1. Se quiere conocer la cantidad de acetato de sodio y de ácido acético que se deben mezclar para preparar 100 mL de una solución amortiguadora a pH = 5.0. La concentración total del Buffer debe ser 0.5 M

Datos: Acetato de sodio es una sal (CH3COONa), ensayo de 98.5 %. Ácido acético (CH3COOH), densidad = 1.064 g/mL, ensayo de 98 %

ácido acético/acetato= CH_3COOH/CH_3COO^- $pKa = 4.7$

$pH = 5.0$ $pKa = 4.7$ $[HA^-] = ?$ $[A^-] = ?$

$$pH = pKa + \log \frac{[A^-]}{[HA]} \qquad [HA] + [A^-] = 0.5\ M$$

$$5.0 = 4.7 + \log \frac{[A^-]}{0.5 - [A^-]}$$

$$5.0 - 4.7 = \log \frac{[A^-]}{0.5 - [A^-]}$$

$$10^{\left(5.0 - 4.7 = \log \frac{[A^-]}{0.5 - [A^-]}\right)} \Rightarrow$$

$$10^{5.0-4.7} = \frac{[A^-]}{0.5 - [A^-]}$$

$$(10^{0.3})(0.5 - [A^-]) = [A^-]$$

$$0.5(10^{0.3}) - [A^-](10^{0.3}) = [A^-]$$

$$0.5\,(10^{0.3}) = [A^-] + [A^-]\,(10^{0.3})$$

$$0.5\,(10^{0.3}) = [A^-]\,(1 + 10^{0.3})$$

$$\frac{0.5\,(10^{0.3})}{(1+10^{0.3})} = [A^-]$$

$$[A^-] = 0.33\ M$$

$$[HA] = 0.5 - [A^-] = 0.17\ M$$

$[A^-] = [NaCH_3COO] \Rightarrow$

$NaCH_3COO = 82.0\ g/mol$

pureza $= 98.5\ \%$

$[HA] = [CH_3COOH] \Rightarrow$

$CH_3COOH = 60\ g/mol$

pureza $= 98\ \%$

$\rho_{CH_3COOH} = 1.064\ g/mL$

$$100\,mL \left| \frac{0.33\,mmol}{1\,mL} \right| \frac{82\ mg\ R.P}{1\,mmol\ acetato} \left| \frac{100\,mg\ R.A}{98.5\,mg\ R.P} \right| \frac{1\,g}{1000\,mg} \Big| = 2.75\,g\ de\ NaCH_3COO$$

$$100mL \left| \frac{0.17\,mmol}{1\,mL} \right| \frac{60\,mg\ R.P}{1\,mmol\ ácido} \left| \frac{100\,mg\ R.A}{98\,mg\ R.P} \right| \frac{1g}{1000\,mg} \left| \frac{1\,mL}{1.064\,g\ R.A} \right| = 0.978\,mL$$

$\approx 1.0\,mL\ de\ CH_3COOH$