

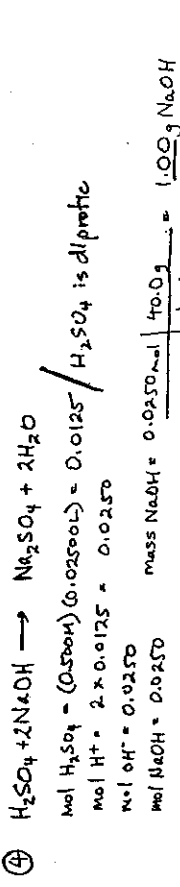
ACID/BASE I REVIEW

	[H ⁺]	pH	POH	[OH ⁻]	A/B/N?
1					
a)	3.0 x 10 ⁻² M	1.52	12.48	3.3 x 10 ⁻¹³ M	A
b)	4.6 x 10 ⁻⁹ M	7.34	6.66	2.2 x 10 ⁻⁷ M	B
c)	1.97 x 10 ⁻¹² M	11.72	2.28	5.2 x 10 ⁻³ M	B
d)	5.9 x 10 ⁻¹ M	8.23	5.77	1.7 x 10 ⁻⁶ M	B
e)	8.0 x 10 ⁻⁵ M	4.10	9.90	1.3 x 10 ⁻¹⁰ M	A
f)	1.0 x 10 ⁻⁷ M	7.00	7.00	1.0 x 10 ⁻⁷ M	N
g)	1.0 x 10 ⁻³ M	3.00	11.00	1.0 x 10 ⁻¹¹ M	A
h)	1.0 M	-1.0	15.0	1 x 10 ⁻¹⁵ M	A
i)	1.1 x 10 ⁻¹² M	11.96	2.06	8.7 x 10 ⁻³ M	B
j)	2.6 x 10 ⁻⁵ M	5.58	8.42	3.8 x 10 ⁻⁷ M	A

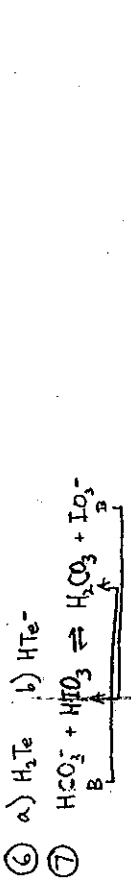
KEY

2) [H⁺] = 3.7 x 10⁻⁸ M [OH⁻] = 2.7 x 10⁻⁷ M

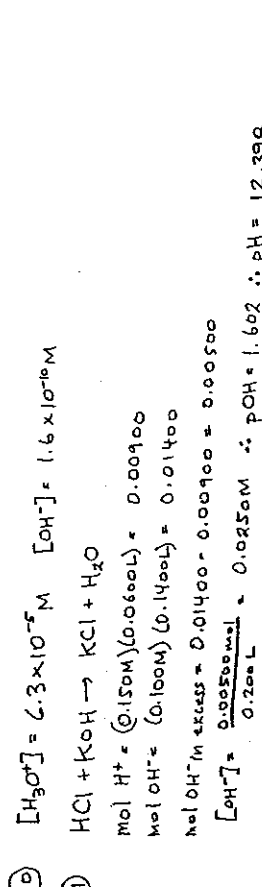
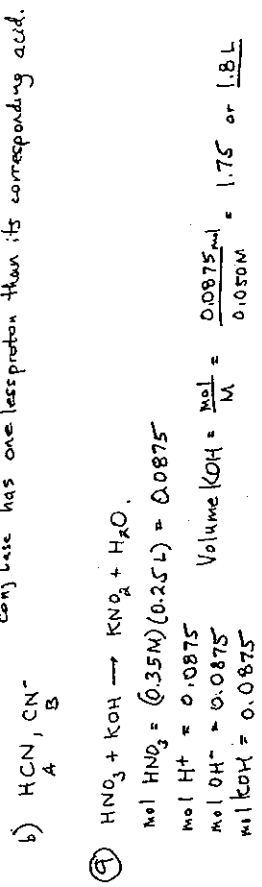
3) a) pH = -0.30 POH = 14.30 b) pH = 10.54, POH = 3.46 c) 0.70, POH = 13.30.
d) pH = 8.398 POH = 5.602



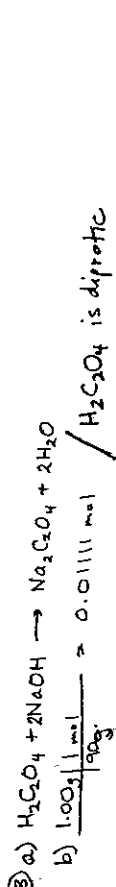
5) M₁V₁ = M₂V₂
 ∴ M₂ = M₁V₁ / V₂
 [H₃O⁺]_f = 0.0375M ∴ pH = 1.43



8) Conjugate base: The base produced when an acid reacts with water. A conjugate base has one less proton than its corresponding acid.

