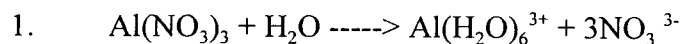
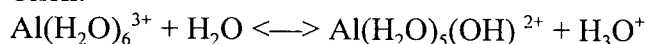


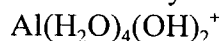
Acid # 10



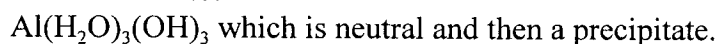
Then:



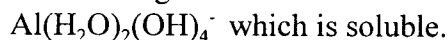
which can hydrolyze further into:



and further into:



Now adding additional OH^- causes further hydrolyzation into:



2. The Colour at the transition point equals that point where K_a of the indicator is the $[\text{H}_3\text{O}^+]$ in the solution.

$$\text{Then: } K_a = [\text{H}_3\text{O}^+] = 5.2 \times 10^{-4}$$

$$\text{The pH} = \text{p}K_a = 3.28$$

3. $K_a = K_{a1} \times K_{a2} \times K_{a3}$

$$(7.5 \times 10^{-3}) (6.2 \times 10^{-8}) (2.2 \times 10^{-13}) = 1.0 \times 10^{-22}$$

4. $\text{Ca}(\text{OH})_2 + \text{H}_2\text{O} \rightleftharpoons \text{Ca}^{2+} + 2\text{OH}^-$

$$\text{a pH of } 12.32 \Rightarrow [\text{OH}^-] = 2.09 \times 10^{-2}$$

since 2OH^- are produced for each Ca^{2+} , then $[\text{Ca}^{2+}] = 1.05 \times 10^{-2} \text{ M}$

$$\begin{aligned} K_{sp} &= [\text{Ca}^{2+}][\text{OH}^-]^2 \\ &= (1.05 \times 10^{-2})(2.09 \times 10^{-2})^2 \\ &= 4.6 \times 10^{-6} \end{aligned}$$

5. Moles $\text{OH}^- = (42.55\text{mL})(0.50\text{M}) = 21.28 \text{ m mol}$

at the equivalence point, $\text{mol H}^+ = \text{mol OH}^-$

moles $\text{H}^+ = 21.28 \text{ mmol}$

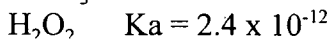
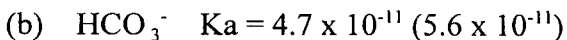
Since the acid is monoprotic, then moles acid = 21.28 mmol

$$\text{molecular mass} = \text{mass/mol} = 2.6\text{g}/21.28 \text{ mmol} = 1.2 \times 10^2 \text{g/mol}$$

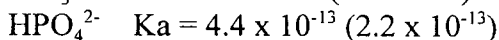
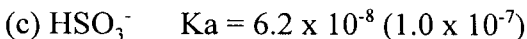
- 6.(a) HSO_3^- $K_a = 6.2 \times 10^{-8}$ (1.0×10^{-7})

$$\text{H}_3\text{PO}_4 \quad K_a = 7.1 \times 10^{-3} \quad (7.5 \times 10^{-3})$$

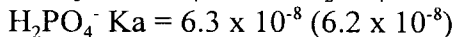
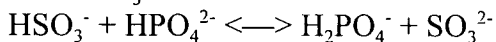
Since 7.1×10^{-3} (7.5×10^{-3}) $>$ 6.2×10^{-8} (1.0×10^{-7}), H_3PO_4 is stronger acid and equilibrium shifts to favor reactants.



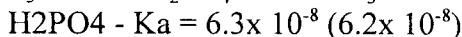
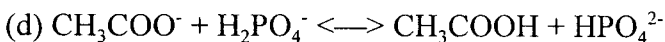
Since $4.7 \times 10^{-11} (5.6 \times 10^{-11}) > 2.4 \times 10^{-12}$, HCO_3^- is the stronger acid and products are favored



Then HSO_3^- is the acid



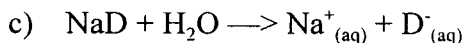
Since $6.3 \times 10^{-8} (6.2 \times 10^{-8})$ is slightly greater than $6.2 \times 10^{-8} (1.0 \times 10^{-7})$ then the products are favored.



Since $1.8 \times 10^{-5} > 6.3 \times 10^{-8}$, then the reactants are favored.

- 7.a) HC Strongest acid
H₂A
HB
HA
HD weakest acid

b) The conjugate of the weakest acid is the strongest base.
The strongest base is D⁻



Na⁺ do not hydrolyze.

