

**Chem 111****10:10a section****Evening Exam #1 Makeup**

This exam is composed of 20 questions, 6 of which require mathematics that might require a calculator. Go initially through the exam and answer the questions you can answer *quickly*. Then go back and try the ones that are more challenging to you and/or that require calculations.

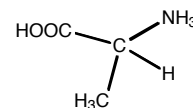
*As discussed on the course syllabus, honesty and integrity are absolute essentials for this class. In fairness to others, dishonest behavior will be dealt with to the full extent of University regulations.*

$E = h\nu = \frac{hc}{\lambda}$	<b>Some common ions:</b> $\text{PO}_4^{3-}$ $\text{CN}^-$ $\text{CH}_3\text{CO}_2^-$ $\text{NO}_2^-$ $\text{NO}_3^-$ $\text{CO}_3^{2-}$ $\text{SO}_3^{2-}$ $\text{SO}_4^{2-}$	$h = 6.626 \times 10^{-34} \text{ J s}$ $c = \frac{2.998 \times 10^8 \text{ m}}{\text{s}}$ $N = \frac{6.022 \times 10^{23}}{\text{mol}}$
1 mL = 1 cm <sup>3</sup>		

1. What is the charge of ions formed from **O**?
- 1) +1                      2) +2                      3) -1                      4) -2                      5) -3

2. What is the charge of ions formed from **Rb**?
- 1) +1                      2) +2                      3) -1                      4) -2                      5) -3

3. The correct molecular formula for the molecule at right is:
- 1) C<sub>3</sub>O<sub>2</sub>NH<sub>3</sub>      2) C<sub>2</sub>ONH<sub>8</sub>      3) C<sub>3</sub>O<sub>2</sub>NH<sub>8</sub>      4) C<sub>3</sub>ONH<sub>3</sub>



4. Which of the following describes the compound **Ba(NO<sub>3</sub>)<sub>2</sub>**?
- 1) If the compound dissolved in water it would not conduct electricity.  
 2) The compound is ionic.  
 3) If the compound dissolved in water it would be a non-electrolyte.  
 4) The compound is molecular.  
 5) Both (1) and (2)

5. An aqueous solution of **K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>** is:
- 1) an element    4) a homogeneous mixture  
 2) an ionic compound    5) a heterogeneous mixture  
 3) a nonionic compound

6. What is the formula of the ionic compound expected to form between the elements **Cl** and **K**?
- 1) KCl                      2) K<sub>2</sub>Cl                      3) K<sub>2</sub>Cl<sub>3</sub>                      4) K<sub>3</sub>Cl<sub>2</sub>                      5) KCl<sub>2</sub>

7. What is the formula of the compound formed between the ions  $\text{Co}^{3+}$  and  $\text{O}^{2-}$  ?  
1)  $\text{CoO}$       2)  $\text{Co}_2\text{O}$       3)  $\text{Co}_2\text{O}_3$       4)  $\text{Co}_3\text{O}_2$       5)  $\text{CoO}_2$
8. What is the formula of the compound formed between the ions  $\text{Co}^{3+}$  and  $\text{CN}^-$ ?  
1)  $\text{CoCN}$       2)  $\text{Co}_2\text{CN}$       3)  $\text{Co}(\text{CN})_3$       4)  $\text{Co}_3(\text{CN})_2$       5)  $\text{Co}(\text{CN})_2$
9. Which of the following is *not* an ionic compound?  
1)  $\text{Ca}(\text{CH}_3\text{CO}_2)_2$     2)  $\text{CO}$       3)  $\text{CrO}$       4)  $\text{NaCN}$       5)  $\text{AgCl}$
10. What is the formula for the **hydrogen phosphate** ion ?  
1)  $\text{H}_3\text{PO}_4$       2)  $\text{H}_2\text{PO}_4^-$       3)  $\text{HPO}_4^{2-}$       4)  $\text{H}_3\text{P}^-$       5)  $\text{HP}^{2-}$
11. What is the molar mass of **carbon dioxide**?  
1) 64 g/mol      2) 28 g/mol      3) 44 g/mol      4) 16 g/mol      5) 128 g/mol
12. Which of the following is a valid empirical formula?  
1)  $\text{Fe}_4\text{Cl}_6$       2)  $\text{Fe}_2\text{Cl}_2$       3)  $\text{FeCl}_2$       4)  $\text{Fe}_6\text{Cl}_4$       5)  $\text{Fe}_4\text{Cl}_2$

13. A sample of cinnamaldehyde,  $\text{C}_9\text{H}_8\text{O}$ , contains 0.153 mol of the compound. What is the mass of this sample, in grams?
- 1) 3.02 g      2) 13.7 g      3) 27.4 g      4) 0.0730 g      5) 20.2 g
14. What is the (mass) percent composition of **H** in  $\text{C}_9\text{H}_8\text{O}$ ?
- 1) 6.87%      2) 50%      3) 61.2%      4) 81.8%      5) 30.6%
15. Ethylene glycol,  $\text{C}_2\text{H}_6\text{O}_2$ , is an ingredient in automobile antifreeze. Its density is  $1.11 \text{ g/cm}^3$  at  $20^\circ\text{C}$ . If you need exactly 450 mL of ethylene glycol, what mass of the compound, in grams, is required?
- 1) 555 g      2) 500 g      3) 1.80 g      4) 62.0 g      5) 68.6 g

16. You've decided you don't like Chemistry after all and have decided to travel Europe instead. You're driving a rental car through France and see petrol selling at 0.81 euros per liter.

0.88 euro = 1.0 US dollar 4.546 liters = 1 gallon
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How much does petrol cost in U.S. dollars per gallon?

