

This week in Chem110

- We will use our understanding of orbitals/electronic configurations to:
- Determine how bonds are formed
- Understand why there is a difference in the types of bonds
- Compare bond strengths between different bonds
- Draw 2-dimensional representation of covalent bonds in simple molecules

Practice Question 1

Which of the following has higher lattice energy?

CsCl or MgCl₂

KCl or CaS

RbI or NaBr

Please use this periodic table (also posted on myCourses)

Periodic Table of the Elements																		18
1 H Hydrogen 1.008																	2 He Helium 4.003	
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180	
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948	
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.933	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.922	34 Se Selenium 78.09	35 Br Bromine 79.904	36 Kr Krypton 84.80	
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molibdenum 95.94	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.29	
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanides		72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103 Actinides		104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [293]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown

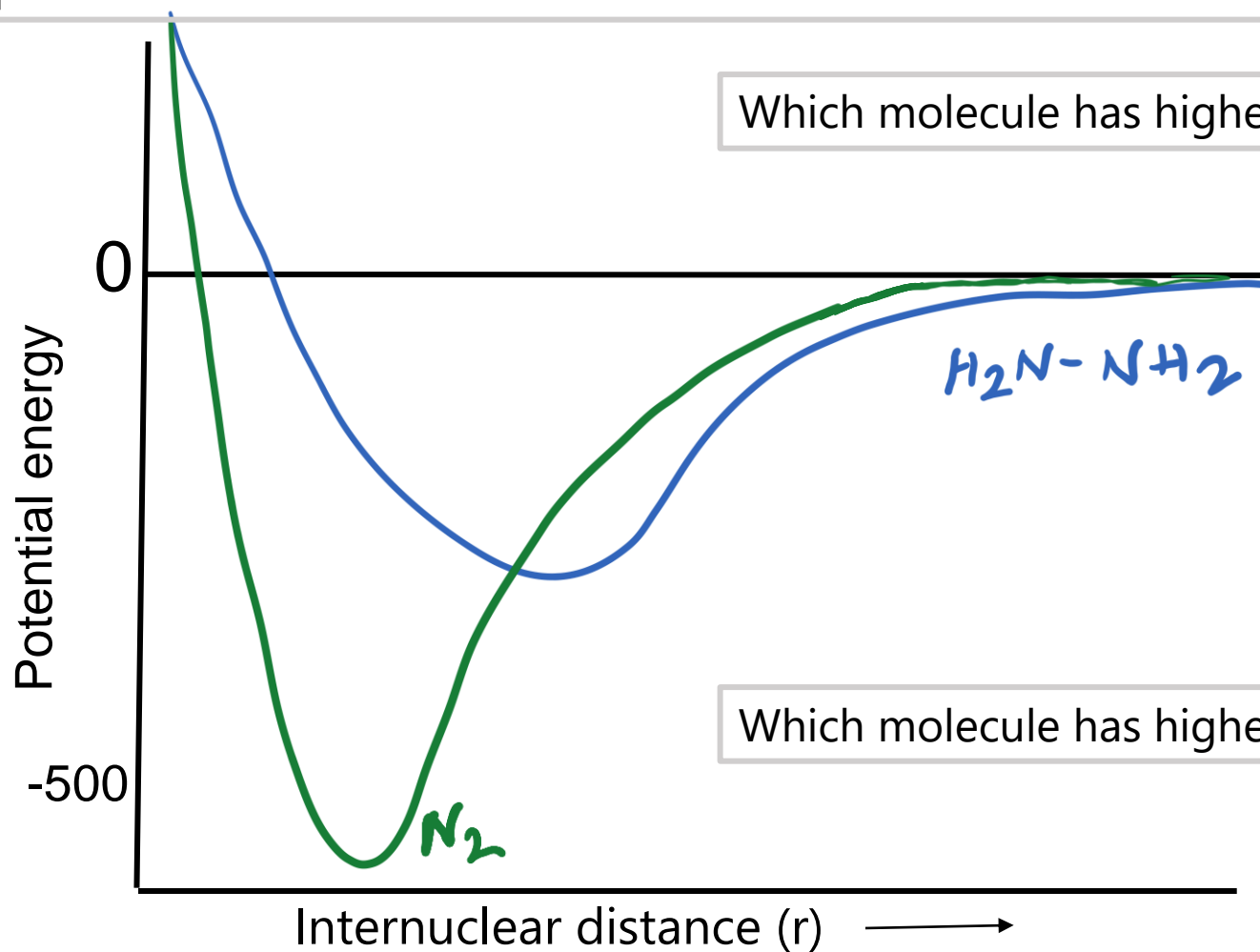
Practice Question 2

Compare the bond energy and bond order of the following:



Practice Question 3

Based on the figure below (for $\text{NH}_2\text{-NH}_2$ and N_2), answer the following questions:



Which molecule has higher **bond energy**?

