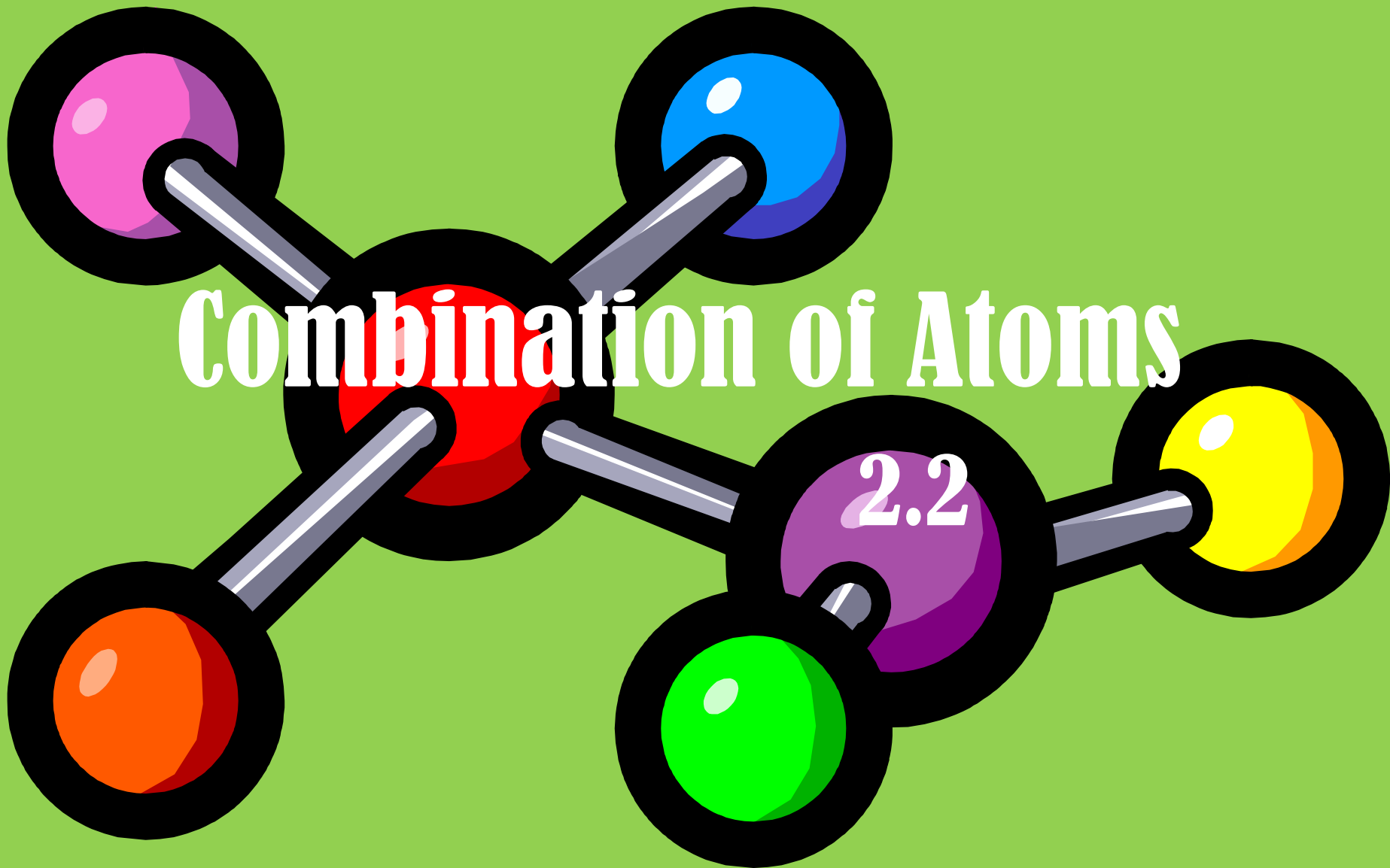


Combination of Atoms



I. Interaction of Atoms

- Atoms of elements combine chemically to form new substances called compounds
- When elements form compounds their individual elements change

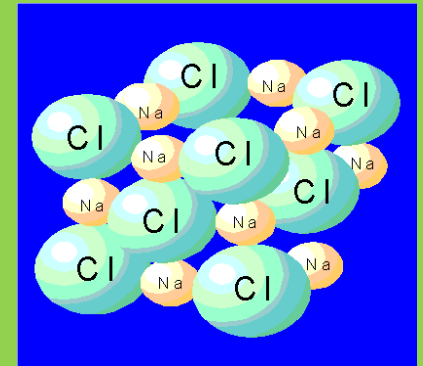
A. Compounds

- a. One way that atoms combine is by sharing the electrons in the outermost portion of their electron clouds
- b. The combined atoms form a molecule
- c. A compound is a type of matter that has properties of each of the elements in it
- d. Examples: Salt = NaCl Water = H₂O



Salt Compounds

Table Salt – small cubic crystals.



