1.

Which statement is *inconsistent* with the kinetic theory of an ideal gas?

1. The forces of repulsion between gas molecules are very weak or negligible.
2. Most of the volume occupied by a gas is empty space.
3. Gas molecules move in a straight line between collisions.
4. The average kinetic energy of a gas is proportional to the absolute temperature.
5. When gas molecules collide, they both gain kinetic energy.

2.

Which of the following samples has the least moles of gas?

1. 1.00 L of CH_4 at 10°C and 1.00 atm
2. 1.00 L of HCl at 20°C and 1.00 atm
3. 1.00 L of Ar at -10.0°C and 1.00 atm
4. 1.00 L of H_2 at 0.0°C and 1.18 atm
5. 1.00 L of NH_3 at 10°C and 1.00 atm

3.

At standard conditions, it was found that 1.50 L of a gas weighed 1.14 g. The gas could be

1. N_2F_4.
2. NH_3.
3. SO_2.
4. CO_2.
5. PCl_3.

4.

For the reaction $H_2(g) + F_2(g) \rightarrow 2HF(g)$, if 11.4 torr of $H_2(g)$ and 46.8 torr of $F_2(g)$ are added to a 14.3-L sealed container at 65.0°C, what will be the total pressure inside the container once the reaction is complete? (R = 0.08206 L atm K^{-1} mol^{-1})

1. 46.8 torr
2. 93.6 torr
3. 22.8 torr
4. 11.4 torr
5. 58.2 torr

5.

What is the pressure exerted by 87.2 g of chlorine gas in a 14.0-L vessel at 12.3°C? (R = 0.08206 L atm K^{-1} mol^{-1})

1. 6.29 atm
2. 0.177 atm
3. 2.06 atm
4. 0.0887 atm
5. 4.12 atm

6.

How many molecules of nitrogen dioxide are present in a 55.6-L container of $NO_2(g)$ at 658.3 torr and 85.8°C? (R = 0.08206 L atm K^{-1} mol^{-1}, $N_A = 6.02 \times 10^{23}$ mol^{-1})

1. 4.12×10^{24}
2. 7.48×10^{26}
3. 9.84×10^{23}
4. 3.13×10^{27}
5. 4.53×10^{25}

7.

A 2.0 L glass soda bottle filled only with air is tightly capped at 18°C and 686 mmHg. If the bottle is placed in water at 95°C, what is the pressure in the bottle?

1. 542 mmHg
2. 3620 mmHg
3. 130 mmHg
4. 868 mmHg
5. 467 mmHg

8.

A sealed container of oxygen gas has a pressure of 44.2 atm at 319.0 K. If the container is cooled to 239.0 K, what is the new pressure of the gas? (R = 0.08206 L atm K^{-1} mol^{-1})

1. 44.2 atm
2. 3.23 atm
3. 3.58×10^3 atm
4. 33.1 atm
5. 59.0 atm

9.

How many moles of gas are in a gas sample occupying 2.25 L at 679 mmHg and 303 K?

1. 5.04 mol
2. 61.4 mol
3. 0.0808 mol
4. 12.4 mol
5. 0.00663 mol

10.

Which of the following assumptions of the kinetic molecular theory of gases is *not* valid for real gases at high pressure?

1. The gas particles move in a straight line until they collide with another particle or the walls of the container.
2. All of the above are valid for real gases at high pressure.
3. The average kinetic energy of the gas particles depends upon temperature of the gas only.
4. The volume of the gas particles is much smaller than the distance between the gas particles.
5. The gas particles behave like hard, spherical objects in a state of constant, random motion.

11.

Under what set of conditions does HCl(*g*) deviate the most from ideal behavior?

1. Low temperature and high pressure
2. High temperature and high pressure
3. Low temperature and low pressure
4. Standard temperature and pressure
5. High temperature and low pressure

12.

What is the ratio of the average speed of CH_4 molecules to that of SO_2 molecules at 298 K?

1. 1:1.4
2. 1:1
3. 1.4:1
4. 1:2
5. 2:1

13.

Which of the following gases would be expected to show the greatest deviation from ideal behavior at the same temperature and pressure?

1. CH_4
2. CH_3CH_3
3. He
4. SO_2
5. N_2

14.

A 5.00 L balloon is partially filled with He at the foot of Mt. Everest where the ambient pressure is 0.95 atm and 24ºC. The balloon is going to be taken to the top of the mountain where the air pressure is 0.64 atm and temperature is –10ºC. To what volume should the balloon be filled at the base of the mountain so that it is fully inflated at the top?

1. 5.6 L
2. 3.8 L
3. 3.4 L
4. 3.0 L
5. 8.1 L

15.

All of the following statements concerning gas molecules are *true, except*

1. real molecules have a weak attraction for each other.
2. nonpolar larger molecules have greater attraction than nonpolar smaller molecules.
3. attraction between molecules is greater between fast-moving molecules than slow-moving molecules.
4. real molecules occupy a finite space.
5. real molecules have the greatest attraction for each other at high pressures.

16.

At 29°C and 1.44 atm, the density of a gaseous hydrocarbon is 1.51 g/L. The hydrocarbon could be

1. C_3H_8.
2. CH_2.
3. C_2H_4.
4. C_2H_2.
5. C_2H_6.

17.

A 5.00 L balloon is partially filled with He at the foot of Mt. Everest where the ambient pressure is 0.95 atm. The balloon is going to be taken to the top of the mountain where the air pressure is 0.64 atm. Ignoring changes in temperature, to what volume should the balloon be filled at the base of the mountain so that it is fully inflated at the top?

1. 7.4 L
2. 3.0 L
3. 5.0 L
4. 4.8 L
5. 3.2 L

18.

Graham's law states that

1. the rates of effusion of gases are inversely proportional to the square roots of their molar masses.
2. the volume of a fixed amount of gas is directly proportional to its temperature in Kelvin at constant pressure.
3. the volume of a fixed amount of gas is inversely proportional to its pressure at constant temperature.
4. the total pressure of a mixture of gases is the simple sum of the partial pressure of all of the gaseous compounds.
5. equal amounts of gases occupy the same volume at constant temperature and pressure.

19.

All of the following statements describe 64 g of gaseous sulfur dioxide at 0ºC and 76 cm Hg pressure *except*

1. one mole of gas.
2. the amount of gas that contains $64 \times 6.02 \times 10^{23}$ molecules of SO_2.
3. the amount of gas that contains 32 g of sulfur.
4. the amount of gas that contains 32 g of oxygen.
5. 22.4 L of gas.

20.

When ammonium nitrite undergoes decomposition, only gases are produced, according to the equation
$NH_4NO_2(s) \Leftrightarrow N_2(g) + 2H_2O(g)$
What is the total volume of gases produced at 1092 K and 1.00 atm pressure when 192 g of ammonium nitrite undergoes the foregoing decomposition reaction?

1. 9×22.4 L
2. 18×22.4 L

3. 12 × 22.4 L
4. 36 × 22.4 L
5. 6 × 22.4 L