

The Periodic Table

<i>IA</i>																<i>VIIIA</i>	
H 1 1.01											<i>IIA</i>						He 2 4.00
Li 3 6.94	Be 4 9.01											<i>IIIA</i>	<i>IVA</i>	<i>VA</i>	<i>VIA</i>	<i>VIIA</i>	
Na 11 22.99	Mg 12 24.31	<i>IIIB</i>	<i>IVB</i>	<i>VB</i>	<i>VIB</i>	<i>VIIIB</i>	<i>VIIIB</i>	<i>VIIIB</i>	<i>VIIIB</i>	<i>IB</i>	<i>IIB</i>	B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)			

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11

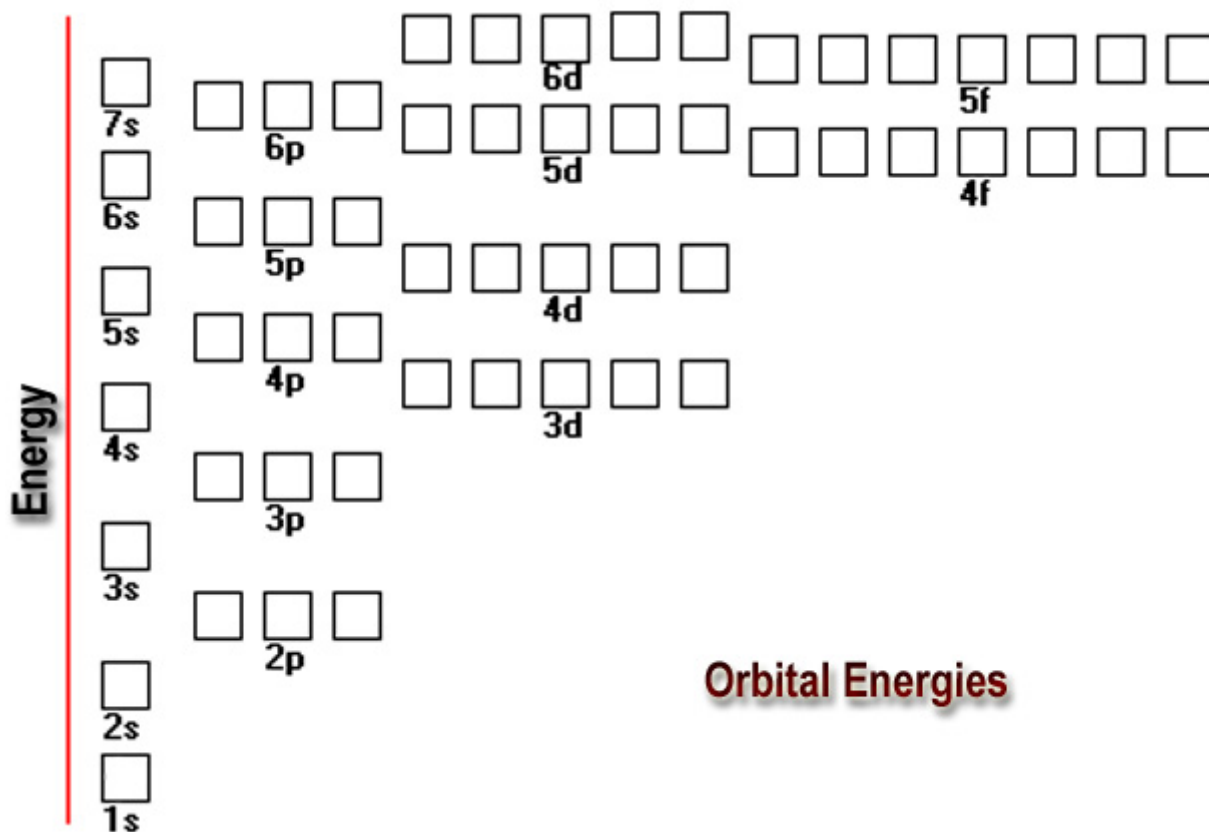
Average Single Bond Energies (kJ per mole)

	H	C	N	O	F	Si	P	S	Cl	Br	I
H	436	414	389	464	569	293	318	339	431	368	297
C		347	293	351	439	289	264	259	330	276	238
N			159	201	272		209		201	243	
O				138	184	368	351		205		201
F					159	540	490	285	255	197	
Si						176	213	226	360	289	
P							213	230	331	272	213
S								213	251	213	
Cl									243	218	209
Br										192	180
I											151

Average Multiple Bond Energies (kJ per mole)

N = N	418	C = C	611
N ≡ N	946	C ≡ C	837
N = O	590	C = O	803
C ≡ N	891	C = O	745
O = O	498	C ≡ O	1075

In CO₂ Only



Average Single Bond Lengths (Picometers)

	H	C	N	O	F	Si	P	S	Cl	Br	I
H	74	110	98	94	92	145	138	132	127	142	161
C		154	147	143	141	194	187	181	176	191	210
N			140	136	134	187	180	174	169	184	203
O				132	130	183	176	170	165	180	199
F					128	181	174	168	163	178	197
Si						234	227	221	216	231	250
P							220	214	209	224	243
S								208	203	218	237
Cl									200	213	232
Br										228	247
I											266

