

ES 3053 Homework Set #1

Due: September 4, 2020

1. A 1500 kg car is traveling on a flat surface at 100 km/h. Find the kinetic energy. Assuming no frictional losses so that kinetic energy is transformed to potential energy, if the car then coasts up a hill, how high will it go vertically before it comes to rest?
2. At a park, atmospheric pressure is 1025 mbar. You climb a hill up to 350 m elevation and you later dive 12 m down in the ocean. What pressure do you feel at each place? Assume the density of water is 1000 kg/m³ and the density of air is 1.18 kg/m³.
3. Convert the following:
 - a. 50°C = what in K?
 - b. 100°F = what in R?
 - c. 166 R = what in K?
 - d. 344°C = what in °F?
 - e. 344K = what in °F

Show your work otherwise, you get NO credit.

4. Find the specific volume of ammonia at 100 psia and 200°C using:
 - a. This figure. Xerox the figure, mark the correct point in red and turn in with your homework solution.

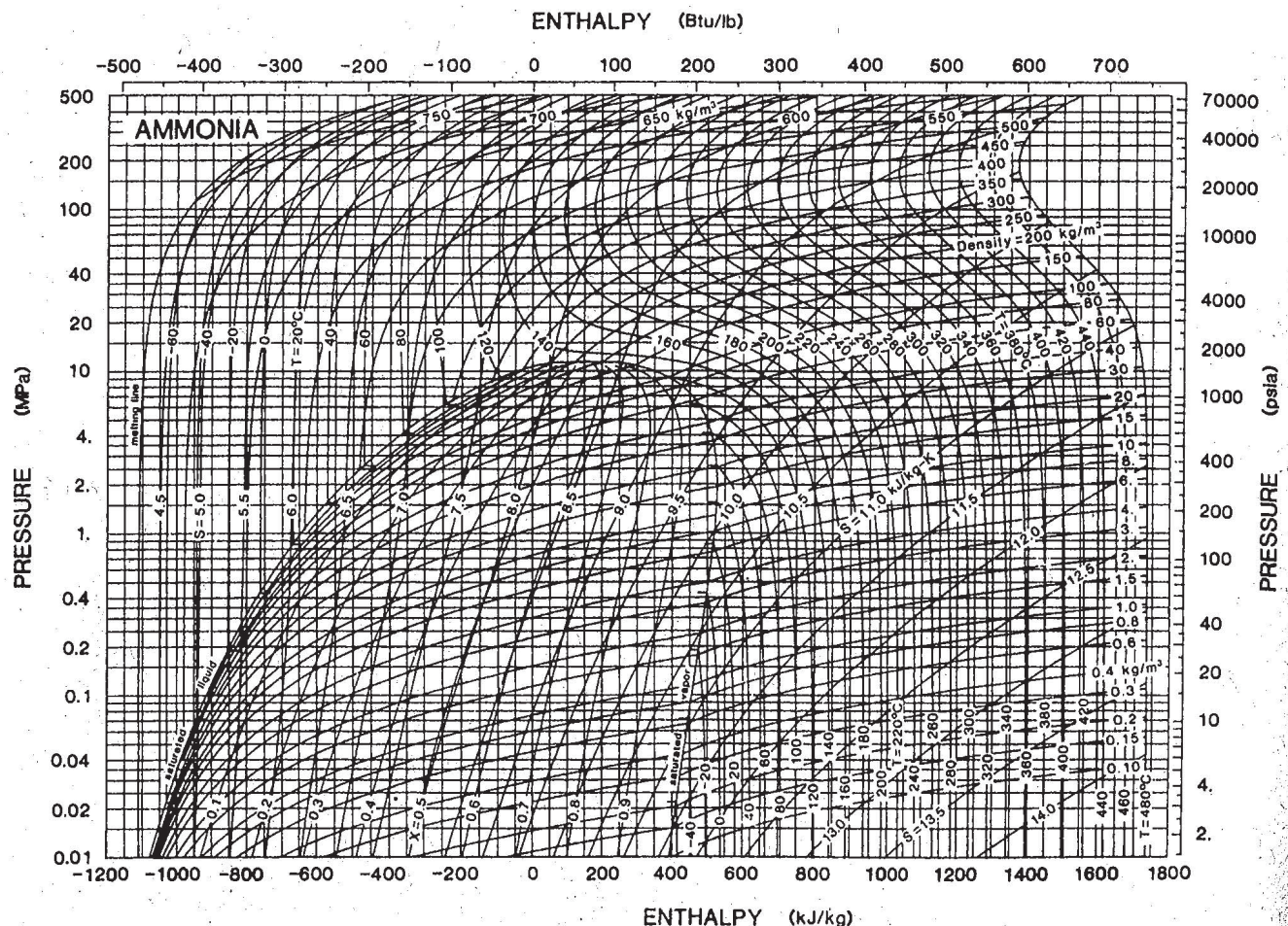


FIGURE E.2 Pressure-enthalpy diagram for ammonia.

- b. Using CATT3 software.
- c. Assuming ammonia is an ideal gas.
- d. Figure 3-48, pg 137 in your book and critical constants, which you should be able to find if they are not in your book.

Comment on the accuracy of each method.

- 5. Find the pressure when 55.5 moles (g-moles) of water are contained in a 0.1 m^3 vessel at 200°C using the steam tables (not CATT3). Show your work and cite the pages and entry in the steam table that gives you the result.