

3. 続

$$K_h = \frac{K_w}{\frac{[NH_4^+][OH^-]}{[NH_3]}} = \frac{K_w}{K_a}$$

$$(NH_3 + H_2O \xrightleftharpoons{K_h} NH_4^+ + OH^-)$$

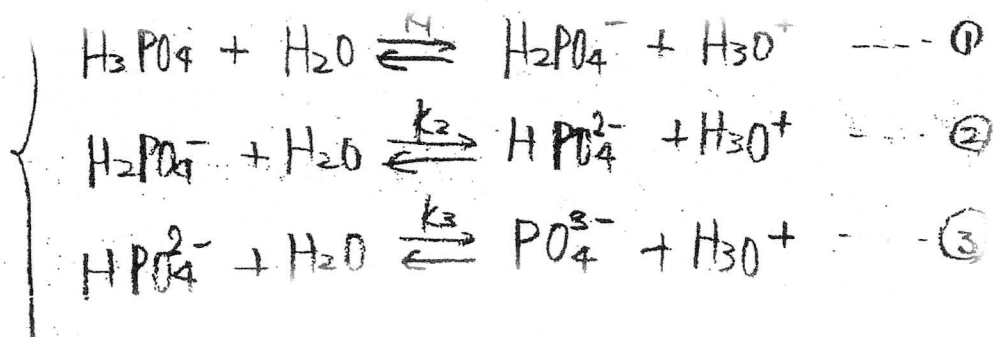
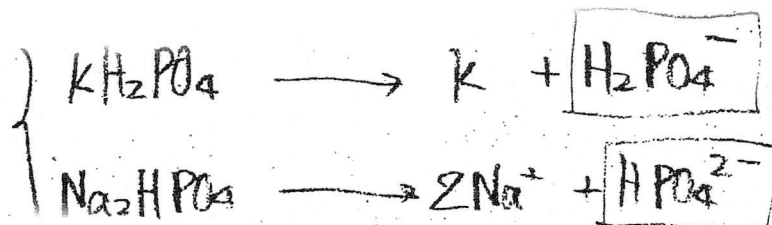
$$[H_3O^+] = \sqrt{CK_h} = \sqrt{C \frac{K_w}{K_a}}$$

$$= \sqrt{0.1 \times \frac{1.0 \times 10^{-14}}{1.79 \times 10^{-5}}}$$

$$= 7.47 \times 10^{-6} \approx \underline{7.5 \times 10^{-6}} \text{ (mol/L)}$$

4.

1)

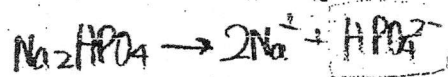
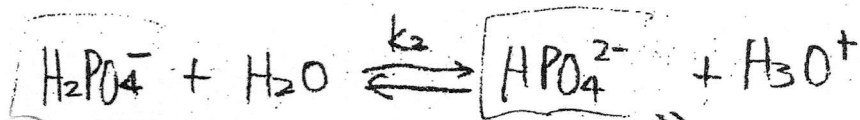


4. 続

k_1 は大よ 反応①は ほぼ右へ進む.

k_3 は小よ 反応③は ほとんどおこさぬ.

よって 反応②が 主におこっている.



$$k_2 = \frac{[\text{HPO}_4^{2-}][\text{H}_3\text{O}^+]}{[\text{H}_2\text{PO}_4^-]} = \frac{[\text{Na}_2\text{HPO}_4]}{[\text{KH}_2\text{PO}_4]} [\text{H}_3\text{O}^+]$$

$$[\text{H}_3\text{O}^+] = \frac{[\text{KH}_2\text{PO}_4]}{[\text{Na}_2\text{HPO}_4]} k_2 = 1.0 \times 10^{-7}$$

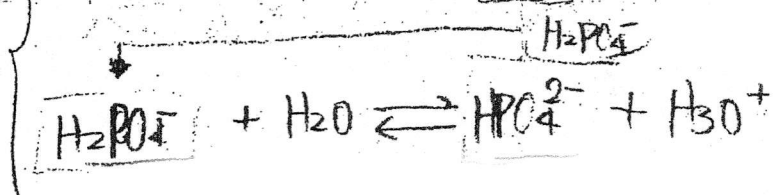
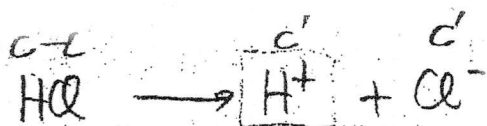
$$[\text{Na}_2\text{HPO}_4] = \frac{[\text{KH}_2\text{PO}_4] k_2}{1.0 \times 10^{-7}} = \frac{0.65 \times 6.2 \times 10^{-8}}{1.0 \times 10^{-7}}$$

$$= 4.03 \times 10^{-1} = 0.40 \text{ (mol dm}^{-3}\text{)}$$

$$\begin{aligned} 2) \quad [\text{H}_3\text{O}^+] &= \frac{[\text{KH}_2\text{PO}_4]}{[\text{Na}_2\text{HPO}_4]} k_2 = \frac{0.65 \times \frac{1}{20}}{0.403 \times \frac{1}{20}} \times 6.2 \times 10^{-8} \\ &= 1.0 \times 10^{-7} \text{ (mol dm}^{-3}\text{)} \end{aligned}$$

4. 続

3)



$$[H_2PO_4^-] = [KH_2PO_4] + C'$$

$$[HPO_4^{2-}] = [Na_2HPO_4] - C'$$

$$[H_3O^+] = \frac{[KH_2PO_4] + C'}{[Na_2HPO_4] - C'} \times K_2$$

$$= \frac{0.15 + 0.01}{0.40 - 0.01} \times 6.2 \times 10^{-8}$$

$$= 1.05 \times 10^{-7} = 1.0 \times 10^{-7} \text{ (mol/L)}$$

5. 単原子分子一個の平均エネルギーを

平均エネルギーで記述される

$$\epsilon = \frac{1}{2} m \overline{u^2} = \frac{1}{2} m \frac{3RT}{M} \quad (\overline{u^2} = \frac{3RT}{M})$$

$$= \frac{1}{2} m \frac{3RT}{mL}$$

$$M = m L \quad \text{モル質量}$$