- 1) \$2.77/gal    2) \$0.81/gal    3) \$4.20/gal    4) \$3.15/gal    5) \$4.72/gal
17. Which radiation below has the shortest wavelength (don't use your calculator!)?
- 1) blue light ( $6.8 \times 10^{14}$  Hz)                      4) microwaves ( $2.4 \times 10^9$  Hz)  
2) green light ( $6.0 \times 10^{14}$  Hz)                      5) x-rays ( $5.0 \times 10^{12}$  Hz)  
3) red light ( $4.5 \times 10^{14}$  Hz)
18. Which radiation below has the lowest energy (don't use your calculator!)?
- 1) blue light ( $6.8 \times 10^{14}$  Hz)                      4) gamma rays ( $8.0 \times 10^{21}$  Hz)  
2) green light ( $6.0 \times 10^{14}$  Hz)                      5) x-rays ( $5.0 \times 10^{18}$  Hz)  
3) red light ( $4.5 \times 10^{14}$  Hz)
19. What is the wavelength of visible light with frequency  $5.00 \times 10^{14}$  Hz?
- 1) 600 nm    2) 300 nm    3) 500 nm    4) 162 nm    5) 280 nm
20. What is the catalog number for this class?
- 1) 241            2) 111            3) 222            4) 3.14159            5) 68.6 g

## PERIODIC TABLE OF THE ELEMENTS

1A	2A	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A
1 <b>H</b> 1.008																	2 <b>He</b> 4.003
3 <b>Li</b> 6.939	4 <b>Be</b> 9.012											5 <b>B</b> 10.81	6 <b>C</b> 12.01	7 <b>N</b> 14.01	8 <b>O</b> 16.00	9 <b>F</b> 19.00	10 <b>Ne</b> 20.18
11 <b>Na</b> 22.99	12 <b>Mg</b> 24.31											13 <b>Al</b> 26.98	14 <b>Si</b> 28.09	15 <b>P</b> 30.97	16 <b>S</b> 32.07	17 <b>Cl</b> 35.45	18 <b>Ar</b> 39.95
19 <b>K</b> 39.10	20 <b>Ca</b> 40.08	21 <b>Sc</b> 44.96	22 <b>Ti</b> 47.90	23 <b>V</b> 50.94	24 <b>Cr</b> 52.00	25 <b>Mn</b> 54.94	26 <b>Fe</b> 55.85	27 <b>Co</b> 58.93	28 <b>Ni</b> 58.71	29 <b>Cu</b> 63.55	30 <b>Zn</b> 65.39	31 <b>Ga</b> 69.72	32 <b>Ge</b> 72.61	33 <b>As</b> 74.92	34 <b>Se</b> 78.96	35 <b>Br</b> 79.90	36 <b>Kr</b> 83.80
37 <b>Rb</b> 85.47	38 <b>Sr</b> 87.62	39 <b>Y</b> 88.91	40 <b>Zr</b> 91.22	41 <b>Nb</b> 92.91	42 <b>Mo</b> 95.94	43 <b>Tc</b> (99)	44 <b>Ru</b> 101.1	45 <b>Rh</b> 102.9	46 <b>Pd</b> 106.4	47 <b>Ag</b> 107.9	48 <b>Cd</b> 112.4	49 <b>In</b> 114.8	50 <b>Sn</b> 118.7	51 <b>Sb</b> 121.8	52 <b>Te</b> 127.6	53 <b>I</b> 126.9	54 <b>Xe</b> 131.3
55 <b>Cs</b> 132.9	56 <b>Ba</b> 137.3	57 <b>La</b> 138.9	72 <b>Hf</b> 178.5	73 <b>Ta</b> 181.0	74 <b>W</b> 183.8	75 <b>Re</b> 186.2	76 <b>Os</b> 190.2	77 <b>Ir</b> 192.2	78 <b>Pt</b> 195.1	79 <b>Au</b> 197.0	80 <b>Hg</b> 200.6	81 <b>Tl</b> 204.4	82 <b>Pb</b> 207.2	83 <b>Bi</b> 209.0	84 <b>Po</b> (209)	85 <b>At</b> (210)	86 <b>Rn</b> (222)
87 <b>Fr</b> (223)	88 <b>Ra</b> 226.0	89 <b>Ac</b> 227.0	104 <b>Unq</b> (261)	105 <b>Unp</b> (262)	106 <b>Unh</b> (263)	107 <b>Uns</b> (262)	108 <b>Uno</b> (265)	109 <b>Une</b> (266)									

58 <b>Ce</b> 140.1	59 <b>Pr</b> 140.9	60 <b>Nd</b> 144.2	61 <b>Pm</b> (145)	62 <b>Sm</b> 150.4	63 <b>Eu</b> 152.0	64 <b>Gd</b> 157.3	65 <b>Tb</b> 158.9	66 <b>Dy</b> 162.5	67 <b>Ho</b> 164.9	68 <b>Er</b> 167.3	69 <b>Tm</b> 168.9	70 <b>Yb</b> 173.0	71 <b>Lu</b> 175.0
90 <b>Th</b> 232.0	91 <b>Pa</b> 231.0	92 <b>U</b> 238.0	93 <b>Np</b> 237.0	94 <b>Pu</b> (244)	95 <b>Am</b> (243)	96 <b>Cm</b> (247)	97 <b>Bk</b> (249)	98 <b>Cf</b> (251)	99 <b>Es</b> (252)	100 <b>Fm</b> (257)	101 <b>Md</b> (258)	102 <b>No</b> (259)	103 <b>Lr</b> (260)