

## Gas Laws: KM Theory & Ideal Gases

1. The kinetic molecular theory of motion of particles is strongly supported by experimental evidence. The primary types of motion in molecules of solids, liquids and gases (in that order) will be \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

|   |               |               |               |
|---|---------------|---------------|---------------|
| a | Translational | Rotational    | Vibrational   |
| b | Vibrational   | Rotational    | translational |
| c | Translational | Vibrational   | Rotational    |
| d | Rotational    | Translational | Vibrational   |

2. Scientists have theorized about IDEAL gases, but in application situations, many gases act like REAL gases. Consider the list of statements

|     |                                                                                                                     |
|-----|---------------------------------------------------------------------------------------------------------------------|
| i   | Under high pressure $O_2(g)$ will compress to $O_2(l)$                                                              |
| ii  | Gas molecules are in constant random motion in straight lines                                                       |
| iii | Gas molecules undergo elastic collisions where no energy is lost                                                    |
| iv  | Gas molecules act like rigid hard billiard balls during collisions and experience no change in shape                |
| v   | At cold temperatures, gas molecules experience an increase in intermolecular forces causing them to stick together. |

The number of **TRUE** statements for **IDEAL gases** is \_\_\_\_\_

|   |   |
|---|---|
| a | 5 |
| b | 4 |
| c | 3 |
| d | 2 |

3. A sample of an ideal doubles its volume. How many of the following situations could allow this to happen?

|     |                                                                                                         |
|-----|---------------------------------------------------------------------------------------------------------|
| i   | The mass of the gas is doubled at the same conditions of temperature and pressure                       |
| ii  | The mass of the mass is kept constant while the pressure is doubled and the temperature is cut in half. |
| iii | The mass of the gas and the pressure of the gas remain constant while the temperature is doubled.       |
| iv  | The mass of the gas and the temperature of the gas remain constant while the pressure is cut in half    |

|   |   |
|---|---|
| a | 4 |
| b | 3 |
| c | 2 |
| d | 1 |

4. **Numerical response question**

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

Left justify your answer in the boxes provided.

Johannes van der Waals worked on explaining the difference(s) between Ideal gases and Real gases. List the statements below that apply only to particles of REAL gases

1. Like soft spheres
2. Constant random motion
3. Size is negligible
4. Can change state
5. Size is significant
6. Elastic collisions

List the choice(s) in ascending order.

**Answers:**

1. B
2. C
3. B
4. 145