

STRENGTH IN NUMBERS BRIDGE CLASS

CHEMISTRY: PARTS AND WHOLES

TEXTBOOK – *CHEMISTRY: THE CENTRAL SCIENCE*, BY BROWN, LEMAY, AND BURSTEN. 10TH EDITION.

Chemistry is the study of the constituent properties of the physical universe. Because the universe is made of “matter,” the first task is defining what matter is, what counts as a “type” of matter, and how many different types of matter there are. Although there are seemingly limitless types of materials in our physical universe, it turns out they are all made of around a hundred different types of “atoms,” which is a fancy word for the smallest unit of matter that is really useful to examine. (In fact, *almost all* things are made of just a *few dozen* of those hundred types of atoms.)

Using chemistry, you will be able to understand much better how the physical world works. You will understand things like carbon emissions, why some things dissolve in water and others do not, what a “chemical reaction” is, why soda bubbles suddenly fizz out when you open a bottle, and lots of other cool stuff. The class will be a mixture of memorization, reasoning, and math. You do not need very advanced math in order to succeed in this class, but you should have a well-developed sense of proportional reasoning. Memorization and reasoning will be of a form that’s unfamiliar at first, and will use a lot of what’s called the “periodic table.” This table will be the central focus of much of our work, and rightly so: it is perhaps the greatest achievement of systematic thought in the history of science. It lists all the known types of atoms, together with a host of useful properties that they possess.

The main assets that will let you succeed in this class are persistence and patience with yourself. No significant achievement is easily won, and understanding chemistry is a significant achievement. Accordingly, you should expect to struggle and be frustrated at times. This is a normal part of the learning process. Although this subject is not easy, it is also not impossible, and the main things that will drive your success will be commitment to sustained effort and learning from your mistakes. Like all difficult topics, chemistry is immensely rewarding to understand, and you will greatly benefit from working hard at it.

Class number	Topics	Book Sections
1	Matter and measurement	1.2-1.6
2	Atoms vs. compounds	2.3, 2.5-2.8
3	Quantum mechanics	6.3-6.4, 6.8-6.9
4	Periodic trends	7.1-7.6
5	Ionic bonding and naming	2.7-2.8, 8.2
6	Covalent bonding and naming	8.1, 2.8, 8.3-8.6
7	Lewis structures and polarity	8.1, 8.3-8.6
8	Molecular geometry	9.1-9.3

Class number	Topics	Book Sections
9	Intermolecular forces; phase changes	11.2, 11.4, 11.6
10	Gases (Part 1)	10.3-10.5
11	Gases (Part 2)	10.6-10.7
12	Stoichiometry	3.1, 3.3-3.4, 3.6-3.7
13	Properties of Solutions	13.2-13.3, 13.5
14	Solutions calculations	4.1-4.2, 4.5
15	Acid-base reactions	4.3, 16.1-16.4, 17.3
16	BONUS: Redox; Thermochemistry; Electrochemistry; Equilibria; Nuclear chemistry (subject to change)	4.4, 20.1-20.2, 5.3-5.6, 20.3, 17.4- 17.5, 21.1, 21.4