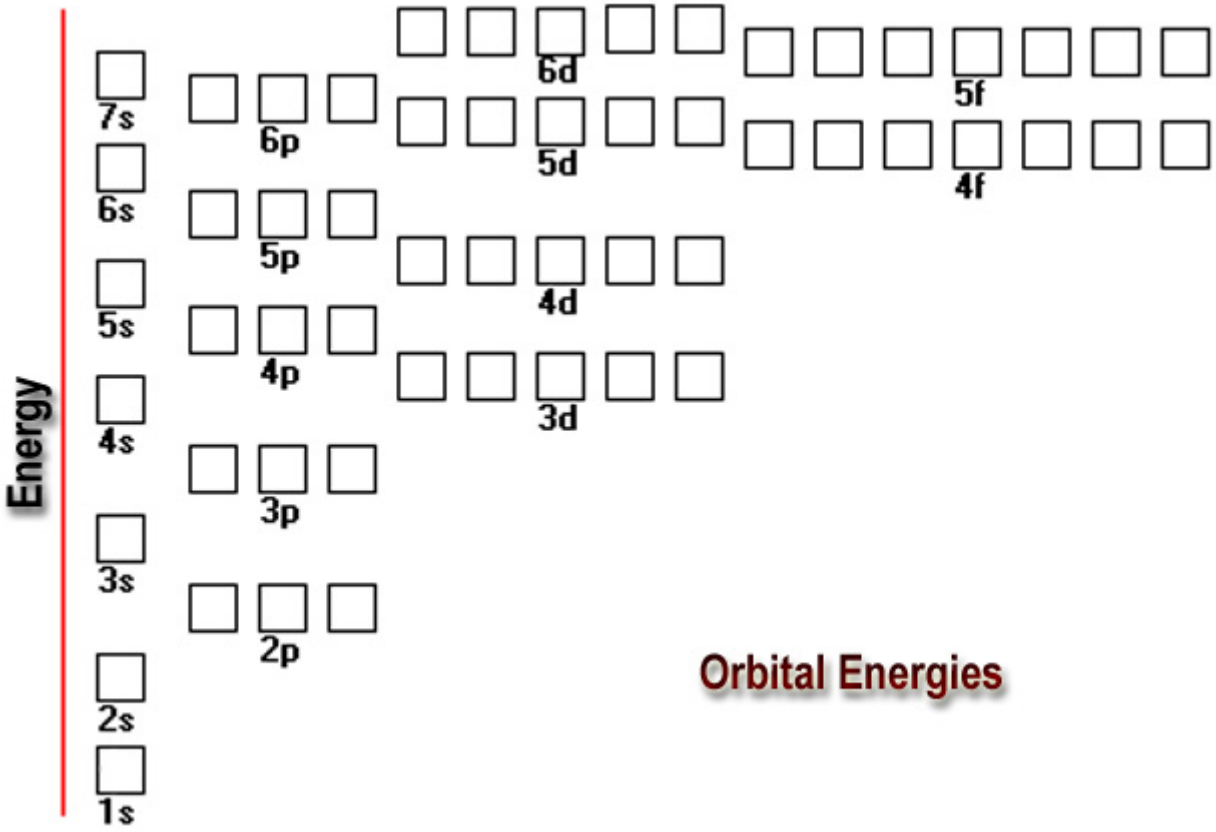
The Periodic Table

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



Some Approximate Single and Multiple Bond Lengths*

Single Bond Lengths

	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

Multiple Bond Lengths

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

*In picometers (pm); 1 pm = 10^{-12} m.

SID: | | | | | | | | | **Last:** _____ **First:** _____

Question 1
6 Points

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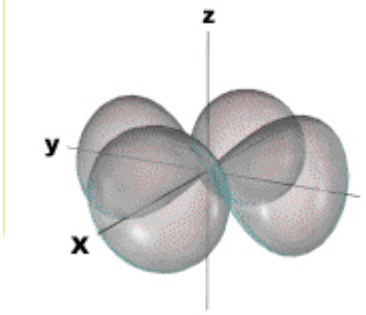


Circle the correct answers to the following questions, which relate to the orbital depicted on the left.

