GASES CQ   - AP Chemistry

As with any multiple choice question on a CQ, please explain your answer. Justify through a math calculation or use appropriate concepts in your description.

ALL students should:

- ❑ Be able to convert between different units of pressure
- ❑ Be able to convert between different units of temperature
- ❑ Recall and be able to use Boyle's law in calculations
- ❑ Recall and be able to use Charles' law in calculations
- ❑ Recall and be able to use Gay-Lussac's law in calculations
- ❑ Recall and be able to use Avogadro's law in calculations
- ❑ Recall and be able to use the Combined gas law and the General gas law in calculations
- ❑ Recall and be able to use the Ideal gas law in calculations
- ❑ Understand and be able to use the van der Waals equation (modified ideal gas law) in calculations
- ❑ Recall and be able to use Dalton's law of partial pressures in calculations
- ❑ Recall the conditions that are used as standard in calculations
- ❑ Be able to use molar gas volume in calculations
- ❑ Understand the Kinetic theory as applied to gases
- ❑ Understand the concept of, and be able to perform calculations involving, the root-mean-square-speed of gases
- ❑ Understand the terms effusion and diffusion and be able to perform calculations relating to those concepts

1. Which of the following gases will have the greatest rate of effusion?

(A) Hydrogen
(B) Helium
(C) Nitrogen
(D) Neon
(E) Carbon Monoxide

2. A gas mixture contains 1.0 mole of oxygen and 9.0 moles of nitrogen and is held under conditions of standard temperature and pressure. What is the partial pressure of the oxygen?

(A) 1.0atm
(B) 0.1 atm
(C) 9.0 atm
(D) 0.9 atm
(E) None of the Above

3. The temperature of a fixed mass of gas in a rigid container is raised from 28.00 degrees Celsius to 88.00 degress Celsius. The initial pressure was 1000. mmHg. What is the new pressure, after heating?

(A) 1100. mmHg
(B) 1060 mmHg
(C) 1.578 atm
(D) 1.000 atm
(E) 760.0 atm

4. **A gas is collected over water at a temperature where the vapor pressure of water is known to be 22.0 mmHg. The total pressure recorded in the container is 790 mmHg, what is the pressure of the gas being collected?**

(A) 22.0 mHg
(B) 66.0 mmHg
(C) 790. mmHg

(D) 812 mmHg
(E) 768 mmHg

5. 3.00 moles of a gas are contained in a 3.00 liter vessel at a temperature of 200. degrees Celsius at a pressure of 5.00 atm. Tha gas is allowed to expand to a new volume of 4.50 liters, but at the same time maintaining the original temperature. What is the new pressure?

(A) 2.33 atm
(B) 3.33 atm
(C) 3.00 atm
(D) 4.33 atm
(E) 5.00 atm

6. A gas that is confined in a rigid container is heated. Which of the following statements is FALSE?

(A) The Kinetic energy of the gas particles will increase
(B) The pressure will increase
(C) The density will remain constant
(D) The number of moles of gas will increase
(E) The volume will remain constant

7. A gas is held under conditions of standard temperature and pressure. It is found that 14.0 grams of the gas occupies a volume of 11.2 L under these conditions. What is the gas?

(A) Carbon Dioxide
(B) Nitrogen
(C) Fluorine
(D) Chlorine
(E) Oxygen

8. A mixture of gases at a constant temperature includes equal numbers of moles of each of the following. Carbon dioxide, Helium, Neon, Oxygen and Nitrogen. Which gas has the highest U_{rms}?

(A) CO_2
(B) He
(C) Ne
(D) O_2
(E) N_2

9. Under what conditions do the assumptions associated with the application of an ideal gas start to breakdown?

(A) High Pressure and High Temperature
(B) High Pressure and Large Volume
(C) Large Volume and High Temperature
(D) Small Volume and High Temperature
(E) High Pressure and Low Temperature

10. A gas is heated from 20.000 degrees Celsius to 122.55 degrees Celsius at a constant pressure of 1.0000 atm. If the initial volume is V, what will be the new volume?

(A) V/293
(B) 1.35 V
(C) 122.55 V
(D) 395.55 V
(E) None of the Above

11. One of the following assumptions is NOT part of the kinetic theory. Which one?

(A) The particles in a gas have a negligible volume
(B) The particles in a gas are not attracting one another
(C) The particles in a gas collide with one another in elastic collisions
(D) The speed of the particles in a gas is directly proportional to the Kelvin temperature
(E) The particles in a gas cannot be compressed

12. Assuming ideal behavior at STP, what is the density of Argon? (Density = Mass/Volume)

(A) 1.79×10^{-3} kg per liter
(B) 1.79 kg per liter
(C) 40 g per liter
(D) 40 g per mole
(E) 22. 4 liters per gram

13. A "Real" gas, when compared to an "Ideal" gas under the same conditions has;

(A) Particles whose volume is significant
(B) A lower pressures than would otherwise be expected if it were "Ideal"
(C) Greater Kinetic energy
(D) Two of (A)-(C)
(E) All three of (A)-(C)

14. 2.00 g of zinc metal is dissolved in excess hydrochloric acid and the hydrogen gas produced is collected. What volume of hydrogen at STP should be collected?

(A) 0.0308 L
(B) 1.38 L
(C) 30.8 L
(D) 0.0308 mL
(E) 689 mL

15. Assuming ideal conditions, calculate the total pressure in 3.0 Liter container that contains 0.015 moles of carbon dioxide combined with 2.0 moles of oxygen at a temperature of 30 degrees Celsius?

(A) 1.65 atm
(B) 22.4 atm
(C) 16.7 atm
(D) 17.8 atm
(E) None of the Above

16.Oxygen gas contained in a 1.35 L vessel is transferred to a 755 mL vessel. The initial pressure was 515 mmHg and the temperature throughout was 34 degrees Celsius. What is the new pressure?

(A) 0.921 atm
(B) 0.921 mmHg
(C) 0.755 mmHg
(D) 0.755 atm
(E) 921 mmHg

17. An ideal gas is assumed to have which of the following attributes?

(A) Particles that occupy a negligible volume compared to the whole space occupied by the gas
(B) Particles that do not attract one another
(C) Particles that move with varying speeds
(D) Particles that move in straight lines and have elastic collisions
(E) All of the Above

18.Under which of the following sets of circumstances will the pressure of a gas DEFINITELY increase?

(A) Raising the T and reducing the V
(B) Raising the T and increasing the V
(C) Lowering T and reducing the V
(D) Increasing n and increasing the V
(E) Decreasing n and increasing the T

19. What volume is occupied by two moles of an ideal gas at STP?
(A) 22.4 L
(B) 11.2 L
(C) 44.8 L
(D) Depends on the gas
(E) None of the Above

20. At STP, a certain gas of mass 18.0 g occupies a volume of 12.6 L. What is the gas?

(A) Oxygen
(B) Hydrogen
(C) Helium
(D) Nitrogen
(E) None of the Above

21. Which Law describes the total pressure as being a sum of the individual pressures in a gaseous mixture?

(A) Boyles
(B) Charles's
(C) Avogadro's
(D) Graham's
(E) None of the Above

22. Which of the following are the same for each gas in a mixture of gases that are confined in a single vessel?

(A) Volume and number of moles
(B) Volume and Temperature
(C) Volume and Partial Pressure
(D) Temperature and Partial Pressure
(E) None of the Above