Average Multiple Bond Lengths (Picometers)

C = C	134	C ≡ C	121
C = N	127	C ≡ N	115
C = O	122	C ≡ O	113
N = O	115	N ≡ O	108

$$1 \text{ pm} = 1 \times 10^{-12} \text{ m}$$

SID

Last _____

First _____

Question 1
4 Points

Give the **complete** electronic configuration for the following:

a. **Cl** _____ b. **Ga** _____

Question 2
8 Points

Give the **noble gas** configuration for the following

a. **Br** _____ c. **Cu** _____
b. **Fe²⁺** _____ d. **F⁻** _____

Question 3
6 Points

How many **valence electrons** do the following atoms possess?

a. **Al³⁺** _____ b. **Ne** _____ c. **Cu** _____

Question 4
4 Points

How many **diamagnetic** elements are there in period 6? _____

Question 5
5 Points

Arrange the following elements in order of **increasing ionization energy**, by ranking them from 1 (**smallest**) to 5 (**greatest**)

Ca Ge
Rb Sr
P

Question 6
5 Points

I belong to the **3rd period** on the Periodic Table. I am **less metallic** than **magnesium**, **less electronegative** than **phosphorous**, and I am **smaller** than **silicon**.
Who am I? _____ (Symbol)

Question 7
16 Points

Draw the **best** Lewis Dot structure for the following

F₂CO

H₃O⁺

BCl₃

XeF₄

Question 8

10 Points
(6 Points)Draw all reasonable resonance structure for FNO_2 .

Circle the correct answer:

Average bond length table is on the front page of this exam.

(4 Points)

The F to N bond length is expected to be:

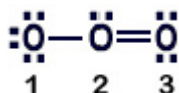
1. > 134 pm
2. < 134 pm
3. = 134 pm

The N to O bond length is expected to be:

1. = 136 pm
2. > 136 pm
3. = 115 pm
4. > 115 pm

Question 9

6 Points

A Lewis structure for ozone, O_3 is depicted below:

Give the formal charge on each of the oxygen atoms.

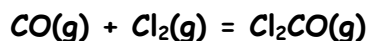
O1: _____

O2: _____

O3: _____

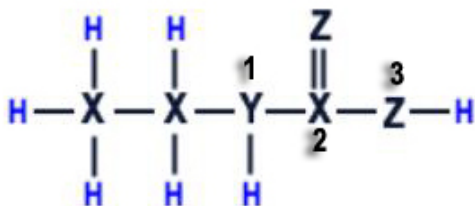
Question 10

5 Points

Phosgene, Cl_2CO is a highly toxic gas. Using the *bond energies given on the front page* of this exam, estimate the enthalpy change for the reaction of carbon monoxide and chlorine to produce phosgene.

Question 11

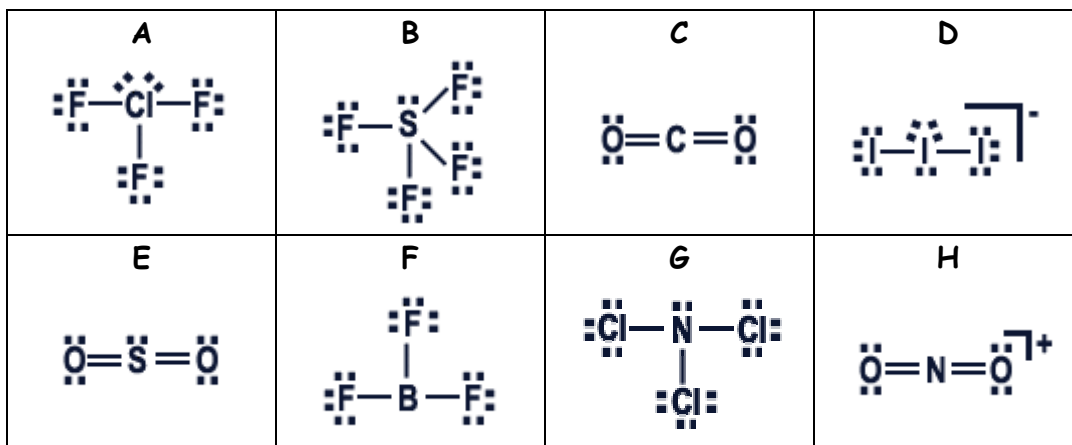
9 Points

A hypothetical organic molecule is depicted on the left. H is hydrogen and X, Y and Z are **period 2** elements. The following questions pertain to this molecule

- a. The **bond angle** around: 1: _____ 2: _____ 3: _____
- b. The **symbol** for: X: _____ Y: _____ Z: _____
- c. The **number** of lone pairs in this molecule: _____

Question 12
22 Points

The following questions refer to the molecules depicted below.



- List the **structure(s)** whose **only** bond angle is $\sim 180^\circ$ _____
- List the **structures(s)** whose **epg** is/are **linear**: _____
- Give the **electron pair geometry (epg)** for:

A: _____	E: _____
G: _____	
- Give the **molecular geometry** for:

B: _____	F: _____
G: _____	
- Label the following molecules as either **polar (P)** or **non polar (NP)**
 C: _____ **D:** _____ H: _____

Do Not Write Below This

Exam II Score