HX is an acid. 0.72M HX solution has pH of 1.75. Is HX a strong acid?

Is $[H_3O^+]$ 0.72M?

pH of 1.75 $\rightarrow$ $-\log_{10}[H_3O^+] = 1.75$

$[H_3O^+] = 0.0178M$

0.0178M much less than 0.72M so not a strong acid

Redox titration

$$Cr_2O_7^{2-} + C_2H_6O + H_3O^+ \longrightarrow Cr^{3+} + CO_2 + H_2O$$

37.5mL blood sample requires 19.25mL of 0.085M $K_2Cr_2O_7$ to titrate what is $[C_2H_6O]$? what is v/v% of BAC

$$2\,Cr_2O_7^{2-} + C_2H_6O + {}^{16}H_3O^+ \longrightarrow {}^{4}Cr^{3+} + {}^{2}CO_2 + {}^{27}H_2O$$

$Cr^{+6} \rightarrow Cr^{3+}$

$C^{-2} \rightarrow C^{4+}$

$$0.01925\,L \times 0.085\,\frac{mol\ Cr_2O_7^{2-}}{L} = 1.636\times10^{-3}\ moles\ Cr_2O_7^{2-}$$

$$1.636\times10^{-3}\ moles\ Cr_2O_7^{2-} \times \frac{1\ mol\ C_2H_6O}{2\ mol\ Cr_2O_7^{2-}} = 8.2\times10^{-4}\ moles\ C_2H_6O$$

$$\frac{8.2\times10^{-4}\ moles\ C_2H_6O}{0.0375\,L} = 0.022M\ C_2H_6O$$

$$8.2\times10^{-4}\ moles\ C_2H_6O \times \frac{46g}{mol} = 0.0377g\ C_2H_6O$$ — assume $d_{blood} = d_{C_2H_6O} = 1\frac{g}{mL}$

$$\frac{0.0377\,mL\ C_2H_6O}{37.5\,mL\ blood} = 0.001 \rightarrow 0.1\%$$

HCl/NaOH titration

25.00 mL HCl titrate w/ 17.35 mL of 0.25 M NaOH to get to equiv pt. pH of original HCl? What pH in flask if we add 1.7 mL NaOH after equiv pt

$0.01735\ L\ NaOH \times \frac{0.25\ mol}{L} = 4.34 \times 10^{-3}$ moles OH^- added

so in orig flask $\frac{0.00434\ moles\ HCl}{0.025\ L} \rightarrow [HCl] = 0.1735\ M$

For strong acid of $[HCl] = 0.1735\ M$, $[H_3O^+] = 0.1735\ M$

$pH = -\log_{10}(0.1735) = 0.76$

$0.0017\ L\ NaOH \times \frac{0.25\ mol}{L} = 4.25 \times 10^{-4}$ moles OH^-

$\frac{4.25 \times 10^{-4}}{0.04405\ L} = 9.65 \times 10^{-3}$

$[H_3O^+] \times [OH^-] = 1 \times 10^{-14}$

$[H_3O^+] = \frac{1 \times 10^{-14}}{9.65 \times 10^{-3}} = 1.04 \times 10^{-12} \rightarrow pH = 11.98$

C_6H_{14} combustion. If you burn 75g how many grams CO_2 produced

$C_6H_{14}(\ell) + \frac{19}{2}O_2(g) \rightarrow 6CO_2(g) + 7H_2O(\ell)$

$75\ g\ C_6H_{14} \times \frac{1\ mole}{86\ g} = 0.87\ mol\ C_6H_{14} \times \frac{6\ mole\ CO_2}{1\ mole\ C_6H_{14}} \times \frac{44.02\ g\ CO_2}{1\ mol\ CO_2}$

$= 230\ g\ CO_2$