Name: _____ **Off. Class:** _____ **Per:** _____ **Date:** _____

Teacher: _____ **Unit 6: Gases Practice Test** **Chemistry**

1. At 25ºC, gas in a rigid cylinder with a movable piston has a volume of 145 mL and a pressure of 125 kPa. Then the gas is compressed to a volume of 80. mL. What is the new pressure of the gas if the temperature is held at 25ºC?

   A) 69 kPa B) 93 kPa
   C) 160 kPa **D) 230 kPa**

2. What is the difference in pressure between a gas at 50.0 kPa and a gas at standard pressure?

   A) 101.3 kPa B) 223 kPa
   C) 51.3 kPa D) 0.0 kPa

3. One reason that a real gas deviates from an ideal gas is that the molecules of the real gas have

   A) a straight-line motion
   B) forces of attraction for each other
   C) a negligible volume
   D) no net loss of energy on collision

4. A rigid cylinder contains a sample of gas at STP. What is the pressure of this gas after the sample is heated to 410 K?

   A) 0.50 atm B) 0.67 atm
   C) 1.5 atm D) 1.0 atm

5. As the pressure on a given sample of a gas increases at constant temperature, the mass of the sample

   A) decreases B) increases
   C) remains the same

6. According to kinetic molecular theory, which statement describes one characteristic of an ideal gas system?

   A) The straight-line motion of the gas molecules is constant and random.
   B) The attractive force between two gas molecules is strong.
   C) The distance between gas molecules is smaller than the diameter of one gas molecule.
   D) The energy of the system decreases as gas molecules collide.

7. A rigid cylinder with a movable piston contains a 2.0-liter sample of neon gas at STP. What is the volume of this sample when its temperature is increased to 30.°C while its pressure is decreased to 90. kilopascals?

   A) 2.5 L B) 0.22 L C) 2.0 L D) 1.6 L

8. A sample of gas *A* was stored in a container at a temperature of 50ºC and a pressure of 0.50 atmosphere. Compared to a sample of gas *B* at STP, gas *A* had a

   A) higher temperature and a higher pressure
   B) lower temperature and a lower pressure
   C) lower temperature and a higher pressure
   D) higher temperature and a lower pressure

9. A 100.-milliliter sample of helium gas is placed in a sealed container of fixed volume. As the temperature of the confined gas increases from 10.ºC to 30.ºC, the internal pressure

   A) decreases **B) increases**
   C) remains the same

10. Which statement correctly describes a sample of gas confined in a sealed container?

    A) It always has a definite volume, and it takes the shape of the container.
    B) It consists of particles arranged in a regular geometric pattern.
    C) It has a crystalline structure.
    D) It takes the shape and the volume of any container in which it is confined.

11. Under which conditions of temperature and pressure would helium behave most like an ideal gas?

    A) 750 K and 600 kPa B) 50 K and 20 kPa
    C) 50 K and 600 kPa **D) 750 K and 20 kPa**

12. A real gas behaves most like an ideal gas at

    A) ionization energy of its particles
    B) activation energy of its particles
    C) average potential energy of its particles
    D) low pressure and high temperature

13. The table below shows data for the temperature, pressure, and volume of four gas samples.

Data for Four Gases

Gas Sample	Temperature (K)	Pressure (atm)	Volume (L)
I	600.	2.0	5.0
II	300.	1.0	10.0
III	600.	3.0	5.0
IV	300.	1.0	10.0

    Which two gas samples contain the same number of molecules?

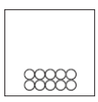
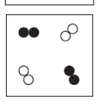
    A) I and II B) II and III
    C) II and IV D) I and III

14. A 16.0 liter sample of $CH_4(g)$ is at 0ºC and 1 atmosphere. The volume of the gas sample in liters at 27ºC and 1 atmosphere is equal to

    A) $16.0 \times \frac{273}{300}$ B) $16.0 \times \frac{1}{27}$
    C) $16.0 \times \frac{300}{273}$ D) $16.0 \times \frac{27}{1}$

15. Which particle diagram represents one substance in the gas phase?

Key
○ = atom of one element
● = atom of another element

    A)  **B)** 
    C)  D) 

16. A sample of gas occupies a volume of 50.0 milliliters in a cylinder with a movable piston. The pressure of the sample is 0.90 atmosphere and the temperature is 298 K. What is the volume of the sample at STP?

    A) 41 mL B) 49 mL C) 51 mL D) 55 mL

17. Which temperature change would cause a sample of an ideal gas to double in volume while the pressure is held constant?

    A) from 400. K to 200. K B) from 400.°C to 200.°C
    C) from 200. K to 400. K D) from 200.°C to 400.°C

18. A cylinder with a movable piston contains a sample of gas having a volume of 6.0 liters at 293 K and 1.0 atmosphere. What is the volume of the sample after the gas is heated to 303 K, while the pressure is held at 1.0 atmosphere?

