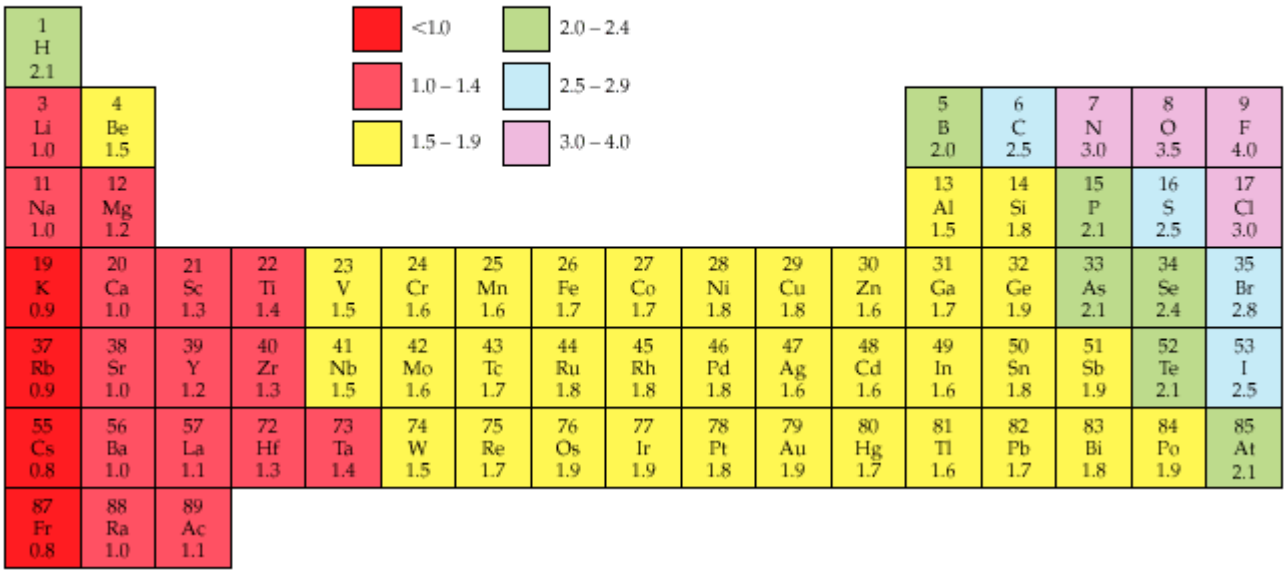
The Periodic Table

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
H 1 1.01																	He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31											Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
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)									

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

Electronegativity Values for the Elements



<u>Some Information For Your Use:</u>

The straight-chained hydrocarbons that we have met had the following general formulae: C_nH_{2n} C_nH_{2n+2} C_nH_{2n-2}

Question 1
16 Point

Answer the following based on the Lewis Dot Structure for SF_2

1. Number of lone pairs on the central S atom is: _____
2. The central S atom forms ___ single bond(s).
3. The central S atom forms ___ double bond(s).
4. The Lewis structure has two or more resonance structure: True False

Answer the following based on the Lewis Dot Structure for O_3

5. Number of lone pairs on the central O atom is: _____
6. The central O atom forms ___ single bond(s).
7. The central O atom forms ___ double bond(s).
8. The Lewis structure has two or more resonance structure: True False

Question 2
9 Points

Draw the three resonance structures for NO_3^-.

Question 3
4 Points

Some typical bond lengths are listed below:

C-O	143 pm	N-O	136 pm
C=O	122pm	N=O	115 pm
C≡O	113pm	N≡O	108 pm

What would you anticipate the C-O bond length to be in H_2CO _____ pm

What would you anticipate the N-O bond length to be in NO_3^- _____ pm

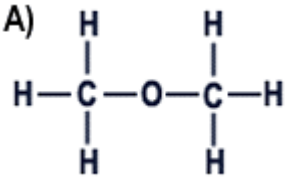
Question 4
10 Points

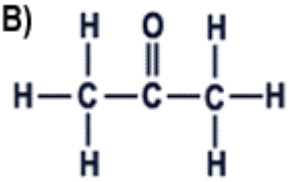
Saturated hydrocarbons contain only single bonds. Answer the following questions with respect to the following molecules.

