ANSWERS: Mega Problems: Solutions & Acid - Base

Mega Problem 1

b. c = 0.0589M

c. $K_2CO_{3(aq)} \rightarrow 2K^+_{(aq)} + CO_3^{2-}_{(aq)}$
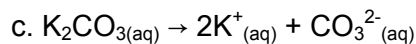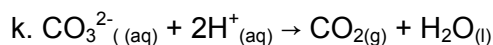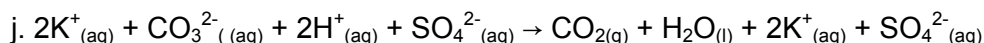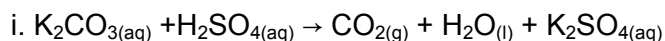
d. $[K^+]$ = 0.118 M

$[CO_3^{2-}]$ = 0.0589 M

e. same concentration

f. 1.06×10^{23} ions

g. Use 3.33 mL of the stock solution

h. a) $[H^+]$ = 36.0 M $[SO_4^{2-}]$ = 18.0 M

   b) $[H^+]$ = 6.00 M $[SO_4^{2-}]$ = 3.00 M

i. $K_2CO_{3(aq)} + H_2SO_{4(aq)} \rightarrow CO_{2(g)} + H_2O_{(l)} + K_2SO_{4(aq)}$

j. $2K^+_{(aq)} + CO_3^{2-}_{((aq)} + 2H^+_{(aq)} + SO_4^{2-}_{(aq)} \rightarrow CO_{2(g)} + H_2O_{(l)} + 2K^+_{(aq)} + SO_4^{2-}_{(aq)}$

k. $CO_3^{2-}_{((aq)} + 2H^+_{(aq)} \rightarrow CO_{2(g)} + H_2O_{(l)}$

l. spectator: K^+, SO_4^{2-}

   reacting: H^+, CO_3^{2-}

   below 7, acidic

m. 2.57g
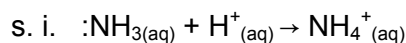
n. 8.56%

o. Strong electrolyte

p. Diprotic

q. pH= 1.61

r. pH = 1.91

e. Sulfuric is strongest (diprotic), hydrochloric is second strongest and acetic acid is weakest

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Mega Problem 2

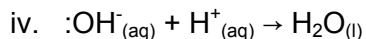s. i. $:NH_{3(aq)} + H^+_{(aq)} \rightarrow NH_4^+_{(aq)}$

   ii. $BF_3 + :NH_3 \rightarrow NH_3BF_3$

Mega Problem 3

2. b) 0.570g

   c) pH = 0.70

   d) i. 0.00666L

      ii. 7

      iii. BTB or Litmus

      iv. $:OH^-_{(aq)} + H^+_{(aq)} \rightarrow H_2O_{(l)}$

      vi. pOH = 0.176