

CHEM 110: Practice Test Questions for FINAL EXAM on GASES and Molecular Geometry

- 1) A sample of gas (24.2 g) initially at 2.00 atm was compressed from 8.00 L to 2.00 L at constant temperature. After the compression, the gas pressure was _____ atm.
- A) 4.00
 - B) 2.00
 - C) 5.00
 - D) 8.00
 - E) 16.0
- 2) A sample of H₂ gas (12.28 g) occupies 100.0 L at 400.0 K and 2.00 atm. A sample weighing 11.56 g occupies _____ L at 353 K and 2.00 atm.
- A) 109.24
 - B) 68.21
 - C) 82.93
 - D) 23.78
 - E) 294.55
- 3) The basis of the VSEPR model of molecular bonding is _____.
- A) regions of electron density on an atom will organize themselves so as to maximize *s-character*
 - B) regions of electron density in the valence shell of an atom will arrange themselves so as to maximize overlap
 - C) atomic orbitals of the bonding atoms must overlap for a bond to form
 - D) electron domains in the valence shell of an atom will arrange themselves so as to minimize repulsions
 - E) hybrid orbitals will form
- 4) The reaction of 150 mL of Cl₂ gas with 150 mL of CH₄ gas via the equation:
- $$\text{Cl}_2 (\text{g}) + \text{CH}_4 (\text{g}) \rightarrow \text{HCl} (\text{g}) + \text{CH}_3\text{Cl} (\text{g})$$
- will produce a total of _____ mL of products if pressure and temperature are kept constant.
- A) 50
 - B) 250
 - C) 100
 - D) 450
 - E) 300
- 5) At a temperature of _____ °C, 0.222 mol of CO gas occupies 11.8 L at 889 torr.
- A) 379
 - B) 485
 - C) 14
 - D) 32
 - E) 652
- 6) The e- pair (domain) arrangement of the BH₃ molecule is _____.
- A) octahedral
 - B) trigonal bipyramidal
 - C) tetrahedral
 - D) trigonal planar
 - E) T-shaped

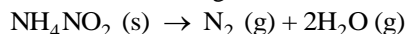
7) According to VSEPR theory, if there are four electron domains in the valence shell of an atom, they will be arranged in a(n) _____ geometry.

- A) octahedral
- B) linear
- C) tetrahedral
- D) trigonal planar
- E) trigonal bipyramidal

8) The density of CO at 1.53 atm and 22.8 °C is _____ g/L.

- A) 18.2
- B) 1.76
- C) 0.388
- D) 11.43
- E) 2.12

9) Ammonium nitrite undergoes thermal decomposition to produce only gases:



What volume (L) of gas is produced by the decomposition of 18.0 g of NH_4NO_2 (s) at 675 °C and 2.5 atm?

- A) 47.53
- B) 160.00
- C) 26.25
- D) 72.89
- E) 24.54

10) How is the density of a gas affected by pressure?

- A) Pressure change has no effect on density of a gas.
- B) There is an increase in density with increase in pressure.
- C) The volume of a gas changes with pressure, but not its density.
- D) Pressure and density of a gas have an inverse relationship.
- E) None of the above.

11) A vessel contained N_2 , Ar, He, and Ne. The total pressure in the vessel was 1076 torr. The partial pressures of nitrogen, argon, and helium were 44.0, 486, and 318 torr, respectively. The partial pressure of neon in the vessel was _____ torr.

- A) 228
- B) 321
- C) 9.7
- D) 239
- E) 654

12) Which of the following statements about gases is true?

- A) Gases are not easily compressed.
- B) Distances between molecules of gas are very large compared to bond distances within molecules.
- C) Gas mixtures are always heterogeneous.
- D) Gases contract to fill the container they are placed in.
- E) All gases are colorless and odorless at room temperature.

13) Which of the following gases would be non-polar?

- A) CBr_3I
- B) AlH_3
- C) H_2O
- D) NH_4^+
- E) PI_3

14) What is the rate of effusion ratio for the gases CO_2 compared to NH_3 ?

- A) 1.24
- B) 1.46
- C) 0.62
- D) 3.71
- E) 0.39

15) Of the following gases, _____ will have the smallest rate of effusion at a given temperature.

- A) Rn
- B) CH_4
- C) XeF_4
- D) HBr
- E) HI

16) In a gas mixture of SO_2 , NO_2 , and CO_2 with a total pressure of 11.25 atm, the mole fraction of NO_2 is _____ if the partial pressures of SO_2 and CO_2 are 3.25 and 4.60 atm, respectively.

- A) 3.40
- B) 1.46
- C) 0.60
- D) 0.30
- E) 0.43