
Problem Solving Session 6

Problem:

- (a) Write a partial derivative that gives the change in entropy of a closed system when the pressure is increased slightly while the temperature is kept constant.
- (b) Use a Maxwell relation to rewrite the partial derivative in (a) in terms of variables that can easily be controlled in laboratory measurements (such as T , p and V). Show the derivation.
- (c) Verify that the Maxwell relationship derived in part (b) holds for ideal gas by explicitly evaluating the left hand side and the right hand side and showing that they are equal.
- (d) Use a Maxwell relation obtained from mixed second derivatives of the entropy (with respect to T and p) to derive an expression for the partial derivative of C_p with respect to pressure at fixed T in terms of a partial derivative that only involves V , T , and P . (This relationship is derived in a slightly different way in example 16.4 in B&B).