

Name _____ Rec. TA/time _____

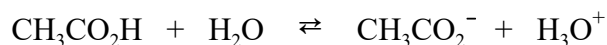
Show **ALL** your work or **EXPLAIN** to receive full credit. $R = 0.08206 \text{ L}\cdot\text{atm/mol}\cdot\text{K} = 8.314 \text{ J/mol}\cdot\text{K}$

1. (3 pts) You have the following data for three weak acids.

Weak Acid	K_a	Concentration (M)	Percent Ionization
HA	9.00×10^{-5}	0.100	3.0
HB	1.10×10^{-4}	0.300	1.9
HX	1.50×10^{-5}	0.010	3.8

What is the correct order for the strengths of these three acids, from weakest to strongest? **Explain!**

2. (3 pts) What change will occur for the following reaction if the acetic acid, $\text{CH}_3\text{CO}_2\text{H}$, solution is diluted from 0.1 to 0.01 M? **Explain!**



- a) a decrease in the fraction of acid dissociated
- b) an increase in the fraction of acid dissociated
- c) no change in the fraction of acid dissociated

3. (10 pts) You have a solution of 0.20 M formic acid, HCHO_2 , with $K_a = 1.8 \times 10^{-4}$, at 25°C (**Show all work, including ICE tables, assumptions & check for % error.**) **Show all work or explain!**
- a) What are $[\text{H}^+]$, $[\text{OH}^-]$, pH and pOH in this solution?
- b) What is the percent ionization of HCHO_2 in this solution?

4. (11 pts) You have a solution of 0.0942 M aniline, $\text{C}_6\text{H}_5\text{NH}_2$, with $K_b = 4.3 \times 10^{-10}$, at 25°C . (**Show the ICE table, state any assumptions made and check your percent error.**) **Show all work or explain!**

a) What are $[\text{H}^+]$, $[\text{OH}^-]$, pH and pOH in this solution?

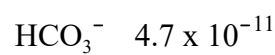
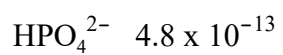
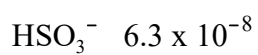
b) What is the percent ionization for $\text{C}_6\text{H}_5\text{NH}_2$ in this solution?

5. (6 pts) A 0.0100 M solution of an acid is 19.0% ionized at 25 °C. **Show all work or explain!**

a) What are the $[\text{H}^+]$ and **pH** of this solution?

b) What is the K_a for the acid? **Show the ICE table.**

6. (3 pts) Given the following K_a values, determine which species is the **strongest base**. **Explain!**



7. (2 pts) The K_a of a weak acid, HX, is 1.3×10^{-6} . What is the K_b for its conjugate base, X^- ?

8. (2 pts) Would you expect the following solutions to be acidic, neutral, or basic? **Explain or show work!**

a) KBrO_2

b) PbCl_2

9. (3 pts) Would you expect a solution of NH_4ClO to be acidic, neutral, or basic? (K_b for $\text{NH}_3 = 1.8 \times 10^{-5}$ and K_a for $\text{HClO} = 3.0 \times 10^{-8}$) **Explain or show work!**

10. (8 pts) What is the **pH** of a 0.30 M $(\text{CH}_3)_2\text{NH}_2\text{Cl}$ solution at 25°C ? ($(\text{CH}_3)_2\text{NH}$: $K_b = 5.4 \times 10^{-4}$, at 25°C) **(Show the ICE table, state any assumptions made and check your percent error.) Explain or show work!**

USEFUL INFORMATION

$$R = 0.08206 \text{ L-atm/mol-K} = 8.3145 \text{ J/mol-K}$$

	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	269 110	272 111	277 112									

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)