

# SAT II-Review Questions

# Solids, Liquids, Gases

O'Malley

For 1-4

- Boyle's law
- Charles' law
- Avogadro's law
- Ideal gas law
- Dalton's law

- The total pressure of a gaseous mixture is equal to the sum of the partial pressures is
- Volume is inversely proportional to pressure is
- Volume is directly proportional to temperature is
- All gases have the same number of moles in the same volume at constant T and P is

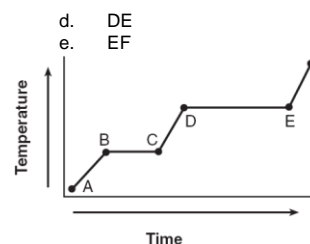
For 5-7

- Sublimation
- Condensation
- Evaporation
- Deposition
- melting

- Gas → solid is called
- Gas → liquid is called
- Solid → gas is called

For 8-10

- AB
- BC
- CD



- Which shows melting?
- Which shows increasing the kinetic energy of a liquid?
- Which shows boiling?

Q	Statement I	Because	Statement II
11.	The ideal gas law does not hold under low temperatures and high pressure	Because	Interactions between particles cannot be neglected under these conditions
12.	CO <sub>2</sub> is able to sublime at atmospheric pressure	Because	Its liquid form is impossible to produce
13.	When an ideal gas is cooled its volume will increase	Because	Temperature and volume are directly proportional
14.	According to the KMT, collisions between gas particles and the walls of the container are elastic	Because	Gas molecules are considered volume-less particles, with no intermolecular forces, in constant random motion
15.	As ice absorbs heat and begins to melt, its temperature remains constant	Because	Changes of state bring about changes in a substance's potential energy, not in its kinetic energy
16.	Water boils at a lower temperature at high altitudes compared to low altitudes	Because	The vapor pressure of water is lower at higher altitude
17.	Decreasing the volume of a system decreases pressure	Because	Pressure and volume are inversely related
18.	At constant pressure, a certain amount of gas will double in volume as the temperature is halved	Because	Temperature and volume are inversely proportional
19.	The volume of a gas at 100 deg C and 600 mmHg will be lower at STP	Because	Decreasing temperature and increasing pressure will cause the volume of a gas to decrease

- What volume would 16 g of molecular oxygen gas occupy at STP?

- 5.6 L
- 11.2 L
- 22.4 L
- 33.6 L
- 44.8 L

- Which of the following is responsible for the abnormally high boiling point of water?

- Covalent bonding
- Hydrogen bonding
- High polarity
- Large dielectric constant
- Low molecular weight

- Which of the following is (are) the weakest attractive forces?

- Van der Waals
- Coordinate covalent bonding
- Covalent bonding
- Polar covalent bonding
- Ionic bonding

- What is the volume at STP of 10 L of gas initially at 546 K, 2 atm?

- 5 L
- 10 L
- 15 L
- 20 L
- 25 L

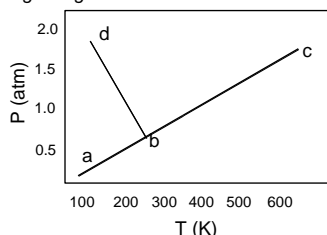
- If one mole of H<sub>2</sub> is compressed from 10 L to 7.5 L at constant temperature, what happens to the gas pressure?

- It increases by 25%
- It decreases by 25%
- It increases by 33%
- It increases by 50%
- None of the above

- An ideal gas in a closed inflexible container has a pressure of 6 atm and a temperature of 27 deg C. What will be the new pressure at -73 deg C?

- 2 atm
- 3 atm
- 4 atm
- 8 atm
- 9 atm

For the next few questions, refer to the diagram below, regarding substance Z.



- Substance Z is at 0.5 atm and 200 K. If the pressure on substance Z is steadily increased and its temperature is kept constant, what phase change will eventually occur?

- condensation
- freezing
- melting
- sublimation
- vaporization

- The normal boiling point of substance Z is approximately

- 100 K
- 200 K
- 300 K
- 400 K
- 500 K

- In what pressure range will the compound sublime?

- Less than 0.5 atm
- Between 0.5 and 1.0
- Between 1.0 and 2.0
- Between 0.5 and 2.0
- This compound won't sublime

- Crossing line bd is:

- condensation
- melting
- evaporation
- sublimation
- boiling

- Five liters of gas at STP have a mass of 12.5 g. What is the molecular mass of the gas?

- 12.5 g/mol
- 25.0 g/mol
- 47.5 g/mol
- 56.0 g/mol
- 125 g/mol

- Equal molar quantities of hydrogen gas and oxygen gas are present in a closed container at a constant pressure. Which of the following quantities will be the same for the two gases?

- Partial pressure
- Partial pressure & average KE
- Partial pressure & average molecular velocity
- Average KE & average molecular velocity
- Partial pressure, average KE, average molecular velocity

For the next few questions: A closed 5.0 L vessel contains a sample of neon. The temperature inside the container is 25 °C and the pressure is 1.5 atm.

- Which of the following expressions is equal to the moles of gas in the sample?

- $(1.5 \times 5.0) / (0.08 \times 25)$
- $(0.08 \times 250) / (1.5 \times 5.0)$
- $(1.5 \times 25) / (0.08 \times 5.0)$
- $(0.08 \times 298) / (1.5 \times 5.0)$
- $(1.5 \times 5.0) / (0.08 \times 298)$

- If the neon gas in the vessel is replaced with an equal molar quantity of helium gas, which will be changed?

- pressure
- temperature
- density
- pressure & temperature
- temperature and density

- The volume was changed while temperature held constant until the pressure was 1.6 atm. Which is equal to the new volume?

