

4. (4 pts) Fill in the blanks with the correct answer to each of the following.
- (a) Which has the **smaller** ionization energy, $_{32}\text{Ge}$ or $_{15}\text{P}$? _____
- (b) Which is **largest** (size): $_{35}\text{Br}^-$, $_{34}\text{Se}^{2-}$ or $_{33}\text{As}^{3-}$? _____
- (c) Which reacts **more readily** with sulfur, $_{37}\text{Rb}$ or $_{55}\text{Cs}$? _____
(i.e. lose an e^- more easily)
- (d) Which has the **more** negative electron affinity, $_{34}\text{Se}$ or $_{17}\text{Cl}$? _____
5. (3 pts) Explain how the effective nuclear charge, Z_{eff} , changes going across a row from left to right in the periodic table and why?
6. (3 pts) Explain how and why the size, (radius), changes going across a row from left to right in the periodic table?

7. (3 pts) Explain how the ionization energy, IE, changes going across a row from left to right in the periodic table and why?
8. (3 pts) Explain why the electron affinity for Beryllium is positive while that for Boron is negative.
9. (2 pts) Write the equation corresponding to the first electron affinity of Oxygen.

10. (2 pts) Write the equation corresponding to the second ionization energy of Ca.
11. (3 pts) Write the electron configuration for the following ion by starting with the electron configuration for the neutral atom and then the ion given. **Show work.**
 Fe^{2+}
12. (3 pts) The electrons that are removed from $_{48}\text{Cd}$ to form the Cd^{2+} ion are from the ____ subshell and the electrons that are removed from $_{83}\text{Bi}$ to form the Bi^{2+} ion are from the ____ subshell.
a) 5s; 6p b) 5s; 5s c) 4d; 4f d) 5d; 6p e) 4s; 5d

USEFUL INFORMATION

$$1 \text{ amu} = 1.66 \times 10^{-24} \text{ g}$$

$$\text{Avogadro's number, } N_A = 6.02 \times 10^{23} \text{ particles/mole}$$

$$1 \text{ \AA} = 10^{-10} \text{ m}$$

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s} \quad c = 3.00 \times 10^8 \text{ m/s} \quad R_H = 1.097 \times 10^7 \text{ m}^{-1} \quad 1 \text{ J} = 1 \text{ kg}\cdot\text{m}^2/\text{s}^2$$

$$E = h\nu \quad c = \lambda\nu \quad E_{\text{Hydrogen}} = (-hcR_H)(1/n_f^2) \quad \Delta E_{\text{Hydrogen}} = -(2.18 \times 10^{-18} \text{ J})(1/n_f^2 - 1/n_i^2)$$

$$1/\lambda = R_H (1/n_f^2 - 1/n_i^2) \quad \lambda = h/(mv) \quad p = mv \quad \Delta x \cdot \Delta p \geq h/4\pi,$$

$$\text{electron charge, } e = 1.602 \times 10^{-19} \text{ C} \quad 1D = 3.34 \times 10^{-30} \text{ C}\cdot\text{m} \quad \mu = Q\cdot r$$

	IA	IIA	IIIB	IVB	VB	VIB	VII B	VIII B			IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1.008 H 1																	4.003 He 2
2	6.941 Li 3	9.012 Be 4											10.811 B 5	12.011 C 6	14.007 N 7	15.999 O 8	18.998 F 9	20.179 Ne 10
3	22.990 Na 11	24.305 Mg 12											26.98 Al 13	28.09 Si 14	30.974 P 15	32.06 S 16	35.453 Cl 17	39.948 Ar 18
4	39.098 K 19	40.08 Ca 20	44.96 Sc 21	47.88 Ti 22	50.94 V 23	52.00 Cr 24	54.94 Mn 25	55.85 Fe 26	58.93 Co 27	58.69 Ni 28	63.546 Cu 29	65.38 Zn 30	69.72 Ga 31	72.59 Ge 32	74.92 As 33	78.96 Se 34	79.904 Br 35	83.80 Kr 36
5	85.47 Rb 37	87.62 Sr 38	88.91 Y 39	91.22 Zr 40	92.91 Nb 41	95.94 Mo 42	98 Tc 43	101.07 Ru 44	102.91 Rh 45	106.42 Pd 46	107.87 Ag 47	112.41 Cd 48	114.82 In 49	118.69 Sn 50	121.75 Sb 51	127.60 Te 52	126.90 I 53	131.39 Xe 54
6	132.91 Cs 55	137.33 Ba 56	138.91 La 57	178.39 Hf 72	180.95 Ta 73	183.85 W 74	186.21 Re 75	190.23 Os 76	192.22 Ir 77	195.08 Pt 78	196.97 Au 79	200.59 Hg 80	204.38 Tl 81	207.2 Pb 82	208.98 Bi 83	209 Po 84	210 At 85	222 Rn 86
7	223 Fr 87	226.03 Ra 88	227.03 Ac 89	261 Rf 104	262 Ha 105	263 Sg 106	262 Ns 107	265 Hs 108	266 Mt 109	269	272	277						

Lanthanide Series	140.12 Ce 58	140.91 Pr 59	144.24 Nd 60	145 Pm 61	150.36 Sm 62	151.96 Eu 63	157.25 Gd 64	158.93 Tb 65	162.50 Dy 66	164.93 Ho 67	167.26 Er 68	168.93 Tm 69	173.04 Yb 70	173.04 Lu 71
Actinide Series	232.04 Th 90	231.04 Pa 91	238.03 U 92	237.05 Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	Lr 103

A PERIODIC CHART OF THE ELEMENTS
(Based on ¹²C)