General Chemistry C1403x, Fall 2005

M/W 1:10-2:25 PM

Instructor: Professor Nicholas J. Turro

Office 768 Chandler

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All of this information is on the course home page in courseworks: https://courseworks.columbia.edu/

Chemistry C1403_2005. Recitation section schedule.

	Monday	*Tuesday*	Wednesday	Friday
10-10:50 AM Marissa Solomon				*(023)* 307 Pupin
11-11:50 AM Marissa Solomon				*(024)* 307 Pupin
1:10-2 PM		*(022) Jeremiah Johnson* *501 B International Affairs*		
3:10-4 PM	***(019)* Marissa Solomon** **424 Pupin**		*(021)* Jeremiah Johnson 424 Pupin	
4:10-5 PM		*(020) Jeremiah Johnson* *412 Pupin*		

Ms. Marissa Solomon (ms2201@columbia.edu)
Mr. Jeremiah Johnson (jaj2109@columbia.edu)

YOU MUST BE REGISTERED for one of the six recitation sections for this course. ***The purpose of the recitation section is for you to go over homework problems, ask questions, take quizzes, meet other students, organize study groups, prepare for the exams.***

If you are not registered for one of these sections, you are not registered for this course and you will not receive a grade. Please see your TA if you are not registered for one of the listed recitation sections.

Diagnostic exam this week. Recitations next week.

This standardized national examination will *not* be used in computing the term grade. However, an exceptional score might decide a borderline computation in your favor.

If you have not taken the diagnostic exam please contact Socky Logo (sl27@columbia.edu). She'll give you instructions on how to be assigned a time and place to take the exam.

EXAM SCHEDULE

Exam 1	Wednesday	September 28
Exam 2	Wednesday	November 2
Exam 3	Wednesday	November 30

Final Exam: Scheduled by the registrar (not me)

Grade will be based on 5 class exam equivalents. A maximum of 500 points (plus a few extra points). See syllabus for details.

There are no makeup exams. If you miss an exam, that one will be dropped. If you miss more than one exam you will not receive a grade for the course.

Tentative coverage of Text: Oxtoby, Freeman and Block, Chemistry: Science of Change

Chapters

1. The Atomic Nature of Matter (review of stuff you had in high school).
2. Stoichiometry (how to count atoms by weighing them).
3. Chemical Periodicity and the Formation of Simple Compounds (structure and properties of matter).

Exam 1: Wednesday, September 28 (After 6 lectures).

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15. Nuclear Chemistry (nuclear structure and nuclear properties).
16. Quantum Mechanics and the Hydrogen Atom (atoms as waves).
17. Many-electron Atoms and Chemical Bonding (how waves interact).

Exam 2: Wednesday, November 2 (9 lectures)

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18. Molecular Orbitals and Spectroscopy(interaction of light and matter).
19. Coordination Complexes (chemistry of metals, the inorganic world).
24. From Petroleum to Pharmaceuticals (chemistry of organic molecules, the organic world).

Exam 3: Wednesday, November 30 (6 lectures)

Period before final (3 lectures)

25. Synthetic and Biological Polymers (chemistry of giant molecules and life).

Courseworks: https://courseworks.columbia.edu/

When sending Email, *please place in the Subject field: Chemistry C1403*

Office hours for Prof. Turro: 2:30-3:30 PM M/W or by appointment

TA office hours will be announced on the course home page.

All queries concerning ***course administration*** to the Undergraduate Office: 340 Havemeyer (located to the right as you leave 309 Havemeyer)

Ms. Socky Lugo (sl27@columbia.edu)

Ms. Daisy Melendez (dm55 sl27@columbia.edu)

Who are you?
180 (or so) bright and eager students!

Who am I?

Professor of Chemistry
Specialist in Photochemistry, Suprmolecular Chemistry and Spectroscopy
Web site: turroserver.chem.columbia.edu
BA, Wesleyan University, 1960
PhD, Caltech, 1963
Postdoc, Harvard, 1963
Professor, Columbia, 1964

Can you find Nick and Sandy Turro in this picture?

Chapter 1: The Atomic Nature of Matter.

Atomic Theory of matter: How it came about from laws based on simple observations.

The Mole Concept: Counting and weighing atoms and molecules.

