TEST QUESTIONS FOR THIS UNIT WILL BE BASED ON THE FOLLOWING ITEMS.

BOOKLET 1

1. BE ABLE TO IDENTIFY THE THREE PARTICLES OF AN ATOM AND THE ELECTRICAL CHARGE ON EACH.

2. BE ABLE TO RECOGNIZE THE FOLLOWING CONCERNING ATOMIC STRUCTURE:
   a. WHICH PARTICLES ARE LOCATED IN THE NUCLEUS OF THE ATOM.
   b. WHICH PARTICLES ORBIT THE NUCLEUS.
   c. THE RELATIONSHIP BETWEEN THE NUMBER OF PROTONS AND THE NUMBER OF ELECTRONS IN A NEUTRAL ATOM.

3. RECOGNIZE THE SIGNIFICANCE OF THE :
   a. ATOMIC WT. OF AM ELEMENT
   b. ATOMIC NUMBER OF AN ELEMENT.

4. RECOGNIZE WHAT ELEMENT EACH OF THE FOLLOWING CHEMICAL SYMBOLS REPRESENTS:

   N H O C Cl Ca K Fe Mg Na P

5. GIVEN THE ATOMIC NUMBER AN THE ATOMIC WEIGHT OF AN ELEMENT, BE ABLE TO DIAGRAM THE ELEMENT WITH THE RIGHT NUMBER OF PROTONS AND NEUTRONS AND THE CORRECT NUMBERS OF ELECTRONS IN EACH SHELL (FOR THOSE ELEMENTS WE HAVE USED IN CLASS.)

6. RECOGNIZE WHAT IS MEANT BY THE WORD " ISOTOPE ".

7. GIVEN A SYMBOL SUCH AS SO_2 AND $4CO_2$, recognize what is meant by THE NUMBER IN FRONT AND THE SUBSCRIPT.

8. GIVEN THE NUMBER OF ATOMS IN A MOLECULE OF A COMPOUND, BE ABLE TO WRITE THE PROPER CHEMICAL FORMULA.

BOOKLET 2

1. RECOGNIZE WHAT IS MEANT BY THE TERM " IONIC BONDING " AND THE CHARACTERISTIC OF SUBSTANCES BONDED IN THIS MANNER.

2. RECOGNIZE WHAT MAKES A SUBSTANCE AN ACID AND A BASE (OR NEUTRAL).

3. RECOGNIZE WHAT IS MEANT BY pH AND THE pH RANGE OF ACIDS AND BASES.

4. DISTINGUISH BETWEEN CATALYST AND ENZYME.

5. GIVEN A CONFIGURATION OF AN ELEMENT, BE ABLE TO
   a. LOCATE THE VALENCE SHELL
   b. DETERMINE WHETHER IT FORMS A POSITIVE OR NEGATIVE ION.

6. DISTINGUISH BETWEEN AN ATOM, AN ION AND A MOLECULE.

7. DISTINGUISH BETWEEN AN ELEMENT AND A COMPOUND.

8. DISTINGUISH BETWEEN AN ELECTROLYTE AND A NON-ELECTROLYTE.

BOOKLET 3

1. DISTINGUISH BETWEEN COVALENT BONDING AND IONIC BONDING.

2. BE ABLE TO DIAGRAM SIMPLE HYDROCARBONS SUCH AS METHANE (CH_4) OR ETHANE (C_2H_6)

3. GIVEN A STRUCTURAL FORMULA OF AN ORGANIC COMPOUND, BE ABLE TO RECOGNIZE THE FUNCTIONAL GROUPS:
   a. ALCOHOL
   b. ALDEHYDES
   c. KETONES
   d. ORGANIC ACIDS
   e. AMINES
   f. ESTERS

