

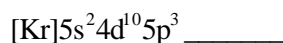
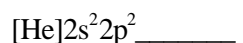
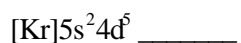
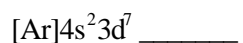
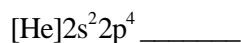
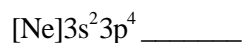
This exam consists of 4 pages. Make sure you have one of each. Print your name at the top of each page now. A fifth page contains a periodic chart, and some electronegativities. You may tear it off and use it for scratch paper.

If anything confuses you or is not clear, raise your hand and ask!

Page	Points
1	_____
2	_____
3	_____
4	_____
Total	_____

PLEASE NOTE: The final exam for the course is a block exam, given from 7:30-9:30 a.m. Tuesday, Dec 10. It is not given at the time for 12:20 pm MWF classes. THE EXAM WILL BE IN 101 CARRAWAY.

(6) 1. Give the symbol for the neutral atoms with the following electron configurations.



(6) 2. Give the electron configuration for the following atoms or ions.

Ba

Si

Fe³⁺

N³⁻

Se²⁻

Zr

(6) 3. How many **unpaired electrons** are found in the following atoms?

V _____

Co _____

Sc _____

K _____

Cu _____

Mn _____

(4) 4. Circle the **smallest** and put an **X** through the **largest** atom or ion in each of the following lists.

(a) O

Ca

P

N

(b) Sr²⁺

Rb⁺

Se²⁻

Br⁻

- (12) 10. Draw **two** resonance structures for the each of the following molecules or ions, without expanding any octets.



- (8) 11. Draw two resonance structures for the following ion, one without expanding any octets, the other minimizing formal charge but expanding an octet if necessary. Indicate the formal charge on **each** atom in **each** structure.



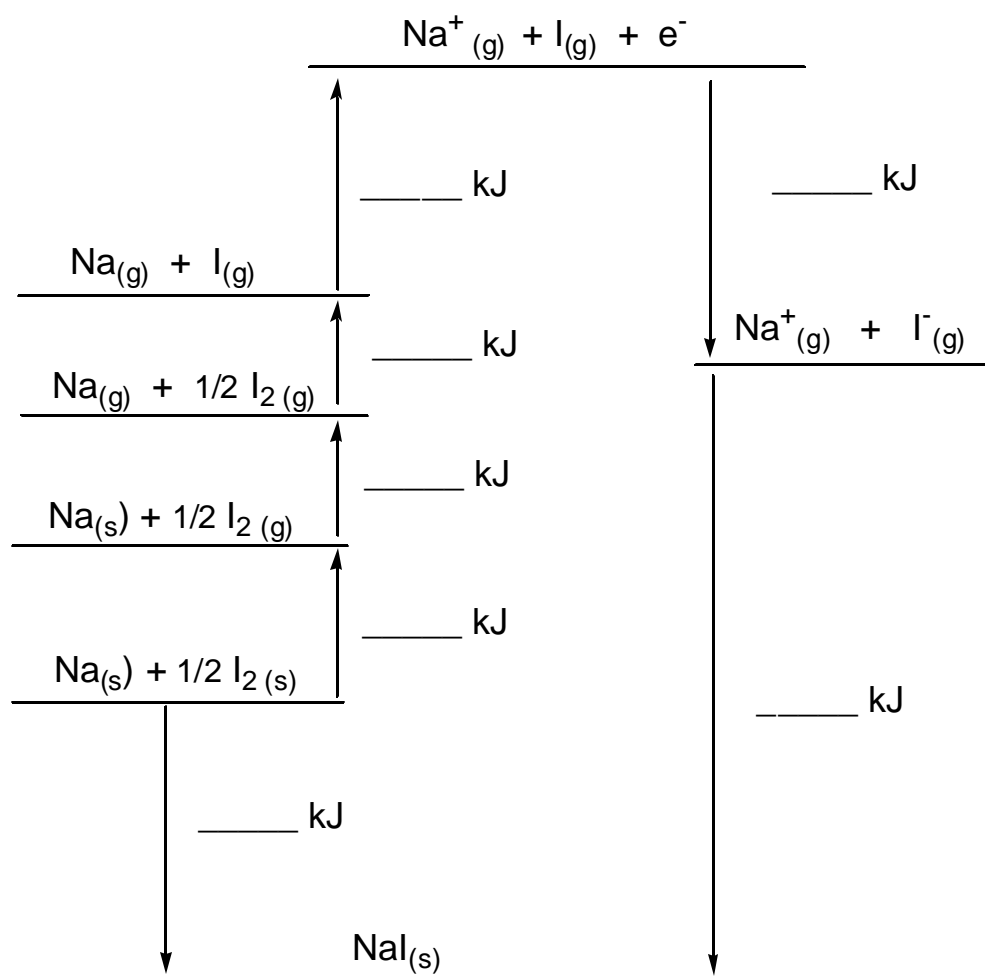
no expanded octet

minimized formal charges

- (13) 12. Draw **three** resonance structures for CNO^- (nitrogen is the central atom, an exception to our rule about central atoms). Calculate the formal charge on **each** atom in **each** structure. Circle the structure which you believe is the **best** of the three.

- (14) 13. Below is a Born-Haber diagram describing how one can calculate the lattice energy of $\text{NaI}_{(s)}$. Given the following information, fill in the blanks in the diagram with the appropriate energy quantity (showing the correct sign for the arrow direction), then calculate the lattice energy and place that value in the correct blank as well.

Heat of formation of $\text{NaI}_{(s)} = -287.8 \text{ kJ/mol}$
 Ionization energy of $\text{Na}_{(g)} = +496 \text{ kJ/mol}$
 Electron affinity of $\text{I}_{(g)} = -295 \text{ kJ/mol}$
 Bond energy of $\text{I}_{2(g)} = 151 \text{ kJ/mol}$
 Heat of sublimation of $\text{Na}_{(s)} = 107.3 \text{ kJ/mol}$
 Heat of sublimation of $\text{I}_{2(s)} = 62.4 \text{ kJ/mol}$



1A 1 H 1.008	2A 4 Be 9.01																	8A 2 He 4.003
3 Li 6.94												3A 5 B 10.81	4A 6 C 12.01	5A 7 N 14.01	6A 8 O 16.00	7A 9 F 19.00	10 Ne 20.18	
11 Na 22.99	12 Mg 24.31	3B	4B	5B	6B	7B	-----	8B	-----	1B	2B	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95	
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80	
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.4	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29	
55 Cs 132.91	56 Ba 137.33	57 La* 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)	
87 Fr (223)	88 Ra 226.03	89 Ac** 227.03	104 Rf (263)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (269)	109 Mt (268)	110 Uun (272)	111 Uuu	112 Uub	113	114 Uuq	115	116 Uuh	117	118 Uuo	

*Lanthanides

58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
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** Actinides

90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (254)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)
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Some Electronegativities

H 2.1	(2A)	(3A)	(4A)	(5A)	(6A)	(7A)
Li 1.0	Be 1.5	B 2.0	C 2.5	N 3.0	O 3.5	F 4.0
Na 0.9	Mg 1.2	Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0
K 0.8	Ca 1.0	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8
	[Transition Metals 1.0-2.4]					
Rb 0.8					Te 2.1	I 2.5
Cs 0.7					Po 2.0	At 2.2