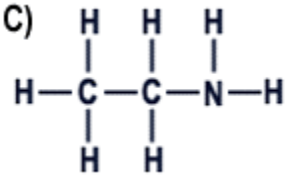
1. C_5H_{12} 2. C_4H_8 3. C_8H_{18} 4. C_6H_{10}

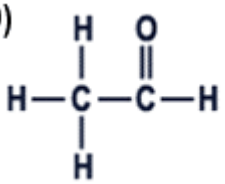
a) A saturated hydrocarbon: _____
b) Octane: _____
c) An alkyne _____
d) An unsaturated hydrocarbon: _____
e) An alkene: _____

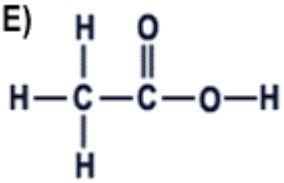
Question 5
16 Points

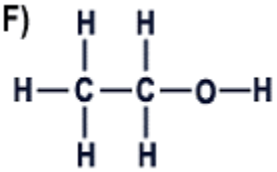
A) 

B) 

C) 

D) 

E) 

F) 

The questions below refer to the structural formulas given above for some organic molecules. Give the letter of the structure that depicts:

1. An alcohol _____
2. An amine _____
3. A carboxylic acid _____
4. An aldehyde _____
5. A ketone _____
6. An ether _____
7. Greatest number of lone pairs _____
8. Greatest number of bond pairs _____

Question 6
6 Points

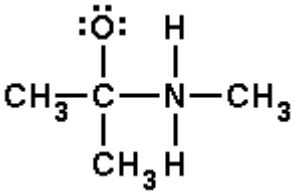
Some typical bond energies in kJ per mole are listed below:

C-O	351	*Cl-Cl*	243
C=O	803	*C-Cl*	330
C≡O	1075		

Use these values to determine the enthalpy change for the following reaction:

$$CO(g) + Cl_2(g) = COCl_2(g)$$

Question 7
4 Points



The molecule depicted on the left is an unstable intermediate in an organic reaction.
What is the formal charge on:

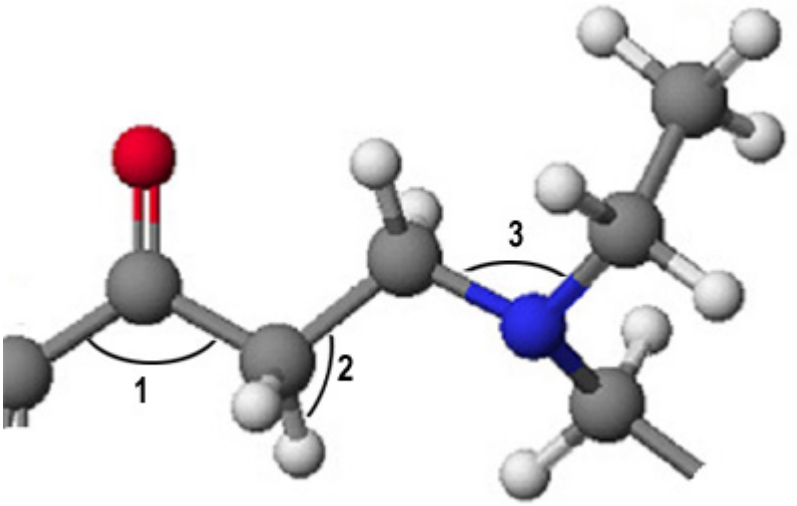
1. The nitrogen atom. _____
2. The oxygen atom. _____

Question 8
16 Points

Give the Electron Pair Geometry (epg) and the Molecular Geometry (mg) for the following molecules:

1. CCl_4 epg: _____ mg: _____
2. NCl_3 epg: _____ mg: _____
3. NO_2^- epg: _____ mg: _____
4. H_2S epg: _____ mg: _____

Question 9
9 Points



A portion of the molecule Novocain is depicted on the left. What are the bond angles about 1, 2 and 3?

1. _____
2. _____
3. _____

Question 10
10 Points

The molecular geometry for the following five molecules is given below. Label these molecules as either Polar or Non Polar.

1. CF_4 Tetrahedron _____
2. CH_2Cl_2 Tetrahedron _____
3. H_2CO Trigonal Planar _____
4. N_2 Linear _____
5. HCN Linear _____