1. Please use the thermodynamics to show that the rubber elasticity of a polymer arises primarily from distortion of the random conformational state and not distortion of primary valence bond lengths or bond angles. (20%)

2. If the pure element A melts at 280 K with enthalpy of melting, $\triangle H_m$=2800 cal/mol. What is the entropy of the melting, $\triangle S_m$= ? (10%)

3. (a) Please write down the van der Waals equation of state. (5%) (b) Please show the parameters and gas constant of van der Waals equation for one mole gas in term of its properties at the critical point. (15%)

4. The enthalpy of a binary liquid system of species 1 and 2 at fixed T and P is represented by the equation

   $H=400x_1+600x_2+x_1x_2(40x_1+20x_2)$

   where H is in J mol^{-1}. Determine expressions for $\overline{H}_1$ and $\overline{H}_2$ as functions of x_1, numerical values for the pure-species enthalpies H_1 and H_2, and numerical values for the partial enthalpies at infinite dilution $\overline{H}_1^{\infty}$ and $\overline{H}_2^{\infty}$. (20%)

5. Derive the Clapeyron and the Clausius/Clapeyron equations for two-phase systems. (15%)

6. A 10-lb block of copper is at 850 °F and 1556 ft above a tank of water (40 lb at 40 °F originally) . It falls into the water. Assuming no splashing, what is the change in entropy of the universe? The heat capacity of copper may be taken as 0.1 Btu/lb°R. (15%)

試題隨卷繳回