homework #1

1. Calculate enthalpy of pure aluminum at 1300°C.
   Plot enthalpy vs. temperature for Al in the temperature range from 25°C to 1300°C. In the plot show the values of melting temperature and the values of enthalpies at $T = 25^\circ C$ and $T = 1300^\circ C$.
   If you are drawing your plot by hand, please use a realistic scale for both axes.

2. Calculate enthalpy of Al$_2$O$_3$ at 3000 K. Assume a temperature-independent heat capacity in the liquid phase, $c_p^{liquid} = 192.5$ J/mol K.

3. Calculate heat of formation of Al$_2$O$_3$ (the enthalpy change for oxidation reaction $2Al + 3/2 O_2 = Al_2O_3$) at 1573 K.

4. An absent-minded cook left a pot with water on a hot stove. There are 2 liters of water in the pot and the stove supplies about 1 kJ/s to the water. When the cook left the kitchen, the water was at 50°C. How long it will take before all the water will be gone from the pot? Latent heat of vaporization of water is $\Delta H_v = 2260$ kJ/kg. You can assume a temperature-independent heat capacity of liquid water, $C_p = 4.184$ J/g K.

You can use thermodynamic/thermochemical data given in tables at the end of the book by Gaskell or any other reliable and accessible source). Please give all the data and formulas used in calculations as well as references to the source of data.