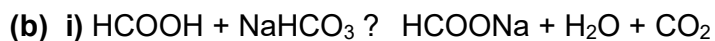


3. This question is about ants

(a) i) $6.0 \times 10^{-3} \times 0.5 \times 100 / 80 = 3.75 \times 10^{-3} \text{ cm}^3$ so accept $3.8 \times 10^{-3} \text{ cm}^3$

ii) $1000 / 3.75 \times 10^{-3} = 2.7 \times 10^5$



ii) $6.0 \times 10^{-3} \times 0.5 \times 1.2 / 46 = 7.8 \times 10^{-5} \text{ moles}$

iii) $7.8 \times 10^{-5} \times 84 = 6.6 \times 10^{-3} \text{ g} = 6.6 \text{ mg}$

(c) $7.8 \times 10^{-2} \text{ mol dm}^{-3}$

(d) $3.7 \times 10^{-3} \text{ mol dm}^{-3}$

(e) $3.7 \times 10^{-3} / 7.8 \times 10^{-2} \times 100 = 4.8 \%$

(f) $(3.7 \times 10^{-3})^2 / (7.8 \times 10^{-2} - 3.7 \times 10^{-3}) = 1.8 \times 10^{-4} \text{ mol dm}^{-3}$ (also accept 1.9×10^{-4}). This means $\text{pK}_a = 3.73$.

1 mark for each part

Total: 9