Additional Exercise General Chemistry **16.02.2022**

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0.1

What is the molarity (molar concentration) of a $KMnO_4$ solution containing 5 wt-% $KMnO_4$? The density of this solution is 1,034 g/cm^3.

0.2

A tritium gas light source contains radioactive tritium (^3_1H , half-life t½ = 12.3 years) with an activity of 1GBq. Which mass of tritium is contained in the light source?

0.3

The decomposition of formic acid on a gold surface shows the kinetics of a 1st order reaction. k = $5{,}5 \cdot 10^{-4} s^{-1}$ at 140°C and $k = 9{,}2 \cdot 10^{-3} s^{-1}$ at 185 °C. Calculate the activation energy.

0.4

How large must the activation energy of a reaction be, so that it causes a rise by a factor of 3 in the reaction rate constant when the temperature increases from 20 °C to 30 °C?

0.5

The constant K_p for the gas reaction A + B → C is $1 \cdot 10^{-6}$ bar^{-1}. In a vessel so much A and B are given that the partial pressures without reaction are 1 bar each. What will be the partial pressure of C in equilibrium? The use of approximations allows to carry out the calculation very easily.

0.6

Benzene boils at 80 °C. What is the vapor pressure of a solution at 80 °C containing 5 g of anthracene in 100 g of benzene?

0.7

Potassium perchlorate dissolves in water of 20 °C at 1.73 g and at 40 °C with 3.63 g in 100 g of water. Determine the heat of solution.

0.8

The freezing point of an aqueous solution containing 2.37 g of Na_2SO_4 in one liter of solution is -0.095 ° C. From this information, determine the number of particles into which a Na_2SO_4 molecule decomposes on dissociation.

0.9

A gas mixture of propane and just enough oxygen for combustion has a pressure of 1 bar at 30 °C. The mixture is reacted in a sealed vessel. Calculate the pressure that arises after cooling the combustion products to 0 °C.