

CHEM MATTERS® PUZZLE

Sudoku by the (Chemical) Numbers

Sudoku puzzles are commonplace these days. *Here is a variant, with a chemical twist!*

Shown in the familiar 9x9 grid are 34 integers, 1 through 9. Your task is to find all 81, with each digit appearing exactly once in every row column, and 3x3 box .

Eighteen of those numbers can get entered by the clues shown below. Each clue is a number between 1 and 9, and each digit will be present exactly twice. They are shown in the grid by an alphabet letter a-t. (We are not using *l* or *o* to avoid any confusion.). If you think you know the answer to a given clue, enter it in its designated cell and check to see if it conforms. Just be warned that a misplaced number can sometimes make a puzzle unsolvable!

Deliberately, the 18 clues cover a wide range of chemical topics. Some are digits in constants, such as the speed of light. Others deal with groups and periods in the periodic table and their electron configurations. Still others are related to acid-base theory or redox reactions or organic chemistry. Enjoy!

THE CLUES

- a. The density of nitrogen gas at standard temperature and pressure (STP)
- b. The (positive) charge of the cuprous ion
- c. The pH of 0.001 Molar HNO_3
- d. The Celsius equivalent of 276 K
- e. The number of orbitals in any filled d subshell
- f. The number of moles of C_2H_6 in a 150-gram sample
- g. The atomic number of the smallest atom in Group 15
- h. The number of carbon atoms in a molecule of 3-methyl 2-ethyl butanol-1
- i. In the international system of units (SI), the metrix prefix *Giga* implies 1 followed by ? zeros
- j. The first digit in the Faraday constant (the charge on one mole of electrons)
- k. The number of neutrons in the nucleus of a tritium atom
- m. The third digit in Avogrado's number
- n. The number of electrons gained per chlorine atom as HClO_2 is reduced to hydrochloric acid
- p. The biggest value in electronegativity (Pauling scale) in the periodic table. (Hint: It is held by a halogen.)
- q. The number of unpaired electrons in the ground state of an atom of chromium
- r. The number of alkali metals in the periodic table. (Should we count hydrogen?)
- s. The ideal Gas Law constant R (when units are L-atm/mol K) is .0?2. What is the missing digit?
- t. The *next* noble gas beyond radon will have an atomic number of 11?. What is the missing digit?

Grid for the *ChemMatters* puzzle: “Sudoku by the (Chemical) Numbers”

			d					9
6			8		2			
	8	i				f	2	
		r		m		c		
	j						4	1
s		3						
	1	5		n			6	g
								2
		7					9	
	3	b			h		k	t
			5					
p	q			a				e
								3