The Periodic Table

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
H 1 1.01																	He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31											Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263)	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)			

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11

$$pH = pKa + \log_{10} \frac{[Base]}{[Acid]}$$

SID | | | | | | | | | Last _____ First _____

Question 1 (8 Points)

a. Write a **net ionic equation** to show that **perchloric** acid, behaves as an acid in water.

$HClO_4(aq) + H_2O(l)$ _____ _____ + _____

(= or ⇔)

b. Write a **net ionic equation** to show how **ammonia** behaves as a base in water.

$NH_3(aq) + H_2O(l)$ _____ _____ + _____

(= or ⇔)

Question 2 (8 Points)

a. HNO_2 _____

b. C_9H_7N _____

c. CH_3COOH _____

d. $Ba(OH)_2$ _____

1. Strong Acid

2. Weak Acid

3. Strong Base

4. Weak Base

Question 3 (6 Points) Circle the appropriate answers

	Acid	**K_a**
A	Acetic	$1.8x10^{-5}$
B	Histidine	$7.9x10^{-7}$
C	Carbonic	$4.2x10^{-7}$

a. The acid with the **smallest [H_3O^+]** in a **0.10** M aqueous solution is: **A** **B** ***C***

b. The acid with the **smallest pKa**: **A** **B** ***C***

c. The acid with the **smallest pOH** in a 0.10 M aqueous solution is: **A** **B** ***C***

Question 4 (4 Points) A student determines that the value of **pKa** for HCN = **9.29** .

What is the value of **Ka**? _____

Question 5 (9 Points) The **hydroxide** concentration in an aqueous solution is **$3.5x10^{-2}$** M.

a. The **hydronium** ion concentration is: _____ M

b. The **pH** of this solution is: _____

c. The **pOH** is: _____

Question 6 (10 Points)

1. For following net ionic equation:

$CN^-(aq) + HSO_3^-(aq) \Leftrightarrow HCN(aq) + SO_3^{2-}(aq)$

– Circle the appropriate answer – B-L = Bronsted Lowry

SO_3^{2-}	B-L Acid	B-L Base
HSO_3^-	B-L Acid	B-L Base

2. The formula for the conjugate _____ of **CN^-** is: _____

3. The formula for the conjugate _____ of **HSO_3^-** is: _____

Question 7
4 Points

A buffer solution made from **HClO** and **KClO** has a **pH** of **7.65**. If **pKa** for HClO is **7.46**, this implies that: ***- Circle the appropriate answer***

1. $[ClO^-]/[HClO] = 1$
2. $[ClO^-]/[HClO] > 1$
3. $[ClO^-]/[HClO] < 1$

Question 8
4 Points

A buffer solution made from **HF** and **NaF** has a pH of **2.87**. If pKa for HF is 3.**14**, what is the $[F^-]/[HF]$ in the buffer?

$[F^-]/[HF]$ _____

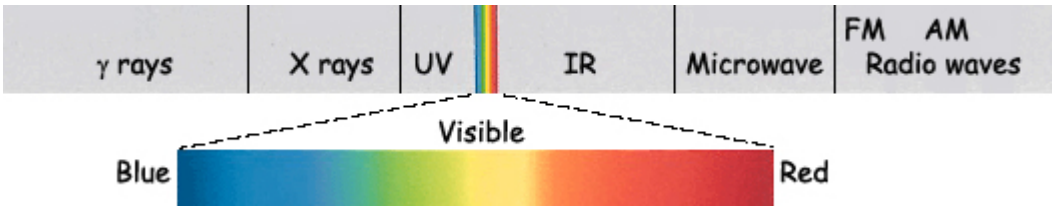
Question 9
8 Points

A small amount of **strong base** is added to a **buffer** made from **HCN** and **NaCN**. What changes if any will occur to the solution.

- Circle the appropriate answer

1.	**pH**	Increase	Decrease	Remain the same
2.	**$[OH^-]$**	Increase	Decrease	Remain the same
3.	**[HCN]**	Increase	Decrease	Remain the same
4.	**$[CN^-]$**	Increase	Decrease	Remain the same

Question 10
9 Points



a. Which has the **greater frequency**, **FM** or **AM** Radio Waves? _____

b. Which has the **longer wavelength**, **Red** or **Blue**? _____

c. The **region** with the **shortest wavelengths**? _____

Question 11
6 Points

a. When the nuclide ^{218}**Po** decays to ^{214}**Pb**, what kind of decay does ^{218}**Po** undergo? _____. The instability of ^{218}**Po** is probably due to the fact that it has too many _____.

b. What type of radioactive decay would account for the transformation of ^{51}**Cr** to ^{51}**V**? _____

Question 12 (3 Points) ^{131}I **(half-life, 8.04 days)** is used as a treatment for thyroid cancer. How many milligrams of a **32** milligram sample of ^{131}I will remain after **32.16** days?

_____ **Milligrams ^{131}I**

Question 13 (6 Points) According to the following reaction, how many **grams** of **oxygen gas** are required for the complete reaction of **21.3** grams of **carbon monoxide**?

carbon monoxide (g) + oxygen (g) = carbon dioxide (g)

_____ **Grams of oxygen gas**

Question 14 (7 Points) An aqueous solution of **hydrochloric acid** is standardized by titration with a **0.453** M solution of **barium hydroxide**.
If **29.4** mL of base are required to neutralize **15.6** mL of the acid, what is the **molarity** of the **hydrochloric acid** solution?

_____ **M**

Question 15 (8 Points) How many **grams** of solid **calcium hydroxide** are needed to exactly neutralize **18.3** mL of a **0.690 M perchloric acid** solution?
Assume that the volume remains constant.

_____ **g**

Exam III Score _____