

**8.1**

How many molecules does 10 g of dichloromethane contain?

**8.2**

10 g of benzene and 10 g of oxygen react in a closed reaction vessel. Determine the composition of the end product in % by weight, assuming that only carbon dioxide and water should be produced as oxidation products.

**8.3**

80.1 g  $\text{SO}_3$  is introduced into an evacuated reaction vessel with a volume of  $1 \text{ dm}^3$  at an elevated temperature. The equilibrium mixture contains only half of the  $\text{SO}_3$  introduced. What is the equilibrium constant  $K_c$  of the  $\text{SO}_2/\text{SO}_3$  equilibrium  $\text{SO}_2 + \frac{1}{2} \text{O}_2 \leftrightarrow \text{SO}_3$ ?

**8.4**

The equilibrium constant of acetic acid dissociation is  $1.8 \cdot 10^{-5} \text{ mol/l}$ . Calculate the concentration of the acetate ions in a solution that is 0.01 M of HCl and 0.01 M of acetic acid. Use possible simplifications in the calculation.

**8.5**

0.0001 M acetic acid solution has a pH value of 4.57. Calculate the acid dissociation constant.

**8.6**

A water calorimeter contains an ampoule in which a reaction with 0.5 mol formula conversion takes place. This leads to a temperature increase of 5 K. The heat capacity of the calorimeter is determined by heating the calorimeter with an electrical resistor. The voltage across the resistor is 50 V and a current of 2.5 A flows for 30 seconds. The temperature of the calorimeter rises by 2.1 K. What is the enthalpy of reaction?

**8.7**

Determine the enthalpy of combustion for liquid hexane. The resulting water should be liquid after combustion. The enthalpies of formation are: hexane: -198.82, carbon dioxide: -393.52, liquid water: -285.84 kJ/mol.

**8.8**

Calculate the volume occupied by 10 g of oxygen at 100 °C and 2 bar.