Chapter 2: Stoichiometry

(1) Writing balanced chemical equations

(2) Using balanced chemical equations

(3) Computing yields and determining limiting reagents

Chapter 3: Periodic Table and Molecular Structure

(1)Periodic properties of the elements and the periodic table

(2)Lewis structures for describing the bonding of atoms in molecules

(3) The shapes and dipole moments of molecules

IUPAC Periodic Table of the Elements

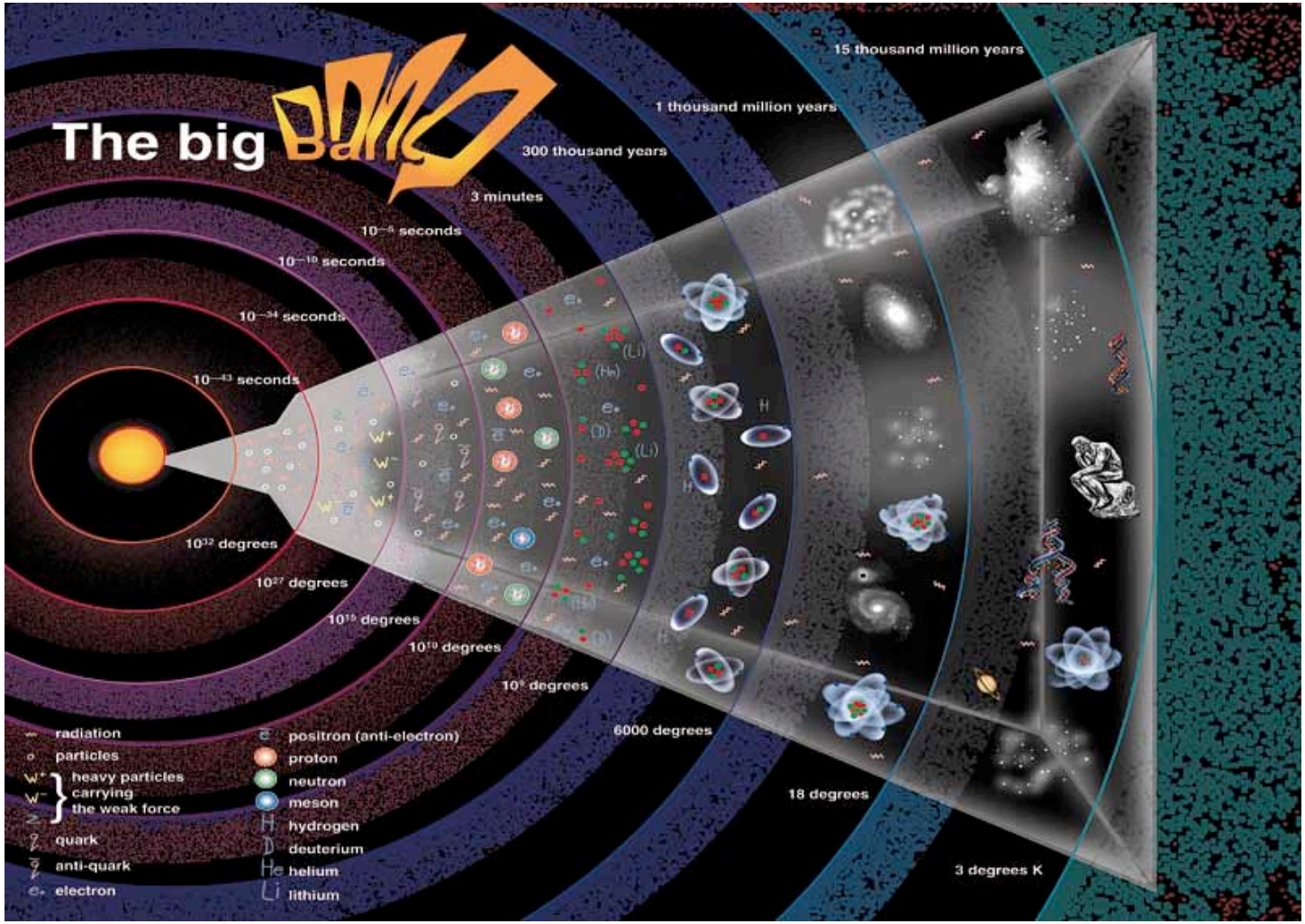
1																	18
1 **H** hydrogen 1.007 94(7)	2		Key: atomic number **symbol** name standard atomic weight									13	14	15	16	17	2 **He** helium 4.002 602(2)
3 **Li** lithium 6.941(2)	4 **Be** beryllium 9.012 182(3)											5 **B** boron 10.811(7)	6 **C** carbon 12.0107(8)	7 **N** nitrogen 14.0067(2)	8 **O** oxygen 15.9994(3)	9 **F** fluorine 18.998 4032(5)	10 **Ne** neon 20.1797(6)
11 **Na** sodium 22.989 770(2)	12 **Mg** magnesium 24.3050(6)	3	4	5	6	7	8	9	10	11	12	13 **Al** aluminium 26.981 538(2)	14 **Si** silicon 28.0855(3)	15 **P** phosphorus 30.973 761(2)	16 **S** sulfur 32.065(5)	17 **Cl** chlorine 35.453(2)	18 **Ar** argon 39.948(1)
19 **K** potassium 39.0983(1)	20 **Ca** calcium 40.078(4)	21 **Sc** scandium 44.955 910(8)	22 **Ti** titanium 47.867(1)	23 **V** vanadium 50.9415(1)	24 **Cr** chromium 51.9961(6)	25 **Mn** manganese 54.938 049(9)	26 **Fe** iron 55.845(2)	27 **Co** cobalt 58.933 200(9)	28 **Ni** nickel 58.6934(2)	29 **Cu** copper 63.546(3)	30 **Zn** zinc 65.409(4)	31 **Ga** gallium 69.723(1)	32 **Ge** germanium 72.64(1)	33 **As** arsenic 74.921 60(2)	34 **Se** selenium 78.96(3)	35 **Br** bromine 79.904(1)	36 **Kr** krypton 83.798(2)
37 **Rb** rubidium 85.4678(3)	38 **Sr** strontium 87.62(1)	39 **Y** yttrium 88.905 85(2)	40 **Zr** zirconium 91.224(2)	41 **Nb** niobium 92.906 38(2)	42 **Mo** molybdenum 95.94(2)	43 **Tc** technetium [97.9072]	44 **Ru** ruthenium 101.07(2)	45 **Rh** rhodium 102.905 50(2)	46 **Pd** palladium 106.42(1)	47 **Ag** silver 107.8682(2)	48 **Cd** cadmium 112.411(8)	49 **In** indium 114.818(3)	50 **Sn** tin 118.710(7)	51 **Sb** antimony 121.760(1)	52 **Te** tellurium 127.60(3)	53 **I** iodine 126.904 47(3)	54 **Xe** xenon 131.293(6)
55 **Cs** caesium 132.905 45(2)	56 **Ba** barium 137.327(7)	57-71 **lanthanoids**	72 **Hf** hafnium 178.49(2)	73 **Ta** tantalum 180.9479(1)	74 **W** tungsten 183.84(1)	75 **Re** rhenium 186.207(1)	76 **Os** osmium 190.23(3)	77 **Ir** iridium 192.217(3)	78 **Pt** platinum 195.078(2)	79 **Au** gold 196.966 55(2)	80 **Hg** mercury 200.59(2)	81 **Tl** thallium 204.3833(2)	82 **Pb** lead 207.2(1)	83 **Bi** bismuth 208.980 38(2)	84 **Po** polonium [208.9824]	85 **At** astatine [209.9871]	86 **Rn** radon [222.0176]
87 **Fr** francium [223.0197]	88 **Ra** radium [226.0254]	89-103 **actinoids**	104 **Rf** rutherfordium [261.1088]	105 **Db** dubnium [262.1141]	106 **Sg** seaborgium [266.1219]	107 **Bh** bohrium [264.12]	108 **Hs** hassium [277]	109 **Mt** meitnerium [268.1388]	110 **Ds** darmstadtium [271]	111 **Uuu** unununium [272]							

