Semainar 1: Simple pH calculations

1. Calculate the pH of the solution:
   a) $[H_3O^+] = 0.01$ mol/dm^3
   b) $[H_3O^+] = 4.1\times10^{-3}$ mol/dm^3
   c) $[H_3O^+] = 2.65\times10^{-5}$ mol/dm^3

2. Calculate the $[H_3O^+]$ and the $[OH^-]$ concentrations in the following solutions:
   a) pH = 2.32
   b) pH = 6.45
   c) pH = 11.32

3. A sample of orange juice has an equilibrium hydrogen ion concentration of 2.9×10^{-4} M. What is the pH? Is the solution acidic, basic or neutral?

4. A saturated solution of potassium hydroxide has an equilibrium hydroxide ion concentration of 0.05 M. What is the pH? Is the solution acidic, basic or neutral?

5. A $HClO_4$ solution has an analytical concentration of 0.012 M. What is the equilibrium hydrogen ion concentration and the pH?

6. A NaOH solution has an analytical concentration of 10^{-7} M. What is the equilibrium hydroxide ion concentration, the pOH and the pH?

7. Calculate the pH of pure water at 25.0 and 50.0 °C ($K_W = 1.0\times10^{-14}$ and 5.0×10^{-14}, respectively)

8. 10.00 ml of HCl of unknown concentration is titrated with potassium hydroxide whose concentration is 0.085 M. Calculate the pH at: a) **0 %;** b) **40 %**; c) **100 %**; d) **160 %** degree of titration. Up to the equivalence point 12.55 mL of KOH solution is consumed.

9. 20.00 ml of HCl of 0.100 mol/dm^3 concentration is titrated with sodium hydroxide whose concentration is 0.200 mol/dm^3. Calculate the pH at: a) **0 %;** b) **20 %**; c) **50 %**; d) **120 %** degree of titration.