

Test 6: Phases of Matter Review Questions

Name: \_\_\_\_\_

Wednesday, January 16, 2008

1.

According to the kinetic theory of gases, which assumption is correct?

- |   |   |
|---|---|
| 1. Gas particles strongly attract each other. | 3. The volume of gas particles prevents random motion.    |
| 2. Gas particles travel in curved paths.      | 4. Energy may be transferred between colliding particles. |

2.

Under the same conditions of temperature and pressure, which of the following gases would behave most like an ideal gas?

- |                        |                        |
|------------------------|------------------------|
| 1. He(g)               | 3. Cl <sub>2</sub> (g) |
| 2. NH <sub>3</sub> (g) | 4. CO <sub>2</sub> (g) |

3.

A sample of a gas occupies 6.00 liters at a temperature of 200 K. If the pressure remains constant and the temperature is raised to 600 K, the volume of gas sample would be

- |           |           |
|-----------|-----------|
| 1. 18.0 L | 3. 3.00 L |
| 2. 2.00 L | 4. 12.0 L |

4.

As the temperature of a gas increases at constant pressure, the volume of the gas

1. decreases
2. increases
3. remains the same

Test 6: Phases of Matter Review Questions

5.

If the pressure and Kelvin temperature of 2.00 moles of an ideal gas at STP are doubled, the resulting volume will be

1. 5.60 L
2. 11.2 L
3. 22.4 L
4. 44.8 L

6.

A 1-gram sample of which substance in a sealed 1-liter container will occupy the container completely and uniformly?

1. Ag(*s*)
2. Hg(*l*)
3. H<sub>2</sub>O(*l*)
4. H<sub>2</sub>O(*g*)

7.

Which 5.0-milliliter sample of NH<sub>3</sub> will take the shape of and completely fill a closed 100.0-milliliter container?

1. NH<sub>3</sub>(*s*)
2. NH<sub>3</sub>(*l*)
3. NH<sub>3</sub>(*g*)
4. NH<sub>3</sub>(*aq*)

8.

If the pressure on a 3.0 liter sample of a gas is doubled at constant temperature, the new volume would be

1. 0.75 L
2. 1.5 L
3. 6.0 L
4. 9.0 L

9.

A volume of 50.0 milliliters of an ideal gas at STP increases to 100 milliliters. If the pressure remains constant, the new temperature must be

1. 0 K
2. 100 K
3. 273 K
4. 546 K

Test 6: Phases of Matter Review Questions

10.

Which sample is most likely to take the shape and total volume of its container?

1.  $\text{CO}_2(g)$
2.  $\text{CO}_2(l)$
3.  $\text{CO}_2(aq)$
4.  $\text{CO}_2(s)$

11.

At STP, 1 liter of  $\text{O}_2(g)$  and 1 liter of  $\text{Ne}(g)$  have the same

1. mass
2. density
3. number of atoms
4. number of molecules

12.

When the pressure exerted on a confined gas at constant temperature is doubled, the volume of the gas is

1. halved
2. doubled
3. tripled
4. quartered

13.

A real gas differs from an ideal gas because the molecules of real gas have

1. some volume and no attraction for each other
2. some volume and some attraction for each other
3. no volume and no attraction for each other
4. no volume and some attraction for each other

14.

A real gas behaves more like an ideal gas when the gas molecules are

1. close and have strong attractive forces between them
2. close and have weak attractive forces between them
3. far apart and have strong attractive forces between them
4. far apart and have weak attractive forces between them

Test 6: Phases of Matter Review Questions

15.

An ideal gas is made up of gas particles that

1. have volume
2. can be liquified
3. attract each other
4. are in random motion

16.

| Sample | Substance      | Temperature (K) | Pressure (atm) | Volume (L) |
|--------|----------------|-----------------|----------------|------------|
| A      | He             | 273             | 1              | 22.4       |
| B      | O <sub>2</sub> | 273             | 1              | 22.4       |
| C      | Ne             | 273             | 2              | 22.4       |
| D      | N <sub>2</sub> | 546             | 2              | 44.8       |
| E      | Ar             | 546             | 2              | 44.8       |

Figure 1

The table shows the temperature, pressure, and volume of five samples. Which sample contains the same number of molecules as sample A?

1. E
2. B
3. C
4. D

17.

The behavior of real gases most closely resembles that of ideal gases under conditions of

1. high temperature and low pressure
2. high temperature and high pressure
3. low temperature and low pressure
4. low temperature and high pressure

18.

