

Final Exam extra practice problems

These problems are meant to provide opportunities for supplemental practice in addition to the homework problems, quiz problems, Exam 2 practice problems, and examples from the lectures/textbook. Numerical answers are provided to check your solutions.

- Koretsky 2.24
 - Answers:
 - b) $W = -940 \text{ J}$
 - c) $Q = 940 \text{ J}$
- Koretsky 2.41
 - Answers:
 - 500°C , 1200 kPa , 0.167 m
- Koretsky 3.22
 - Answers:
 - For Problem 2.28, $\Delta S_{\text{univ}} = 1.24 \text{ J/K}$
 - For Problem 2.29, $\Delta S_{\text{univ}} = 0.004 \text{ J/K}$
- Koretsky 3.41
 - Answers:
 - a) 650 K
 - b) $-55.1 \text{ kJ/s} = -55.1 \text{ kW}$
 - c) -78.7 kW
 - d) 819 K
- Koretsky 3.44
 - Answers:
 - 51.2 J/K
- Koretsky 5.34
 - Answers:
 - a) 776.1 kJ
 - b) 6370.5 J/K
- Koretsky 6.55
 - Skip (a)
 - Answers:
 - b) $2.65 \text{ cm}^3/\text{mol}$
- Koretsky 6.56
 - Answers:
 - a) 325 K
 - b) 9200 J/mol
 - c) 6100 J/mol
- Koretsky 7.46
 - Note that the Virial equation is $z = \frac{Pv_m}{RT} = 1 + \frac{B_{\text{mix}}}{RT}$, where
$$B_{\text{mix}} = y_a^2 B_{aa} + 2y_a y_b B_{ab} + y_b^2 B_{bb}$$
 - Answer:
 - $B_{ab} = 55.9 \text{ cm}^3/\text{mol}$

- Koretsky 7.56
 - Answers:
 - b) 80 kPa
 - c) 975 kPa
 - d) $A = 6235.5 \text{ J/mol}$
 - e) $y_a = 0.768$
 - f) $\gamma_b = 1.49$
- Koretsky 7.64
 - Answers:
 - a) $\hat{f}_a^L = 0.06 \text{ bar}$
 - b) $\hat{f}_b^L = 0.134 \text{ bar}$
 - c) $\hat{f}_c^L = 0.23 \text{ bar}$
- Koretsky 8.18
 - Note that you will need to look up property data in your textbook
 - Answers:
 - 1.13 bar
 - $y_1 = 0.24, y_2 = 0.48, y_3 = 0.07, y_4 = 0.20, y_5 = 0.007$
- Koretsky 8.24
 - Note that the three-suffix Margules equation is $g_m^E = x_a x_b [A + B(x_a - x_b)]$.
 - For b, use the VdW EOS for the vapor with $a_a = 1.33, a_b = 0.454, b_a = 1.16 \times 10^{-4}, b_b = 4.34 \times 10^{-5}$
 - Answers:
 - a) $x_a = 0.53, y_a = 0.118$
 - b) $x_a = 0.53, y_a = 0.14$