

Chem 30 Unit 3 Assignment Key

Key

Jun 18th

1. d.

2. a

3. b

4. a) acids: $\text{H}_2\text{O}(\text{l})$ base: $\text{OH}^-(\text{aq})$
 $\text{H}_2\text{CO}_3(\text{aq})$ $\text{HCO}_3^-(\text{aq})$

b). Vinegar would form $\text{H}_3\text{O}^+(\text{aq})$ ions which would bond to the $\text{OH}^-(\text{aq})$ ions shifting equilibrium right.

$$5. \quad 5.6 \times 10^{-10} = \frac{[\text{H}_3\text{O}^+][\text{NH}_3(\text{aq})]}{[\text{NH}_4^+(\text{aq})]}$$

$$\frac{(0.25 \text{ mol/L}) (5.6 \times 10^{-10})}{(0.35 \text{ mol/L})} = [\text{H}_3\text{O}^+] = 4.0 \times 10^{-10} \text{ mol/L}$$

$$\text{pH} = -\log(4 \times 10^{-10} \text{ mol/L}) = 9.3979$$

$$= \underline{\underline{9.40}}$$

$$6. \quad K_v = K_a K_b$$

$$K_b = \frac{K_w}{K_a}$$

$$= \frac{1 \times 10^{-14}}{5.6 \times 10^{-10}}$$

$$= \underline{\underline{1.79 \times 10^{-5}}}$$

7a) products \searrow

b) reactants \nearrow

c) reactants \nearrow

d) products \searrow

8. a) $[H^+] = 0.3 M$ $pH = -\log(0.3) = \underline{\underline{0.52}}$

b) $[H^+] = 0.6 M$ $pH = -\log(0.6) = \underline{\underline{0.22}}$

9. a) $[OH^-] = 0.050 M$ $pOH = 1.30$ $pH = \underline{\underline{12.70}}$

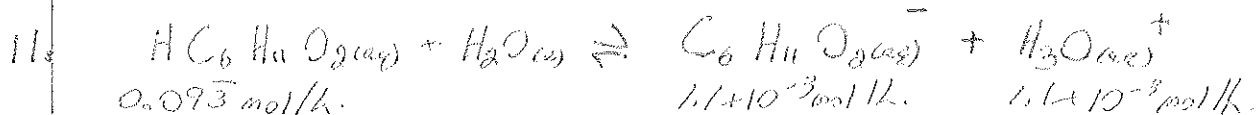
b) $[OH^-] = 0.00080 M$ $pOH = 3.10$ $pH = \underline{\underline{10.90}}$

10. 8. a) methyl violet or cresol red

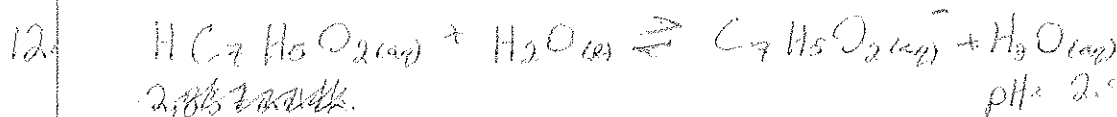
b) methyl violet or cresol red

9. a) indigo carmine or 1,3,5-trinitrobenzene.

b. alizarin yellow R



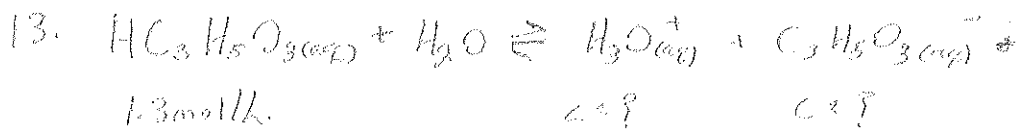
$$K_a = \frac{(1.1 \times 10^{-3} \text{ mol/L})^2}{(0.093 \text{ mol/L})} = \underline{\underline{1.3 \times 10^{-5}}}$$



$$n = \frac{m}{M} = \frac{1 \text{ g}}{122.13 \text{ g/mol}} = 0.008188 \text{ mol} \approx 0.023 \text{ mol/L} \quad [H_3O^+] = 10^{-2.91} = 0.00123 \text{ mol/L}$$

$$K_a = \frac{(0.00123 \text{ mol/L})^2}{(2.857 \text{ mol/L} - 0.023 \text{ mol/L})} = \underline{\underline{6.47 \times 10^{-5}}}$$

$\underline{\underline{6.83 \times 10^{-5}}}$ w subtraction



$$1.28 \times 10^{-4} = \frac{(x)^2}{(1.3 \text{ mol/L})}$$

$$x = 0.0128996 \text{ mol/L}$$

pH = 1.89

14.	Total I	Total II	Total III	Total IV
	v = 28.71	v = 21.29	v = 28.67	v = 28.92
		↑ omit (missed analysis)		

$V_{\text{ave}} = 28.7 \text{ mL}$

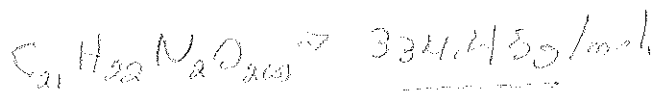
$\frac{c_2 V_2}{V} \Rightarrow n_2 c_2$

$$n = (0.0448 \text{ mol/L})(0.02897 \text{ L})$$

$$= 0.0128876 \text{ mol}$$

$$M_2 = \frac{5.34 \text{ g}}{0.0128876 \text{ mol}}$$

$$= 415.32 \text{ g/mol}$$



B/c the molar masses are so different,
the substance is not strychnine.

15.

1/2

16.

1/2