BOOKLET 4

1. RECOGNIZE THE CHEMICAL COMPOSITION OF THE FOLLOWING:
   a. CARBOHYDRATES
   b. FATS (LIPIDS)
   c. PROTEINS

2. DEFINE HYDROLYSIS AND SYNTHESIS AND EXPLAIN THE SIGNIFICANCE OF EACH.

3. RECOGNIZE THE HYDROLYSIS OF:
   a. CARBOHYDRATES
   b. LIPIDS (FATS)
   c. PROTEINS

3. RECOGNIZE THE SYNTHESIS OF EACH ABOVE.

5. RECOGNIZE AND GIVE THE SIGNIFICANCE OF OXIDATION AND REDUCTION.

6. DISTINGUISH BETWEEN MONOSACCHARIDES, DISACCHARIDES, AND POLYSACCHARIDES. GIVE EXAMPLES OF EACH.

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CHAPTER TEST

1. ALL OF THE ABOVE OBJECTIVES WILL BE COVERED IN THE CHAPTER TEST.

2. EXPLAIN THE NEED ORGANISMS HAVE FOR ENERGY.

3. DEMONSTRATE BETWEEN THE EFFECT OF AN ENZYME IN A CHEMICAL REACTION.

4. DISTINGUISH BETWEEN BREATHING AND CELLULAR RESPIRATION.

5. NAME GLUCOSE AS A BASIC CHEMICAL SOURCE OF CELLULAR ENERGY.

6. DISTINGUISH BETWEEN NUCLEIC ACIDS, DNA, AND RNA.

Chemistry for Biology Students
Work sheet
Booklet 1

1. List the three basic particles in an atom and their charges.

2. The nucleus of the atom consists of what particles?

3. Normally, atoms are electrically neutral. This means that an atom contains _____ number of protons and electrons.

4. Therefore, if an electrically neutral atom had 6 protons it would have _____ electrons.

5. What is meant by the atomic weight of an element?

6. What is an isotope?

7. How is this change in weight accounted for ? (From Question #6)

8. The maximum number of electrons possible in any second shell of an atom is _____.

9. Diagram the two isotopes of chlorine. Atomic number 17 and atomic weights 35 and 37 respectively. Place the correct number of electrons in each shell.

10. What elements do these symbols represent ?

Fe--	Mg--	K--
Cl--	Na--	N--

11. Sodium has 11 protons and 12 neutrons.
    a. What is its atomic number?
    b. What is its atomic weight?

12. How many electrons would an electrically neutral sodium have?

13. If Element X has an atomic weight of 15 and an atomic number of 5, how many electrons are in its second shell?

14. Diagram phosphorus. Atomic number 15 and atomic weight 31.

15. How is hydrogen--3 different from the ordinary form of hydrogen?

16. How is it (hydrogen--3) similar?

Chemistry for Biology Students
Bonding Worksheet
Booklet 2

1. The formula $2H_2$ indicates two _____ of hydrogen.

2. How many atoms of hydrogen are represented in the above formula?

3. How many atoms of each element are contained in the following formula $Ca(OH)_2$?_____

4. What is a valance shell?

5. Atoms that have _____ electrons in their valance shell tend to loss electrons and form _____ charged ions.

6. Since NaF is held together by an ionic bond, What would you expect to happen when the substance was put in water?

7. If compound A_2X_3 has inoic bonding and the charge of a single X ion is -2, what is the charge of a single A ion?

8. If H_2SO_4 -------- $2H^{+1}$ + SO_4^{-2} This substance is called _____.

9. If magnesium has an atomic number of 12 and an atomic weight of 24, how many electrons are in its valance shell?

10. How many chloride ions would be required to react with 9 magnesium ions to form an electrically neutral molecule? (chloriude atomic number 17; atomic weight 35) _____

11. What is the characteristic of atoms with eight electrons in their valance shell?

12. Why is KOH not an acid?

13. What is the pH of a solution?

14. What is the range of an acid?

15. Carbon, with 4 electrons in its valance shell, does not form ions. Why?

Chemistry for Biology Students
Covalent Bonds
Booklet 3

1. Diagram an atom that will form a positive ion.

2. How does covelant bonds differ fron ionic bonds?

3. Diagram methane (CH_4) using electron dot diagram.

4. Referring to your above diagram, how many electrons are in carbon's valance shell?

5. Attach the proper number of hydrogens to this carbon group (#4 above).

6. Diagram 2 carbon atoms that share 4 electrons between them.

7. What is the -OH in a covalent compound?

8. Show the structural formula for an alcohol compound?

9. What is CHO ?

10. Show its structural formula.

11. How do these two compounds above differ? (question #8 and #10)

12. What is a ketone?

13. How does the ketone differ from an aldehyde?

14. What is the name of the COOH group?

15. What do we call a compound that has the NH_2 group?

Chemistry for Biology Students
Organic Chemistry
Booklet 4

1. When two or more atoms react to form a molecule, two different kinds of bonding can occur. You have studied ionic bonding where electrons are lost from one atom and gained by another. What happens to electrons in covalent bonding?

