The exam of Principles of Physical Chemistry (CHEM-C1230) at 11.12.2023. has been corrected. There is an Excel file in the MyCourses which has all the points (also the exercises and quiz). Please check the points.

I will add the marks to Sisu after few days. The next exam is 22.1.2024. form 13:00-17:00. The registration is open in Sisu. The Jan exam **is a remote exam**.

The exam weight was 70 %, the exercise 25 % and the quiz 5 %.

The point score is below.

	lowest points
1	50
2	60
3	70
4	80
5	90

Correction notes 11.12. exam

1) Iron Fe(s) oxides quite easily to Fe_2O_3(s). Which is more exothermic at room temperature – the oxidation with gas phase water H_2O(g) or with O_2(g).
   2 p. reaction equations
   2 p. how to compute the reaction enthalpy, where you got the data. Having only equations is not enough.
   1 p. correct calculation of reaction enthalpy.
   1 p. correct conclusion Note: comparison needs to be made on same amount of Fe_2O_3.

2) Explain how the constant pressure calorimeter works.
   1 p. A picture and general explanations
   1 p. you observe temperature change
   1 p. you measure heat change -> enthalpy and heat capacity
   1 p. calibration -> you need the heat capacity of the calorimeter
   2 p. correct calculations of the heat capacity of the calorimeter

3) Table salt NaCl(s) dissolves quite easily to water
   1 p. reaction enthalpy
   1 p. reaction gibbs energy
   2 p. correct conclusion for heating and spontaneity
   2 p. the calculation for KCl and correct conclusion

4) Fugacity and fugacity coefficient
   1 p. fugacity is similar to pressure
   1 p. definition of fugacity coefficient
   1 p. the fugacity (or real pressure) estimation of the gases at 200 atm.
   1 p. ammonia synthesis reaction equation and equilibrium constant (K)
   1 p. estimation of the K using fugacities
   1 p. general quality of the aswer

5) The phase changes can be investigated using either P-T or P-V diagram
   1 p. pressure need to be higher than P(triple point) and lower than P(critical)
   1 p. volume change in solid and liquid when temp increase
   1 p. volume change at melting point,
   1 p. co-exist of solid and liquid.
   1 p. volume change at boiling point, co-exist of liquid and gas
   1 p. large change in liquid gas transition. in gas V = nRT/p

6) Explain the reaction rate and rate constant of a model reaction
   2 p. what are reaction rate and rate constant, understanding the reaction order.
   1 p. the unit of reaction rate and rate constant.
   1 p. general equilibrium constant, aA + bB <-> cC + dD and A + B <-> C + D reactions
   1 p. At equilibrium forward and backward reactions are equal
   1 p. relation of K, k(forw), and k(backw)