Dr. Zellmer | Chemistry 1220 | All Sections
Time: 7 PM Sun. | Spring Semester 2023 | February 26, 2023
40 min | Quiz VI

Name _____ Rec. TA/time _____

Show **ALL** your work or **EXPLAIN** to receive full credit. R = 0.08206 L•atm/mol•K = 8.314 J/mol•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, CH_3CO_2H, solution is diluted from 0.1 to 0.01 M? **Explain!**

$$CH_3CO_2H + H_2O \rightleftarrows CH_3CO_2^- + H_3O^+$$

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 $[H^+]$, $[OH^-]$, 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, $C_6H_5NH_2$, 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 $[H^+]$, $[OH^-]$, pH and pOH in this solution?

b) What is the **percent ionization** for $C_6H_5NH_2$ 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 **$[H^+]$** 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 **<u>strongest</u> base**. **Explain!**

HSO_3^- 6.3×10^{-8} HPO_4^{2-} 4.8×10^{-13} HCO_3^- 4.7×10^{-11}

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 $NH_3 = 1.8 \times 10^{-5}$ and K_a for $HClO = 3.0 \times 10^{-8}$) **Explain or show work!**

10. (8 pts) What is the **pH** of a 0.30 M $(CH_3)_2NH_2Cl$ solution at 25°C? ($(CH_3)_2NH$: $K_b = 5.4 \times 10^{-4}$, 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 L-atm/mol-K = 8.3145 J/mol-K

	IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB			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 ^{12}C)