2. A molecule of Hydrogen gas can be symbolized as H_2 or as H-H. In the symbolization H-H, what is meant by he line?

3. Nitrogen atoms form covalent bonds with other atoms. How many electrons does nitrogen share in such bonds? (The atomic number of nitrogen is 7). How many bonds can nitrogen hold?

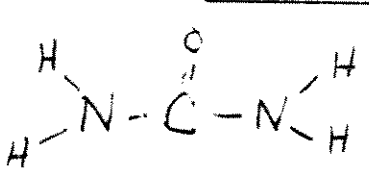
4. For each of the following, state the number of electrons which are being shared between the atoms composing the molecule.

   a. Water, H_2O, H-O-H, Each hydrogen is sharing how many electrons with the oxygen.
   b. Amonia, NH_3, H-N-H, The nitrogen is sharing how many electrons in total?
   C. Nitrogen gas, N_2, N=N, Each nitrogen is sharing how many electrons?

5. What is the chemical formula for table sugar?

6. What are "organic compounds"?
   Organic compounds always contain the element_____.

7. The structural formula for urea is:



   a. How many electrons is the carbon (C) sharing in total?

   b. How many electrons is each nitrogen sharing?

8. Water is not an organic compound but is very important to living cells for several reasons. One reason is that it serves as an excellent solvent. Why is this important to cells?

9. How are proteins important to living things?
Give the chemical formula for the protein hemoglobin.
Of what smaller units are porteins composed?
Protein molecules are made up of what elements?

10. What elements compose carbohydrate molecules?
What is the difference between simple sugars, double sugars, and starch?

11. Fats are composed of what two simpler substances?
What elements compose a fat molecule?

12. Diagram and explain hydrolysis?
Diagram and explain dehydration synthesis?

PERIODIC CHART OF THE ELEMENTS

THE SYMBOL. Shown in the middle of each block directly below the name of the element.

THE ATOMIC WEIGHT. Directly below the symbol for each element the atomic weight is shown. The values are taken from the official Report on Atomic Weights Cf. J. Amer. Chem. Soc. 84, 4193 (1962). For elements not listed in the Report the mass number of the longest lived isotope is shown in brackets.

THE ATOMIC NUMBER. Shown in the upper left hand corner.

ELECTRONIC CONFIGURATION. Shown at the upper right as a group of numerals. When read downward they indicate the number of electrons normally found in successive energy levels.

	I A	II A	III B	IV B	V B	VI B	VII B	VIII			I B	II B	III A	IV A	V A	VI A	VII A	0
1	1 H 1.00797																	2 He 4.0026
2	3 Li 6.939	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.9984	10 Ne 20.183
3	11 Na 22.9898	12 Mg 24.312											13 Al 26.9815	14 Si 28.086	15 P 30.9738	16 S 32.064	17 Cl 35.453	18 Ar 39.948
4	19 K 39.102	20 Ca 40.08	21 Sc 44.956	22 Ti 47.90	23 V 50.942	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.54	30 Zn 65.37	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.909	36 Kr 83.80
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.905	40 Zr 91.22	41 Nb 92.906	42 Mo 95.94	43 Tc (98.)	44 Ru 101.07	45 Rh 102.905	46 Pd 106.4	47 Ag 107.870	48 Cd 112.40	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.904	54 Xe 131.30
6	55 Cs 132.905	56 Ba 137.34	57 La 138.91	72 Hf 178.49	73 Ta 180.948	74 W 183.85	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.09	79 Au 196.967	80 Hg 200.59	81 Tl 204.37	82 Pb 207.19	83 Bi 208.98	84 Po (210)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra 226.05	89 Ac 227.04															

* Lanthanide Series →	58 Ce 140.12	59 Pr 140.907	60 Nd 144.24	61 Pm (147)	62 Sm 150.35	63 Eu 151.96	64 Gd 157.25	65 Tb 158.924	66 Dy 162.50	67 Ho 164.930	68 Er 167.26	69 Tm 168.934	70 Yb 173.04	71 Lu 174.97
* Actinide Series →	90 Th 232.038	91 Pa 231.05	92 U 238.03	93 Np 237.06	94 Pu (242)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (254)	100 Fm (253)	101 Md (256)	102 No (253)	103 Lw (257)

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