B. Chemical Properties

- a. Chemical properties* describes how one substance changes when it reacts with other substances
 - The chemical properties of iron cause it to rust when it reacts with water and oxygen

II. Bonding

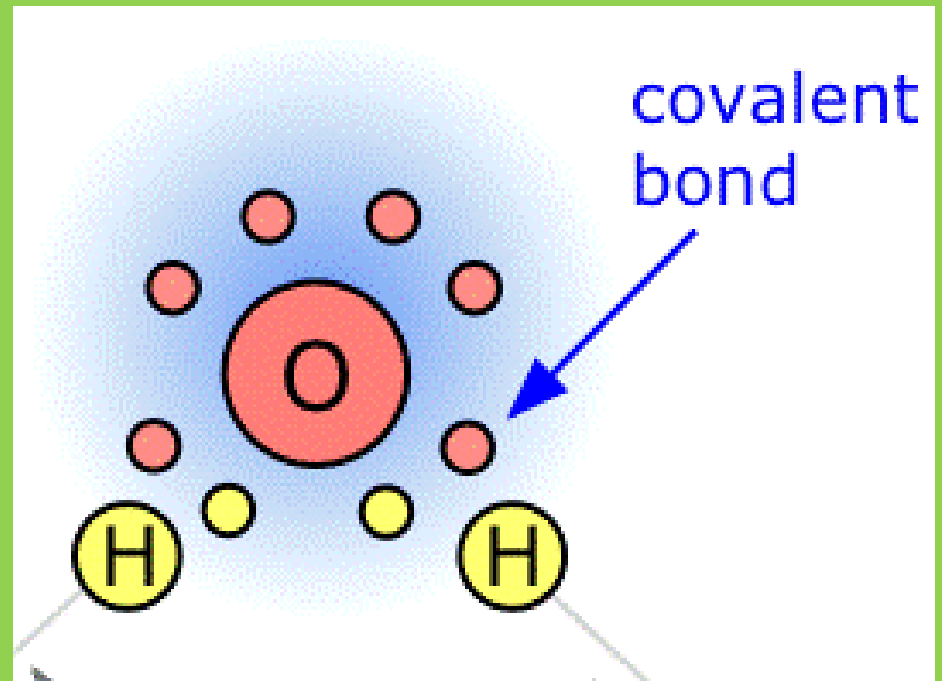
- The forces that hold the atoms in compounds together are called chemical bonds
- Some atoms are reactive and form bonds easily while others are less reactive or stable
- Atoms like to have 8 electrons in their outer most electron cloud.
 - 8 electrons = stable atom

Most Reactive – UnReactive

		Atomic number																18																		
		Symbol																2																		
		Atomic weight																4.003																		
1	1	H																	2	He																
		1.008																		4.003																
2	3	Li	4	Be											5	B	6	C	7	N	8	O	9	F	10	Ne										
		6.941	9.012											10.81	12.01	14.01	16.00	19.00	20.18																	
3	11	Na	12	Mg	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar																				
		22.99	24.31	26.98	28.09	30.97	32.07	35.45	39.95																											
4	19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
		39.10	40.08	44.96	47.88	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.39	69.72	72.61	74.92	78.96	79.90	83.80																	
5	37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe
		85.47	87.62	88.91	91.22	92.91	95.94	98.91	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3																	
6	55	Cs	56	Ba	71	Lu	72	Hf	73	Ta	74	W	75	Re	76	Os	77	Ir	78	Pt	79	Au	80	Hg	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn
		132.9	137.3	175.0	178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	209.0	210.0	222.0																	
7	87	Fr	88	Ra	103	Lr	104	Rf	105	Db	106	Sg	107	Bh	108	Hs	109	Mt	110	Uun	111	Uuu	112	Uub	113	Uut	114	Uuq	115	Uup	116	Uuh	117	Uus	118	Uuo
		223.0	226.0	262.1	261.1	262.1	263.1	264.1	265.1	266	269	272	277																							
6	57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb								
		138.9	140.1	140.9	144.2	146.9	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0																					
7	89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No								
		227.0	232.0	231.0	238.0	237.0	244.1	243.1	247.1	247.1	251.1	252.0	257.1	258.1	259.1																					

A. Covalent Bonds

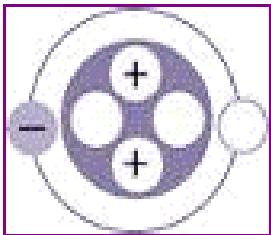
- a. A covalent bond occurs when two separate atoms share their outer electrons
- b. Their goal is to become stable



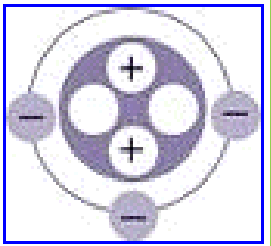
B. Ionic Bonds

a. Electrically charged atoms are called ions

1. Under certain conditions atoms can lose or gain an electron



- When an atom loses an electron it becomes **positively charged**



- When an atom gains an electron it becomes **negatively charged**

b. Ions are attracted to each other when they have opposite charges

c. Oppositely charged ions join to form neutral compounds

C. Metallic Bonds

- Metallic Bonds are found in metals
- Electrons are free to move from one positively charged ion to another
- This results in metals being *good conductors* – the movement of electrons allows metals to pass an electric current easily

D. Hydrogen Bonds

- Some bonds form without the interaction of electrons
 - therefore they do not share electrons evenly giving them a positive or a negative end = polar molecule
- The positive end of one molecule is attracted to the negative end of another molecule
- Hydrogen bonds are responsible for the cohesion in water, causing rain drops, and the ability for water to exist as a liquid at room temperature

III. Mixtures

A. Mixture – Many different objects are mixed together but each retains its own properties

- A Heterogeneous mixture is not mixed evenly and each component retains its own properties



B. Solutions

a. Homogeneous mixtures – are evenly mixed throughout, you can not see the individual components

- Another name for a homogeneous mixture is a solution.



IV. Separating Mixtures and Compounds

- a. The components of a mixture and solution can be separated by physical means

- b. The only way to change one substance into one or more new substances with different chemical properties is a chemical change