1. The orbital depicted is an **s, p, d, f or g** orbital.
2. The principal quantum number for this orbital cannot be: **2 3 4**
3. The likely specific designation for this orbital:

   2s, 3s, $2p_x$, $2p_y$, $2p_z$, $3p_x$, $3p_y$, $3p_z$, $2d_{xy}$, $2d_{xz}$, $2d_{yz}$, $2d_{z2}$, $2d_{x2-y2}$, $3d_{xy}$, $3d_{xz}$, $3d_{yz}$, $3d_{z2}$, $3d_{x2-y2}$

Question 2
18 Points

Do Not Write Here

1. Write the complete electronic configuration for the following:

   Sodium atom _____ **Oxide** ion _____

2. What is the valence electron configuration for:

   Phosphorus atom _____ **Bromide** ion _____

3. How many valence electrons do the following have:

   Zenon (Xe) _____ **Li^+** _____

4. A main group element with the valence electron configuration **$3s^2 3p^4$** is in periodic group _____ . It forms a monatomic ion with a charge of _____ . The symbol for this element is _____ .

Question 3
6 Points

Label the following atom/ions as either paramagnetic (P) or diamagnetic (D):

1. Be _____ 2. C _____ 3. F^- _____

Question 4
8 Points

Do Not Write Here

With respect to the elements, **Rb**, **Cs**, **K** and **Na**:

A. Which element would you expect to have the smallest atomic radius? _____

B. Which element would you expect to be most metallic? _____

C. Which element would you expect to have the largest ionization energy? _____

D. Which element would you expect to be least electronegative? _____

Question 5
8 Points

With respect to the elements, **B**, **Li**, **Be** and **C**:

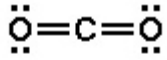
A. Which element would you expect to have the smallest atomic radius? _____

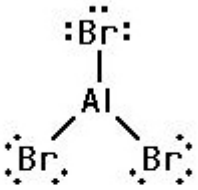
B. Which element would you expect to be most metallic? _____

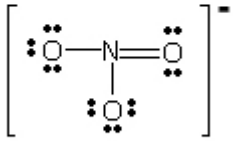
C. Which element would you expect to have the smallest ionization energy? _____

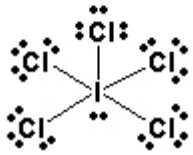
D. Which element would you expect to be most electronegative? _____

Question 6
12 Points

a) 

b) 

c) 

d) 

With respect to the Lewis Dot Structures depicted on the left: **(Circle the correct letter)**

1. Identify all whose central atom obeys the octet rule.
   a b c d
2. Identify all whose central atom has more than an octet. **a b c d**
3. Identify the structure whose central atom has the greatest number of bond pair electrons.
   a b c d
4. Identify the structure that has the least number of lone pair electrons. **a b c d**
5. Identify the structure(s) that have resonance structures. **a b c d**

Question 7
16 Points

Draw the Lewis Dot Structure for each of the following molecules:

NHF_2	**H_2CO**
ClO_3^-	**BF_3**

SID: | | | | | | | | | **Last:** _____ **First:** _____

Question 8
9 Points

Draw the three resonance structures for CO_3^{2-}.

Do Not Write Here

Question 10
5 Points

The anticipated Carbon to Oxygen bond length in CO_3^{2-} is: (check the correct answer)

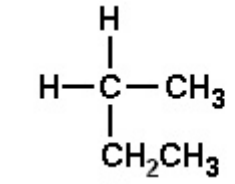
_____143pm _____between 143pm and 122pm _____122 pm

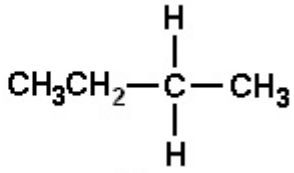
_____between 122pm and 113pm _____113pm

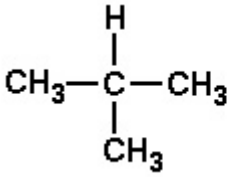
Question 11
12 Points

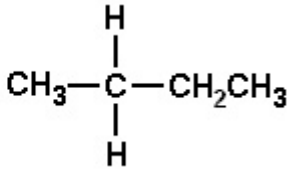
Give the correct name for the following straight chain alkane,

$CH_3CH_2CH_2CH_2CH_2\ CH_2CH_2CH_3$ _____









Three of the structures depicted on the left represent the same molecule. Circle the structure that does not match the others

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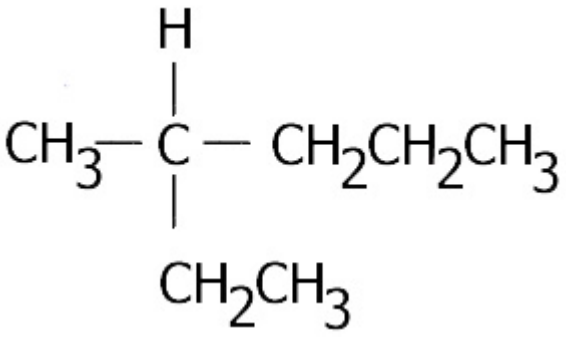

Fill in the missing portions of the correct name given below for the molecule depicted on the left.

__-methyl_____ane

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