Physics II **Name** _____

Ch 13 Ideal Gas Model Factors **Date** _____ **Period** _____

1. By what factor does v_{rms} change in a sample of gas when its Kelvin temperature is doubled?
2. By what factor does v_{rms} change in a sample of gas when its Kelvin temperature remains the same while its volume is doubled?
3. By what factor does v_{rms} change in a sample of gas when its Kelvin temperature and volume remain the same but the number of particles is doubled?
4. By what factor does the average kinetic energy of the molecules in a sample of gas change when its Kelvin temperature is doubled?
5. How does the average kinetic energy of helium atoms ($^4_2$He) at STP compare to the average kinetic energy of oxygen molecules (O_2) at STP? Oxygen is $^{16}_{8}$O.
6. How many times greater is v_{rms} of helium atoms ($^4_2$He) at STP compared to the v_{rms} of oxygen molecules (O_2) at STP? Oxygen is $^{16}_{8}$O.
7. If we keep the temperature and the amount of gas constant, what happens to the volume if we increase its pressure by a factor α, that is $P \to \alpha P$?
8. If we keep the temperature and the volume of gas constant, what happens to the pressure if we increase the amount of gas by a factor α, that is $N \to \alpha N$?
9. If we keep the volume and the amount of a gas sample constant, what happens to its pressure if we increase the temperature from 100 K to 200 K?
10. If we keep the volume and the amount of a gas sample constant, what happens to its pressure if we increase the temperature from 100°C to 200°C?
11. Which changes in the state of a given gas sample will result an increase in its volume?

	Pressure / kPa	**Temperature** / K
A.	Doubled	Doubled
B.	Halved	Halved
C.	Doubled	Halved
D.	Halved	Doubled

12. Which of the following best accounts for the observation that gases are easily compressed?
    (a) Gas molecules have negligible attractive forces for one another.
    (b) The volume occupied by the gas is much greater than that occupied by the molecules.
    (c) The average energy of the molecules in a gas is proportional to the absolute temperature of the gas.
    (d) The collisions between gas molecules are elastic.

13. In which gas sample do the molecules have the greatest average kinetic energy?

    (a) H_2 at 100 K

    (b) CH_4 at 273 K

    (c) H_2O at 373 K

    (d) CH_3OH at 353 K

14. The temperature in Kelvin of 2.0 L of an ideal gas is doubled and its pressure is increased by a factor of four. What is the final volume of the gas?

    (a) 1.0 L

    (b) 2.0 L

    (c) 3.0 L

    (d) 4.0 L

15. When the pressure of a sample of gas is increased at constant temperature, its particles will

    (a) become smaller

    (b) become larger

    (c) move faster

    (d) be closer together

16. Which quantity will not change for a sample of gas in a sealed rigid container (which means its volume will not change) as it is cooled from 100°C to 75°C?

    (a) The average kinetic energy of the molecules

    (b) The pressure of the gas

    (c) The density of the gas

17. When a bicycle tire is pumped up with air at constant temperature, assuming any change in its volume can be neglected, the pressure increase comes from the fact that

    (a) The gas particles are moving faster.

    (b) The collisions with the wall occur at a greater frequency.

    (c) Each collision transfers more momentum to the wall than before.

    (d) Two or three of the changes mentioned in A, B, and C occur simultaneously.

18. 1 L of gas in a container at -73°C is allowed to expand to 1.5 L, what must the temperature be increased to so that the pressure remains constant?

19. A 2.00 L sample of a gas at a pressure of 1000. kPa is allowed to expand at constant temperature until its pressure decreases to 500 kPa. What will the new volume of the gas be?