these orbitals are filled, and there are four unpaired electrons. They are located in the 3d sublevel. The notation 3d⁶ represents