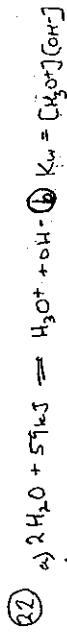


12) a) a substance that can act as an acid or a base.
 b) H₂PO₄⁻



mol H⁺ = 2 x 0.0111 = 0.02222 mol
 mol OH⁻ = 0.02222 mol [NaOH] = $\frac{0.02222 \text{ mol}}{0.06000L} = 0.370M$
 mol NaOH = 0.02222 mol
 14) 9.6×10^{-14}
 6.51 x 2 = 13.02 = pK_w
 inv log(13.02) = 9.55 x 10⁻¹⁴

15) Volume NaOH = $\frac{\text{Total } L + \text{Total } L}{2} = \frac{11.33 + 11.31}{2} = 11.32 \text{ mL}$
 H₂C₄H₄O₆ + 2NaOH → Na₂C₄H₄O₆ + 2H₂O
 moles NaOH = (0.10M)(0.1132L) = 1.17 x 10⁻²
 moles H⁺ = 1.17 x 10⁻²
 moles H₂C₄H₄O₆ = $\frac{1.17 \times 10^{-2}}{2} = 5.86 \times 10^{-4}$
 % of tartaric acid in wine = $\frac{5.86 \times 10^{-4} \times 100}{10.00} = 0.889\%$
~~5.86 x 10⁻⁴ mol / 150.0g = 8.89 x 10⁻⁶ g/g~~



c) $K_w = 1.0 \times 10^{-14}$ p $K_w = 14$

d) K_w increases as an increase in temp favours endothermic rxn (fwd rxn) and therefore both $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ increase.

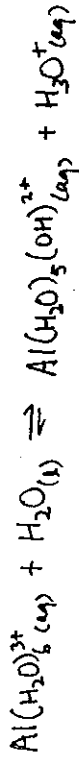
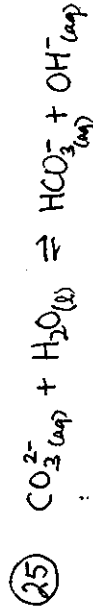
- 23) a) 7-8 b) 5-7 c) 10-14 d) 1-3 e) 5

24) a) Arrhenius acid: any substance that releases H^+ in water.

b) Arrhenius base: any substance that releases OH^- in water.

c) Bronsted-Lowry Acid: a substance that donates a proton to another substance.

d) Bronsted-Lowry Base: a substance that accepts a proton from another substance.



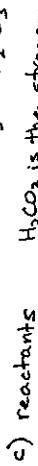
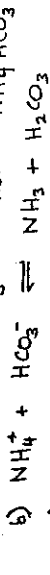
26) a) Conductivity test

The strong acid solution will conduct much better than an equal molar concentration of a weak acid solution

b) pH meter

The strong acid solution will have a lower pH than an equal molar concentration of a weak acid solution.

- 16) ① 1.0M HBr strong acid / 100% disso. into charges
 ② 1.0M CH_3COOH weak acid
 ③ 1.0M HCN weak acid
 The more charge produced in solution, the greater the conductivity.



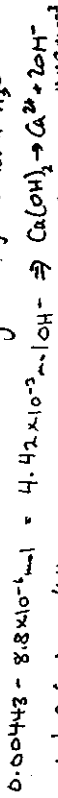
c) reactants H_2CO_3 is the stronger acid + drives the equil. to the left thereby favouring reactants.

18) starting pH = 4.50 $\therefore [\text{H}_3\text{O}^+] = 3.16 \times 10^{-5}\text{M}$
 $\text{mol H}_3\text{O}^+ = (3.16 \times 10^{-5}\text{M})(140\text{L}) = 0.00443 \text{ mol H}_3\text{O}^+$
 in solution

target pH = 7.20 $\therefore [\text{H}_3\text{O}^+] = 6.31 \times 10^{-8}\text{M}$

$\text{mol H}_3\text{O}^+ = (6.31 \times 10^{-8}\text{M})(140\text{L}) = 8.8 \times 10^{-6} \text{ mol}$

mol OH⁻ needed is difference between starting and target moles of H_3O^+



mol $\text{Ca}(\text{OH})_2 = \frac{4.42 \times 10^{-3}}{2} = 2.21 \times 10^{-3}$ ← stoich

mass $\text{Ca}(\text{OH})_2 = \frac{2.21 \times 10^{-3} \text{ mol} \times 74.1\text{g/mol}}{1 \text{ mol}} = 1.6 \times 10^{-1}\text{g}$

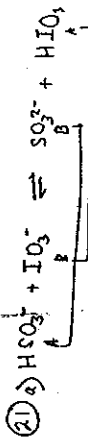
19) H_3O^+ is the strongest of any weak acid.

When any strong acid is reacted with water, it reacts 100% to form H_3O^+ .
 e.g. $\text{HCl} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$
 \therefore no strong acids exist in water!

20) p $K_w = -\log(2.95 \times 10^{-15}) = 14.530$

a) pH of pure water = $\frac{14.530}{2} = 7.265$

b) neutral as $[\text{H}_3\text{O}^+] = [\text{OH}^-]$ and/or pH = pOH.



c) reactants. HIO_3 is a stronger acid than HSO_3^- , thereby driving the equation to the left, favouring reactants.