

Homework 1 Due: 01/25/2015

Applied Transport Phenomena - CHME420

- Exercise 1.** Estimate the viscosity of methyl chloride CH_3Cl at 560°C and 132 atm using the corresponding states correlation (Fig 1.3-1 BSL).
- Exercise 2.** Sketch the flow pattern and write the components of the *combined momentum flux* tensor for each of the following velocities:
- (a) $v_x = y, v_y = 0, v_z = 0$
 - (b) $v_x = y, v_y = x, v_z = 0$
 - (c) $v_x = -y, v_y = x, v_z = 0$
 - (d) $v_x = -\frac{1}{2}x, v_y = -\frac{1}{2}y, v_z = z$
- Exercise 3.** Describe the dependence of the viscosity, thermal conductivity, and binary diffusivity on temperature and pressure.
- Exercise 4.** Give two interpretations for the quantity $\tau_{\theta r}$. Can you make a sketch of such stress?
- Exercise 5.** Calculate the location of the minimum in the Lennard-Jones potential.
- Exercise 6.** BSL 1A.5 - You need only do one of the mixture compositions.
- Exercise 7.** Write the equation for the combined energy flux vector. Identify each term and make it clear which quantities are vectors and which are tensors.
- Exercise 8.** BSL 9A.4
- Exercise 9.** BSL 17A.2

You should complete some of the other A problems from chapters 1, 9, and 17 for exam practice.