At STP, equal volumes of N<sub>2</sub>(g) and CO<sub>2</sub>(g) contains equal numbers of

1. atoms
2. electrons
3. molecules
4. protons

Test 6: Phases of Matter Review Questions

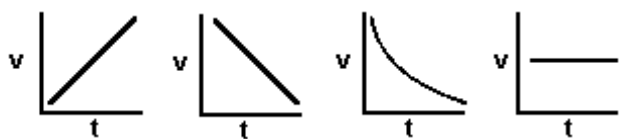
19.

A flask containing molecules of gas *A* and a separate flask containing molecules of gas *B* are both at the same temperature. Gases *A* and *B* must have equal

1. volumes
2. masses
3. pressures
4. average kinetic energies

20.

At constant pressure which graph shows the correct relationship between the volume of a gas (*v*) and its absolute temperature (*t*)?



- 1.
- 2.
- 3.
- 4.

21.

The volume of a 1.00-mole sample of an ideal gas will decrease when the

1. pressure decreases and the temperature decreases
2. pressure decreases and the temperature increases
3. pressure increases and the temperature decreases
4. pressure increases and the temperature increases

22.

Two basic properties of the gas phase are

1. a definite shape and a definite volume
2. a definite shape but no definite volume
3. no definite shape but a definite volume
4. no definite shape and no definite volume

23.

The volume of a sample of gas is 1.0 liter at STP. If the pressure remains constant and the temperature is raised to 547 K, the new volume of the gas will be

1. 0.25 L
2. 2.0 L
3. 0.50L
4. 4.0 L

Test 6: Phases of Matter Review Questions

24.

The temperature of 100 milliliters of a gas at 200.K is increased to 400.K, pressure remaining constant. The new volume of the gas will be

1. 50.0 ml
2. 100. ml
3. 200. ml
4. 400. ml

25.

A gas sample has a volume of 25.0 milliliters at a pressure of 1.00 atmosphere. If the volume increases to 50.0 milliliters and the temperature remains constant, the new pressure will be

1. 1.00 atm
2. 2.00 atm
3. 0.250 atm
4. 0.500 atm

26.

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

1. It always has a definite volume, and it takes the shape of the container.
2. It takes the shape and the volume of any container in which it is confined.
3. It has a crystalline structure.
4. It consists of particles arranged in a regular geometric pattern.

27.

A sample of  $\text{H}_2(\text{g})$  and a sample of  $\text{N}_2(\text{g})$  at STP contain the same number of molecules. Each sample must have

1. the same volume, but a different mass
2. the same mass, but a different volume
3. both the same volume and the same mass
4. neither the same volume nor the same mass

28.

At 1 atmosphere and 20°C, all samples of  $\text{H}_2\text{O}(\text{l})$  must have the same

1. mass
2. density
3. volume
4. weight

Test 6: Phases of Matter Review Questions

29.

A gas occupies a volume of 40.0 milliliters at 20°C. If the volume is increased to 80.0 milliliters at constant pressure, the resulting temperature will be equal to

1.  $20^{\circ}\text{C} \times \frac{80.0 \text{ mL}}{40.0 \text{ mL}}$
2.  $20^{\circ}\text{C} \times \frac{40.0 \text{ mL}}{80.0 \text{ mL}}$
3.  $293\text{K} \times \frac{80.0 \text{ mL}}{40.0 \text{ mL}}$
4.  $293\text{K} \times \frac{40.0 \text{ mL}}{80.0 \text{ mL}}$

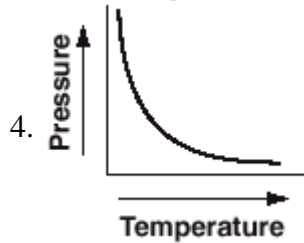
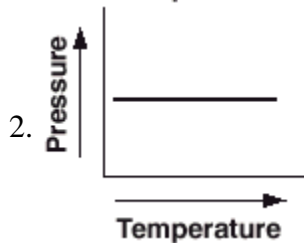
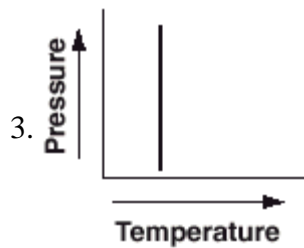
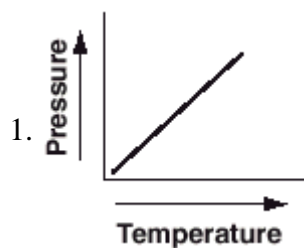
30.

