Unit 6 - Week 4: Molecular Theory of Corresponding States

Assessment 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-26, 23:59 IST.

1) The critical temperature and critical pressure of nitrogen gas are given as T_c = 126.2K and P_c = 34 bar. If this gas is obeying van der Waals equation of state then what are its constants "a" and "b"? ***4 points***

- a = 3.3546 Pa m^6/mol^2, b=6.658×10^{-2} m^3/mol
- a = 2.6786 Pa m^6/mol^2, b=4.658×10^{-6} m^3/mol
- a = 2.9614 Pa m^6/mol^2, b=5.658×10^{-4} m^3/mol
- a = 0.1366 Pa m^6/mol^2, b=3.857×10^{-5} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
a = 0.1366 Pa m^6/mol^2, b=3.857×10^{-5} m^3/mol

2) The critical temperature and critical pressure of n-butane are given as T_c = 425.1K and P_c = 37.96 bar. If this gas is obeying van der Waals equation of state then what are its constants "a" and "b"? ***4 points***

- a = 1.3882 Pa m^6/mol^2, b=1.164×10^{-4} m^3/mol
- a = 3.3546 Pa m^6/mol^2, b=2.658×10^{-3} m^3/mol
- a = 2.1587 Pa m^6/mol^2, b=0.592×10^{-2} m^3/mol
- a = 5.3619 Pa m^6/mol^2, b=3.284×10^{-5} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
a = 1.3882 Pa m^6/mol^2, b=1.164×10^{-4} m^3/mol

3) The critical temperature and critical pressure of nitrogen gas are given as T_c = 126.2 K and P_c = 34 bar. If this gas is obeying Redlich-Kwong equation of state then what are its constants "a" and "b"? ***4 points***

- a = 0.9316 Pa $K^{1/2}$ m^6/mol^2, b = 3.4296 ×10^{-4} m^3/mol
- a = 3.2051 Pa $K^{1/2}$ m^6/mol^2, b = 3.8147 ×10^{-3} m^3/mol
- a = 1.555 Pa $K^{1/2}$ m^6/mol^2, b = 2.6737 ×10^{-5} m^3/mol
- a = 4.314 Pa $K^{1/2}$ m^6/mol^2, b = 6.2135 ×10^{-4} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
a = 1.555 Pa $K^{1/2}$ m^6/mol^2, b = 2.6737 ×10^{-5} m^3/mol

4) The critical temperature and critical pressure of n-butane are given as T_c = 425.1K and P_c = 37.96 bar. If this gas is obeying Redlich-Kwong equation of state then what are its constants "a" and "b"? ***4 points***

- a = 29 Pa $K^{1/2}$ m^6/mol^2, b = 8.0667 ×10^{-5} m^3/mol
- a = 18 Pa $K^{1/2}$ m^6/mol^2, b = 2.7581 ×10^{-7} m^3/mol
- a = 15 Pa $K^{1/2}$ m^6/mol^2, b = 0.9377 ×10^{-4} m^3/mol
- a = 35 Pa $K^{1/2}$ m^6/mol^2, b = 1.4625 ×10^{-3} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
a = 29 Pa $K^{1/2}$ m^6/mol^2, b = 8.0667 ×10^{-5} m^3/mol

5) What is the molar volume of methane gas at 500°C and 15 atm pressure if it obeys van der Waals equation of state? The critical temperature and critical pressure of methane are given as T_c = 190.6K and P_c = 45.99bar. ***8 points***

- 4.2356 ×10^{-3} m^3/mol
- 7.8175 ×10^{-3} m^3/mol
- 2.7664 ×10^{-5} m^3/mol
- 5.5497 ×10^{-2} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.2356 ×10^{-3} m^3/mol

6) What is the molar volume of methane gas at 500°C and 15 atm pressure if it obeys Redlich-Kwong equation of state? The critical temperature and critical pressure of methane are given as T_c = 190.6K and P_c = 45.99bar. ***8 points***

- 6.127 ×10^{-5} m^3/mol
- 9.253 ×10^{-3} m^3/mol
- 4.24 ×10^{-3} m^3/mol
- 3.148 ×10^{-4} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.24 ×10^{-3} m^3/mol

7) What is the molar volume of methane gas at 500°C and 15 atm pressure if it obeys Peng-Robinson equation of state? Critical conditions for methane: T_c = 190.6K, P_c = 45.99bar, z_c = 0.286 and ω = 0.012. Note: Consider largest root of molar volume as answer because the system is gaseous system. ***8 points***

- 1.036 ×10^{-4} m^3/mol
- 4.24 ×10^{-3} m^3/mol
- 0.751 ×10^{-7} m^3/mol
- 7.526 ×10^{-5} m^3/mol

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.24 ×10^{-3} m^3/mol