Theoretical and Physical Organic Chemistry
Homework III

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$$K_a = \frac{[\mathrm{H_3O^+}][\mathrm{H_2O}]}{[\mathrm{H_3O^+}]} = [\mathrm{H_2O}] \tag{0.0.1}$$

$$\mathrm{p}K_a = -\lg[\mathrm{H_2O}] = -\lg 55.5 = -1.74 \tag{0.0.2}$$

$$K_a = \frac{[\mathrm{H_3O^+}][\mathrm{OH^-}]}{[\mathrm{H_2O}]} = \frac{K_w}{[\mathrm{H_2O}]} \tag{0.0.3}$$

$$\mathrm{p}K_a = -(\lg K_w - \lg[\mathrm{H_2O}]) = -(-14 - 1.74) = 15.74 \tag{0.0.4}$$