As the temperature of a given sample of a gas decreases at constant pressure, the volume of the gas

1. decreases
2. increases
3. remains the same

31.

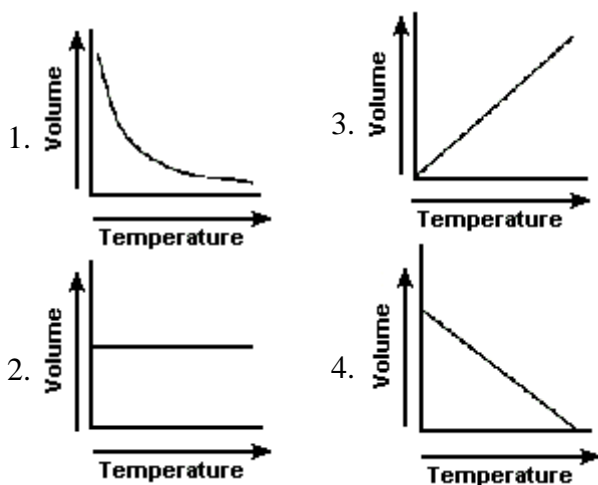
Which graph shows the pressure-temperature relationship expected for an ideal gas?



Test 6: Phases of Matter Review Questions

32.

Which graph represents the relationship between volume and Kelvin temperature for an ideal gas at constant pressure?



33.

Equal volumes of  $\text{SO}_2(g)$ ,  $\text{NO}(g)$ , and  $\text{CO}_2(g)$  at STP contain the same number of

- 1. molecules
- 2. neutrons
- 3. protons
- 4. atoms

34.

A sample of oxygen gas has a volume of 150. milliliters at 300 K. If the pressure of the sample is held constant and the temperature is raised to 600 K, the new volume of the sample will be

- 1. 75.0 mL
- 2. 150. mL
- 3. 300. mL
- 4. 600. mL

35.

At STP, which gas has properties most similar to those of an ideal gas?

- 1.  $\text{NH}_3$
- 2.  $\text{CO}_2$
- 3.  $\text{O}_2$
- 4.  $\text{H}_2$



Test 6: Phases of Matter Review Questions

36.

Equal volumes of  $\text{SO}_2(g)$  and  $\text{O}_2(g)$  at STP contain the same number of

- 1. atoms
- 2. molecules
- 3. electrons
- 4. protons

37.

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

- 1. a straight line motion
- 2. no net loss of energy on collision
- 3. a negligible volume
- 4. forces of attraction for each other

38.

The pressure on a 200-milliliter sample of  $\text{CO}_2(g)$  at constant temperature is increased from 600 kilopascal to 1,200 kilopascal. What is the new volume of the gas?

- 1. 100 mL
- 2. 300 mL
- 3. 400 mL
- 4. 600 mL

39.

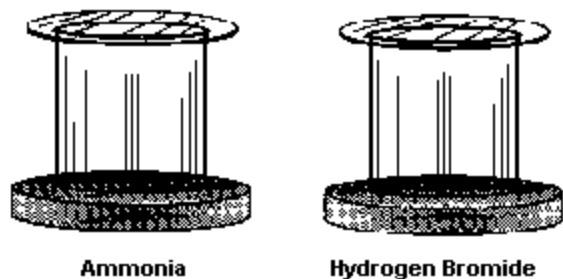


Figure 2

The diagram represents 1-mole samples of ammonia and hydrogen bromide gases at STP. Compared to the ammonia sample, the hydrogen bromide sample has a

- 1. larger mass and fewer molecules
- 2. smaller mass and fewer molecules
- 3. larger mass and an equal number of molecules
- 4. smaller mass and an equal number of molecules

Test 6: Phases of Matter Review Questions

40.

A sample of a gas has a volume of 2.0 liters at a pressure of 1.0 atmosphere. When the volume increases to 4.0 liters, at constant temperature, the pressure will be

- 1. 1.0 atm      3. 0.50 atm
- 2. 2.0 atm      4. 0.25 atm

41.

A 3.00-liter sample of gas is at 288 K and 1.00 atm. If the pressure of the gas is increased to 2.00 atm and its volume is decreased to 1.50 liters, the Kelvin temperature of the sample will be

- 1. 144 K      3. 432 K
- 2. 288 K      4. 576 K

42.

Under which conditions does a real gas behave most like an ideal gas?

- 1. at low temperatures and high pressures      3. at high temperatures and high pressures
- 2. at low temperatures and low pressures      4. at high temperatures and low pressures

43.

