c) Is the use of the truncated virial equation justified in this problem?
Additional data: The saturation pressure of nitrogen is given by the following empirical equation:

$$P^{\mathrm{sat}}(T) = e^{14.9542 - \frac{588.72}{-6.6+T}}$$

with $P^{\mathrm{sat}}$ is in mm Hg and $T$ is in kelvin.

**Problem 2.15:** a) Calculate the second virial coefficient of water at 200 °C using only data from the steam tables.
b) Use the truncated virial equation along with the second virial coefficient calculated above to estimate the volume of water at 200 °C, 14 bar. How does this value compare with the volume obtained from the steam tables? Discuss this comparison.

**Problem 2.16:** 1000 kg of methane is to be stored in a tank at 25 °C, 75 bar. What is the required volume of the tank? (*Hint:* Use the Pitzer equation with the Lee-Kesler values.)

**Problem 2.17:** 200 kg of carbon dioxide are stored in a tank at 25 °C and 70 bar.
a) Is carbon dioxide an ideal gas under the conditions in the tank?
b) What is the volume of the tank?
c) How much carbon dioxide must be removed for the pressure of the tank to fall to 1 bar?
"2" should be subscript
The molecular weight of CO2 is 44 g/mol.

**Problem 2.18:** A full cylinder of ethylene ($C_2H_4$) at 25°C contains 50 kg of gas at 80 bar.
a) Is ethylene an ideal gas under these conditions? Explain.
b) What is the volume of the cylinder?
c) What is the pressure in the cylinder after 90% of the ethylene has been removed, if temperature is 25°C?
The molecular weight of ethylene is 28 g/mol.

**Problem 2.19:** Use the Lee-Kesler method to answer the following:
2000 kg of krypton is to be stored under pressure in a tank at 110 bar, 20 °C. The tank is designed to withstand pressures up to 180 bar.
a) Determine the volume of the tank.
b) Is it safe to store 2500 kg in the tank at 25 °C?
c) Is the Lee-Kesler method appropriate?

**Problem 2.20:** A tank is divided by a rigid, thermally conducting partition into two equal parts, A and B, each 10 m$^3$ in volume. Part A contains saturated liquid