Which molecule has higher **bond length**?

Practice Question 4

Practice the Lewis Structure for the following molecules:



Practice Question 5

Calculate the enthalpy of reaction for the following reaction



BOND ENERGIES:

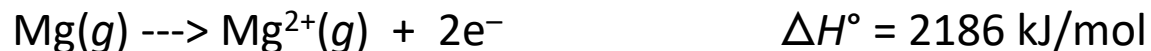
H-H: 436 kJ

O=O: 498 kJ

O-H: 464 kJ

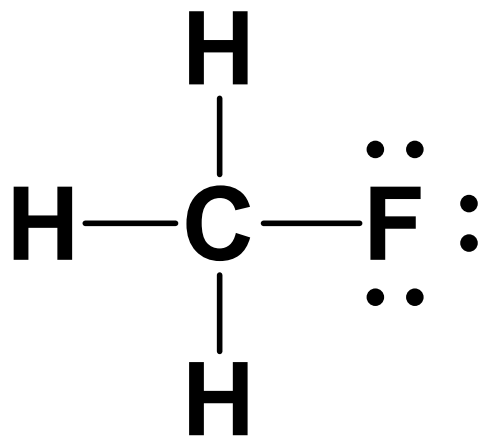
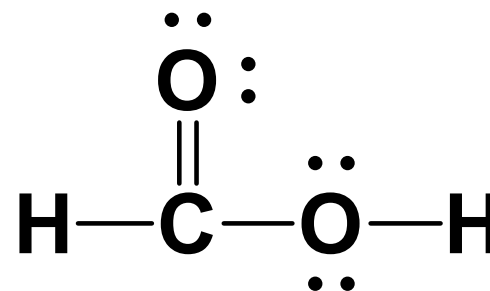
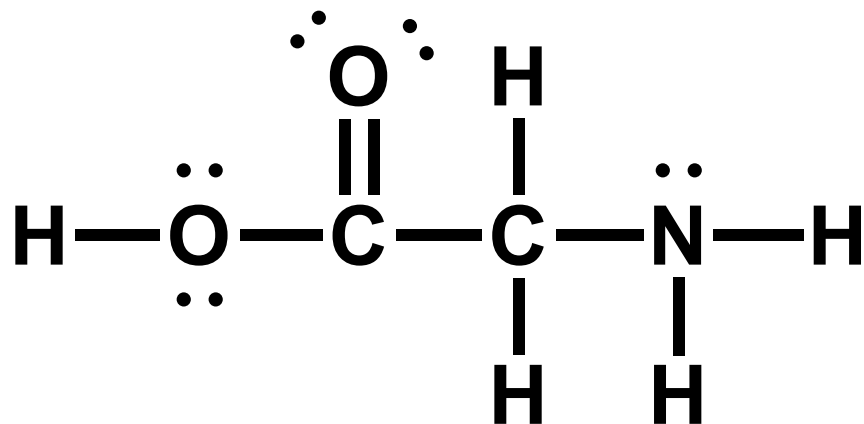
Practice Question 6

Calculate the lattice energy of magnesium sulfide from the data given below.



Practice Question 7

Label the polar covalent bonds in the structures below, indicate $\delta+$ and $\delta-$.
Which bond is the *most* polar? (Use the Datasheet – posted on myCourses has the electronegativity chart)



Practice Question 8: Determining Lewis Structures

Lewis structures to determine the bonding in complex molecules

1. Determine total number of valence electrons
2. Any charges? YES – add (-ve charge)/subtract (+ve charge)
3. Build skeleton structure (incomplete Lewis Structure)
 - a) Group 14,15,16 atoms usually "central"
 - b) Hydrogen and Group 17 atoms "terminal"
 - c) Make *multiple bonds* only when necessary
4. Check - Noble gas electronic configuration at each atom?