Which temperature change would cause the volume of a sample of an ideal gas to double when the pressure of the sample remains the same?

- 1. from 200°C to 400°C      3. from 200 K to 400 K
- 2. from 400°C to 200°C      4. from 400 K to 200 K

Test 6: Phases of Matter Review Questions

44.

The volume of a gas is 4.00 liters at 293 K and constant pressure. For the volume of the gas to become 3.00 liters, the Kelvin temperature must be equal to

1.  $\frac{3.00 \times 293}{4.00}$
2.  $\frac{4.00 \times 293}{3.00}$
3.  $\frac{3.00 \times 4.00}{293}$
4.  $\frac{293}{3.00 \times 4.00}$

45.

A gas has a volume of 2 liters at 323 K and 3 atmospheres. When its temperature is changed to 273 K and the pressure is changed to 1 atmosphere, the new volume of the gas would be equal to

1.  $2\text{L} \times \frac{273\text{K}}{323\text{K}} \times \frac{1\text{ atm}}{3\text{ atm}}$
2.  $2\text{L} \times \frac{323\text{K}}{273\text{K}} \times \frac{1\text{ atm}}{3\text{ atm}}$
3.  $2\text{L} \times \frac{273\text{K}}{323\text{K}} \times \frac{3\text{ atm}}{1\text{ atm}}$
4.  $2\text{L} \times \frac{323\text{K}}{273\text{K}} \times \frac{3\text{ atm}}{1\text{ atm}}$

46.

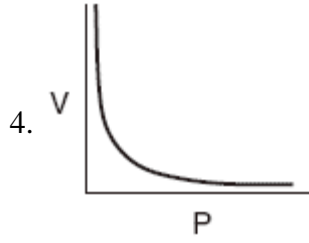
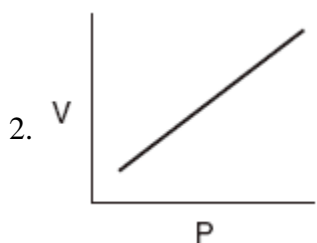
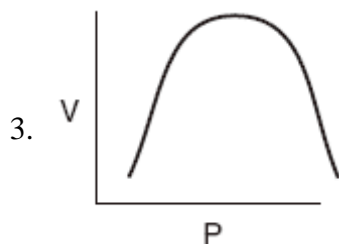
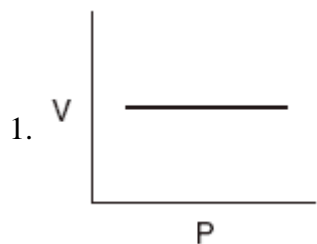
A sealed flask containing 1.0 mole of  $\text{H}_2(g)$  and a sealed flask containing 2.0 moles of  $\text{He}(g)$  are at the same temperature. The two gases must have equal

1. masses
2. volumes
3. average kinetic energies
4. numbers of molecules

Test 6: Phases of Matter Review Questions

47.

Which graph best represents the pressure-volume relationship for an ideal gas at constant temperature?



48.

At the same temperature and pressure, which sample contains the same number of moles of particles as 1 liter of  $O_2(g)$ ?

1. 1 L  $Ne(g)$       3. 0.5 L  $SO_2(g)$

2. 2 L  $N_2(g)$       4. 1 L  $H_2O(l)$

49.

Which material has a crystalline structure at room temperature ( $20^\circ C$ )?

1. water      3. nitrogen

2. glass      4. sucrose

50.

The characteristic which distinguishes a true solid from other phases of matter at STP is that in a true solid the particles are

1. vibrating and changing their relative positions

3. motionless but changing their relative positions

2. vibrating without changing their relative positions

4. motionless without changing their relative positions

## Test 6: Phases of Matter Review Questions

## Test 6: Phases of Matter Review Questions

### Answer Key for Test 6: Phases of Matter Review Questions

1. 4
2. 1
3. 1
4. 2
5. 4
6. 4
7. 3
8. 2
9. 4
10. 1
11. 4
12. 1
13. 2
14. 4
15. 4
16. 2
17. 1
18. 3
19. 4
20. 1
21. 3
22. 4
23. 2
24. 3
25. 4
26. 2
27. 1
28. 2
29. 3
30. 1
31. 1
32. 3
33. 1
34. 3
35. 4
36. 2
37. 4
38. 1
39. 3
40. 3
41. 2
42. 4
43. 3
44. 1
45. 3
46. 3

## Test 6: Phases of Matter Review Questions

47. 4

48. 1

49. 4

50. 2