57 **La** lanthanum 138.9055(2)	58 **Ce** cerium 140.116(1)	59 **Pr** praseodymium 140.907 65(2)	60 **Nd** neodymium 144.24(3)	61 **Pm** promethium [144.9127]	62 **Sm** samarium 150.36(3)	63 **Eu** europium 151.964(1)	64 **Gd** gadolinium 157.25(3)	65 **Tb** terbium 158.925 34(2)	66 **Dy** dysprosium 162.500(1)	67 **Ho** holmium 164.930 32(2)	68 **Er** erbium 167.259(3)	69 **Tm** thulium 168.934 21(2)	70 **Yb** ytterbium 173.04(3)	71 **Lu** lutetium 174.967(1)
89 **Ac** actinium [227.0277]	90 **Th** thorium 232.0381(1)	91 **Pa** protactinium 231.035 88(2)	92 **U** uranium 238.028 91(3)	93 **Np** neptunium [237.0482]	94 **Pu** plutonium [244.0642]	95 **Am** americium [243.0614]	96 **Cm** curium [247.0704]	97 **Bk** berkelium [247.0703]	98 **Cf** californium [251.0796]	99 **Es** einsteinium [252.0830]	100 **Fm** fermium [257.0951]	101 **Md** mendelevium [258.0984]	102 **No** nobelium [259.1010]	103 **Lr** lawrencium [262.1097]

Notes

- Aluminum and cesium are commonly used English-language spellings for aluminium and caesium.
- IUPAC 2001 standard atomic weights (mean relative atomic masses) are listed with uncertainties in the last figure in parentheses [R. D. Loss, *Pure Appl. Chem.* **75**, 1107-1122 (2003)]. These values correspond to current best knowledge of the elements in natural terrestrial sources. For elements with no IUPAC assigned standard value, the atomic mass (in unified atomic mass units) or the mass number of the nuclide with the longest known half-life is listed between square brackets.
- Element with atomic number 111 has not yet been named. The IUPAC provisional name is shown.
- Elements with atomic numbers 112, 114, and 116 have been reported but not fully authenticated.

The periodic table where did it come from? The BIG bang!



Chemistry is about matter and light, their interactions and transformations.

All of which was created by the "Big Bang" about 10 billion year ago.

As the result of the Big Bang, the atoms of the elements contained in the Periodic Table were produced.

Understanding the underlying intellectual structure of the Periodic Table is an important goal of this course.

So, let take a look at a preview of coming attractions for the course.