Answer on Question #56180 - Chemistry - General chemistry

Question:

What volume of .0848M HCl must be added to 88.8 mL of .233M Na3PO4 to reach:

a.) 1st stoichiometric point?

b.) 2nd stoichiometric point?

Solution:

a)

Sodium phosphate dissociates into phosphate anion and sodium cation. The amount of phosphate anion is equal to the sodium phosphate. During titration, there are three stoichiometric points. The first one, is when 1:1 amount of HCl was added, so the first point can be written as:

$$PO_4^{3-} + H^+ = HPO_4^{2-}$$

$n(PO_4^{3-})=C(PO_4^{3-})*V(PO_4^{3-})=0.233*0.0888=0.02$ mol

$V(H^+)=n(H^+)/C(H^+)=0.02/0.0848=0.236$ L=235.85 mL

$V(H^+)=V(HCl)=$ 235.85 mL

b)

The second stoichiometric point, is when 1:2 amount of HCl was added, so the first point can be written as:

$$PO_4^{3-} + 2H^+ = H_2PO_4^-$$

$n(PO_4^{3-})=C(PO_4^{3-})*V(PO_4^{3-})=0.233*0.0888=0.02$ mol

$n(H^+)=2*n(PO_4^{3-})$

$V(H^+)=n(H^+)/C(H^+)=2*0.02/0.0848=0.471$ L=471.7 mL

$V(H^+)=V(HCl)=$ 471.7 mL

Answer: a) V(HCl)=235.85 mL; b) V(HCl)=471.7 mL