

1. Substance properties

Ex1: Draw on the T/v diagram the heating process of the water, constant pressure. Name the state describe and name the regions of the diagram. Present the process for the two different pressure (example: 1,5;10;15;20 MPa. Present the boundaries of each region , name them. Find the characteristic point of the graph “critical point”.

Ex2: Ideal gas equation. Determine the mas of the air in the room of dimension 4x5x6 at the pressure of 100kPa and 25 C. Assume that this is an ideal gas. $R_{air} = 0,287 \text{ kPa} \times \text{m}^3 / \text{kg} \times \text{K}$.

Ex3: Energy balance. A mass of 200g of saturated liquid water is completely vaporised at pressure 100 kPa. Determine: a) volume change of the gas (V), b) amount of energy of vaporisation process. Draw the sketch and determine the states on P/v.

Ex4: Determine the missing properties and the phase description in the following table for water:

	T, C	P , kPa	U kJ/kg	x	Phase description
A		200		0,6	
B	125		1600		
C		1000	2950		
D	75	500			
E		850		0,0	

Ex5: A tank contains 10kg of 90 C water. Inside the rigid tank is 8kg of liquid water the rest is vapour. Determine the pressure of the tank and the volume of the tank. Draw the graph.

Ex6: The Carnot cycle is operating between the temperature of 350 C for the steam and pressure of the condenser 75KPa. What is the efficiency of this Carnot cycle. Draw the diagram on T/s.