CH 141 Practice Test I　　　　　　Name ________________________________
Fall 2014
Short answers

1. a. The electron was the first sub-atomic particle that was discovered (by Thompson.) Why do you think it was the first?

   b. Describe the evidence that was used to support the discovery of the electron. Why was it assumed that electrons exist within atoms, rather than are created in the course of the experiment?

   c. Draw a picture of Thompson's proposed atomic structure and indicate how it differs from Dalton's.

   d. Rutherford discovered the existence of a small positively charged nucleus within each atom. What observation was this conclusion based on? How did this change Thompson's atomic theory ?

   e. Draw a picture of Rutherford's model of the atom; what is wrong with it?

2. Fluorine (F_2) and Chlorine (Cl_2) both exist as diatomic molecules. Fluorine has a boiling point of –85.03 K, and chlorine has a boiling point of 239 K.

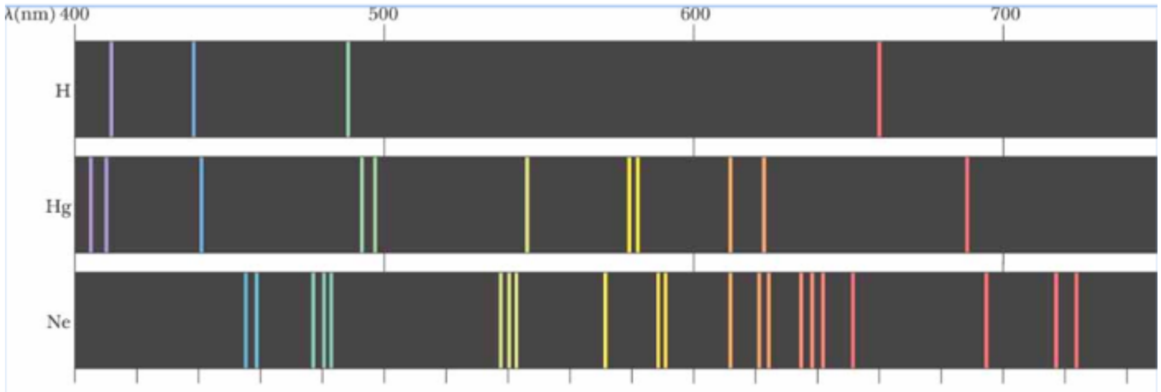
a. Draw a graph showing the change in potential energy as two molecules of fluorine get closer to each other. Label the position where the molecules are **most stable**. Explain why the potential energy changes (either increases or decreases) as the two molecules approach.

b. Now using a dotted line draw a similar curve – **on the same set of axes**. Show the change in potential energy when two chlorine molecules approach each other. Compare the energy changes and position of greatest stability for chlorine to the curve you drew for fluorine. Explain why they are different.

c. Why do molecules of fluorine attract each other? (That is, why can fluorine exist as a liquid or solid?)

d. Why does adding thermal energy make fluorine change from a liquid to a gas?

3. Below are examples of atomic emission spectra (for H, Hg and Ne).

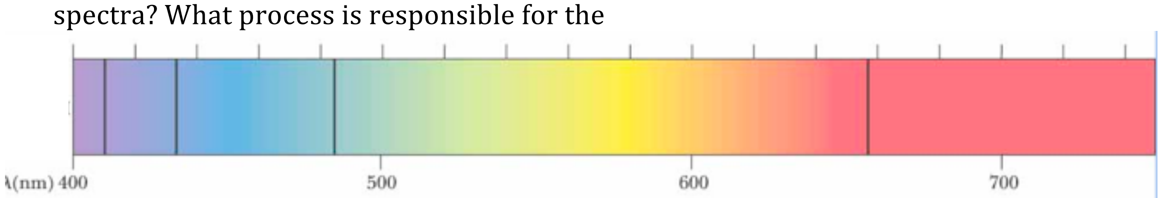


a. Explain what process is responsible for the lines of e/m radiation on an emission spectrum.

b. Explain why the lines are different for each element.

c. If a spectrum was taken on the emissions from a star 300 light years away that contained Hg, would it look the same or different? Explain?

e. Below is an example of an absorption spectrum. Why does it look different to the emission spectra? What process is responsible for the



f. What element is most likely giving rise to this absorption spectrum? On what basis did you make this decision?

$h = 6.626 \times 10^{-34}$ J·s (1 J = $1 kg.m^2/s^2$)

Mass of an electron is 9.1×10^{-31} kg

speed of light = 3.0×10^8 m/s

Avogadros Number = 6.022×10^{23}

$c = \lambda \nu$

$\lambda = h/mv$

$E = h \nu$

PERIODIC TABLE OF THE ELEMENTS

IA 1	IIA 2	IIIB 3	IVB 4	VB 5	VIB 6	VIIB 7	VIIIB 8	VIIIB 9	VIIIB 10	IB 11	IIB 12	IIIA 13	IVA 14	VA 15	VIA 16	VIIA 17	VIIIA 18
1 H 1.008																	2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.066	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.933	28 Ni 58.69	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.905	56 Ba 137.327	57 La 138.906	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 (210)	85 At (210)	86 Rn (220)
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110	111	112						

Lanthanides	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.97	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
Actinides	90 Th 232.04	91 Pa (231)	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)