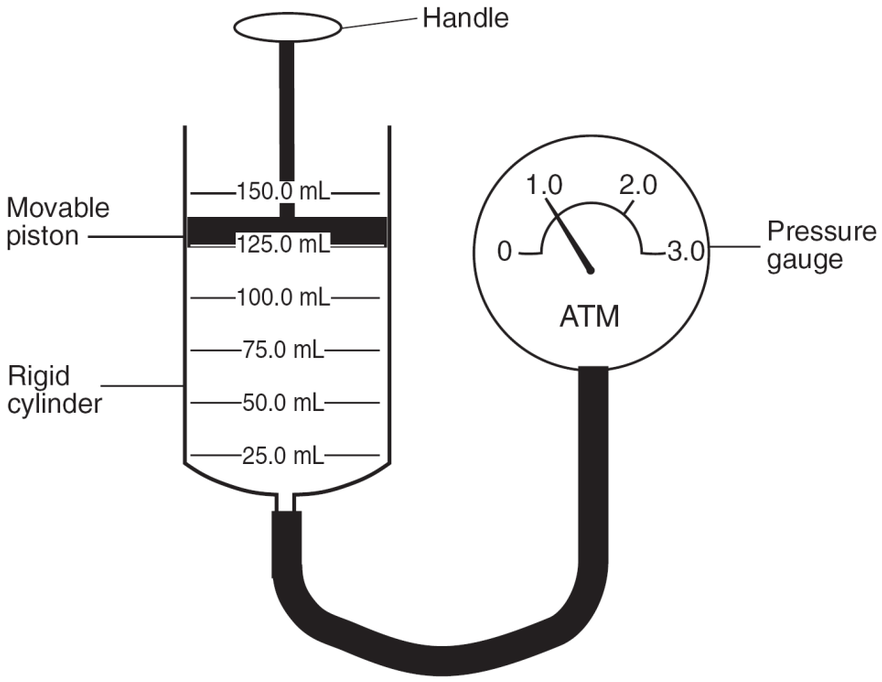
    A) 9.0 L **B) 6.2 L** C) 5.8 L D) 4.0 L

19. Which gas would deviate *least* from ideal gas behavior at low temperatures?

    A) Cl_2 **B) He** C) HCl D) CO_2

Base your answers to questions **20** and **21** on the information below.

A rigid cylinder is fitted with a movable piston. The cylinder contains a sample of helium gas, He(g), which has an initial volume of 125.0 milliliters and an initial pressure of 1.0 atmosphere, as shown below. The temperature of the helium gas sample is 20.0°C.



20. Helium gas is removed from the cylinder and a sample of nitrogen gas, $N_2(g)$, is added to the cylinder. The nitrogen gas has a volume of 125.0 milliliters and a pressure of 1.0 atmosphere at 20.0°C. Compare the number of particles in this nitrogen gas sample to the number of particles in the original helium gas sample.

21. The piston is pushed further into the cylinder. In the space below, show a correct numerical setup for calculating the volume of the helium gas that is anticipated when the reading on the pressure gauge is 1.5 atmospheres. The temperature of the helium gas remains constant.

Base your answers to questions **22** and **23** on the information below.

A weather balloon has a volume of 52.5 liters at a temperature of 295 K. The balloon is released and rises to an altitude where the temperature is 252 K.

22. The original pressure at 295 K was 100.8 kPa and the pressure at the higher altitude at 252 K is 45.6 kPa. Assume the balloon does not burst. Show a correct numerical setup for calculating the volume of the balloon at the higher altitude.

23. What Celsius temperature is equal to 252 K?

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24. Base your answer to the following question on the information below.

A sample of helium gas is in a closed system with a movable piston. The volume of the gas sample is changed when both the temperature and the pressure of the sample are increased. The table below shows the initial temperature, pressure, and volume of the gas sample, as well as the final temperature and pressure of the sample.

Helium Gas in a Closed System

Condition	Temperature (K)	Pressure (atm)	Volume (mL)
Initial	200.	2.0	500.
final	300.	7.0	?

In the space below show a correct numerical setup for calculating the final volume of the helium gas sample.

25. A sample of oxygen gas in one container has a volume of 20.0 milliliters at 297 K and 101.3 kPa. The entire sample is transferred to another container where the temperature is 283 K and the pressure is 94.6 kPa. Show a correct numerical setup for calculating the new volume of this sample of oxygen gas.

Answer Key
Unit 6 Practice Test

1. **D**
2. **C**
3. **B**
4. **C**
5. **C**
6. **A**
7. **A**
8. **D**
9. **B**
10. **D**
11. **D**
12. **D**
13. **C**
14. **C**
15. **B**
16. **A**
17. **C**
18. **B**
19. **B**
20. *Examples:* —Both samples have the same number of particles. —Equal volumes of gases at the same temperature and pressure contain the same number of particles.
21. *Examples:*
—$V_2 = \frac{(1.0atm)(125.0mL)}{1.5atm}$
—(1.0)(125) = (1.50)(V_2)
22. $\frac{(100.8\,\text{kPa})(52.5\,\text{L})}{295\,\text{K}} = \frac{(45.6\,\text{kPa})(X)}{(252\,\text{K})}$

    $52.5 \times \frac{252}{295} \times \frac{100.8}{45.6}$
23. –21°C
24. $\frac{(2.0\,\text{atm}(500.\,\text{mL})}{200.\,\text{K}} = \frac{7.0\,\text{atm}V_2}{300.\,\text{K}}$

    $\frac{(2)(500)(300)}{200(7)}$
25. Acceptable responses include, but are not limited to:
$\text{V}_2 = \frac{(20.0\,\text{mL})(101.3\,\text{kPa})(283\,\text{K})}{(94.6\,\text{kPa})(297\,\text{K})}$

    $\frac{(101.3)(20.0)}{297.283} = (94.6)\text{V}_2$