Chem. 101	*2nd Hour Exam*	**Date: 28/4/2009**	*Time: 60 Min*

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Useful Constants: **Avogadro's constant = 6.023×10^{23} mol^{-1};   c = 3×10^8 m.s^{-1};**

R = 0.0821 L.atm.mol^{-1}.K^{-1} h = 6.63×10^{-34} J.s.

1 1A	2 2A	3	4	5	6	7	8	9	10	11	12	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
1 H 1.008																	2 He 4.003
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	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 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La* 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226	89 Ac† (227)															

1.	A	B	C	D	E	8.	A	B	C	D	E
2.	A	B	C	D	E	9.	A	B	C	D	E
3.	A	B	C	D	E	10.	A	B	C	D	E
4.	A	B	C	D	E	11.	A	B	C	D	E
5.	A	B	C	D	E	12.	A	B	C	D	E
6.	A	B	C	D	E	13.	A	B	C	D	E
7.	A	B	C	D	E						

□ *CHOOSE THE BEST ANSWER IN THE FOLLOWING:*   (2 Points each)

1. Which combination of quantum numbers is *not* allowed?

	n	l	m_l	m_s
A)	6	-5	-1	½
B)	6	5	-5	½
C)	8	2	2	½
D)	9	8	-4	½

   E) All are allowed.

2. A 8.13-L sample of carbon monoxide is collected at 55 ^{o}C and 0.892 atm. What volume will the gas occupy at 1.05 atm and 20.ºC?
   A) 8.55 L
   B) 7.73 L
   C) 2.51 L
   D) 6.17 L
   E) 22.4 L

3. Calculate the root mean square velocity for the O_2 molecules in a sample of O_2 gas at 18.0 ^{o}C. (R = 8.3145 J/K.mol)
   A) 2.868×10^{26} m/s
   B) 275.0 m/s
   C) 15.06 m/s
   D) 118.5 m/s
   E) 476.3 m/s

4. What is the wavelength of light that is emitted when an excited electron in the hydrogen atom falls from n = 5 to n = 3?   Note: $En = 2.18 \times 10^{-18}$ J $(1/n^2)$
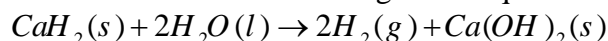   A) 1.55×10^{-19} m
   B) 7.80×10^5 m
   C) 8.21×10^{-7} m
   D) 1.28×10^{-6} m
   E) 2.18×10^{-18} m

5. When the equation $Cl_2 \rightarrow Cl^- + ClO_3^-$ (basic solution) is balanced using the smallest whole-number coefficients, the coefficient of OH^- is:
   A) 3
   B) 6
   C) 2
   D) 1
   E) 4

6. Light can have a wavelength of 581 nm. The energy of a photon of this light is
   A) 5.16×10^{14} J
   B) 3.42×10^{-19} J
   C) 2.92×10^{18} J
   D) 5.81×10^{-7} J
   E) 1.15×10^{-31} J

7. Calcium hydride reacts with water according to the equation:
$$CaH_2(s) + 2H_2O(l) \rightarrow 2H_2(g) + Ca(OH)_2(s)$$
   If 84.0 g of CaH_2 and 36.0 g of H_2O were mixed, what would be the produced volume of H_2 at 273 K and a pressure of 1403 torr?
   A) 437 L
   B) 24.2 L
   C) 44.8 L
   D) 12.1 L
   E) none of these

8. It is found that 250. mL of a gas at STP has a mass of 1.65 g. What is the molar mass?
   A) 22.4 g/mol
   B) 54.3 g/mol
   C) 6.60 g/mol
   D) 11.2 g/mol
   E) 148 g/mol

9. You have 23.5 g of O_2 gas in a container with twice the volume as one with CO_2 gas. The pressure and temperature of both containers are the same. Calculate the mass of carbon dioxide gas you have in the container.
   A) 16.2 g
   B) 32.3 g
   C) 1.47 g
   D) 0.367 g
   E) 23.5 g

10. The electron configuration of indium (In) is
   A) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4d^{10} 4p^1$
   B) $1s^2 3s^2 2p^6 3s^2 3p^6 4s^2 4p^6 4d^{10} 5s^2 5d^{10} 5p^1$
   C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^1$
   D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^1 5d^{10}$
   E) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^{14} 5s^2 5p^1$

11. The oxidation number of Fe in $K_3Fe(CN)_6$ is
    A) +3
    B) +2
    C) +1
    D) −3
    E) −4

12. Which of the following would have a higher rate of effusion than C_2H_2?
    A) CO_2
    B) N_2
    C) CH_4
    D) O_2
    E) Cl_2

13. How many electrons can be described by the quantum numbers $n = 3$, $l = 3$, $m_l = 1$?
    A) 6
    B) 0
    C) 10
    D) 14
    E) 2

GOOD LUCK !

Answer Key

1. A
2. D
3. E
4. D
5. B
6. B
7. B
8. E
9. A
10. C
11. A
12. C
13. B