- $5.0 \times 1.5 / 1.6$  (4.7 L)
- $5.0 \times 1.6 / 1.5$
- $25 \times 1.5 / 1.6$
- $0.08 \times 1.6 / 1.5$
- $0.08 \times 1.5 / 1.6$

35. A flask contains three times as many moles of  $H_2$  as it does  $O_2$ . If hydrogen and oxygen are the only gases present, what is the total pressure in the flask if the partial pressure of oxygen is "P"?
- 4P
  - 3P
  - 4/3P
  - 3/4P
  - 7P
36. The gas in a large cylinder is at a pressure of 3040 torr. Assuming constant temperature and ideal gas behavior, what volume of this gas could you compress into a 100 L box at 8 atm?
- 20 L
  - 200 L
  - 5000 L
  - 50,000 L
  - 500,000 L
37. Which of the following generalizations CANNOT be made about the phase change of a pure substance from solid to liquid?
- It involves a change in potential energy
  - It involves no change in temperature
  - It involves a change in kinetic energy
  - It involves a change in entropy
  - It may occur at different temperatures for different compounds
38. If the pressure of a gas sample is doubled at constant temperature, the volume will be
- 4 x the original
  - 2 x the original
  - 1/2 of the original
  - 1/4 of the original
  - 1/8 of the original
39. Three canisters, A, B, and C, are all at the same temperature, with volumes of 2.0, 4.0, and 6.0 L, respectively. Canister A contains 0.976 g Ar at 120 torr, Canister B contains 1.37 g  $N_2$  at 120 torr, and Canister C is completely empty at the start. Assuming ideality, what would be the pressure in canister C if the contents of A and B are completely transferred to C?
- 180 torr
  - 330 torr
  - 675 torr
  - 0.25 atm
  - none of the above
40. When a fixed amount of gas has its Kelvin temperature and pressure doubled, the new volume of the gas is
- Four times greater than its original volume
  - Twice its original volume
  - Unchanged
  - One half its original volume
  - One fourth its original volume
41. A 600 mL container holds 2 mol  $O_2$ , 3 mol  $H_2$ , and 1 mol He. The total pressure within the container is 760 torr. What is the partial pressure of  $O_2$ ?
- 127 torr
  - 253 torr
  - 380 torr
  - 507 torr
  - 760 torr
42. An ideal gas has a volume of 10 L at 20 deg C and 750 mmHg. Which of the following expressions is needed to determine the volume of the same amount of gas at STP?
- $10 \times (750/760) \times (0/20)$
  - $10 \times (750/760) \times (293/273)$
  - $10 \times (760/750) \times (0/20)$
  - $10 \times (760/750) \times (273/293)$
  - $10 \times (750/760) \times (273/293)$
43. What volume does a sample of  $1.50 \times 10^{23}$  atoms of helium at STP represent?
- 5.6 L
  - 11.2 L
  - 17.8 L
  - 22.4 L
  - none of the above
44. Which of the following will always decrease the volume of a gas?
- Decrease the pressure with the temperature held constant
  - Increase the pressure with a temperature decrease
  - Increase the temperature with a pressure increase
- I only
  - II only
  - I and III
  - II and III only
  - I, II and III
45. A gas has a volume of 10 L at 50 deg C and 200 mmHg. What conversion factor is needed to give a volume at STP?
- $10 \times (0/50) \times (200/760)$
  - $10 \times (0/50) \times 760/200$
  - $10 \times (273/323) \times (200/760)$
  - $10 \times (273/323) \times (760/200)$
  - $10 \times (323/273) \times (760/200)$
46. The temperature above which a liquid cannot exist is indicated by
- the triple point
  - the critical point
  - the eutectic point
  - the boiling point
  - the sublimation point
47. A change of phase never accompanies
- a change in volume
  - a change in pressure
  - a change in temperature
  - a change in density
  - a change in structure
48. The relationship  $P_1V_1 = P_2V_2$  is
- Boyle's law
  - Chales's law
  - Van der Waal's law
  - the combined gas law
  - the ideal gas law
49. The rate of diffusion of hydrogen gas as compared to that of oxygen gas is
- 1/2 as fast
  - identical
  - twice as fast
  - four times as fast
  - eight times as fast
50. The ratio of the rate of diffusion of oxygen to hydrogen is
- 1:2
  - 1:4
  - 1:8
  - 1:16
  - 1:32
51. Standard conditions using a Kelvin thermometer are
- 760 torr, 273 K
  - 760 torr, 273 K, 1 L
  - 760 torr, 0 K
  - 0 torr, 0 K
  - 0 torr, 273 K, 1 L
52. The relation between the pressure and the volume of a gas at constant temperature is given by
- Boyle's law
  - Charles's law
  - the combined gas law
  - the ideal gas law
  - none of the above
53. The relation between the absolute temperature and volume of a gas at constant pressure is given by
- Boyle's law
  - Charles's law
  - the combined gas law
  - the ideal gas law
  - none of the above
54. The relation between the pressure, volume and absolute temperature is given by
- Boyle's law
  - Charles's law
  - the combined gas law
  - the ideal gas law
  - none of the above
55. At a certain temperature and pressure, ice, water and steam are found to coexist at equilibrium. This pressure and temperature corresponds to:
- the critical temperature
  - the critical pressure
  - the sublimation point
  - the triple point
  - two of the above
56. How many atoms are present in 22.4 L of  $O_2$  at STP?
- $3 \times 10^{23}$
  - $6 \times 10^{23}$
  - $9 \times 10^{23}$
  - $12 \times 10^{23}$
  - $15 \times 10^{23}$
57. a gas at STP that contains 6.02 x  $10^{23}$  atoms and forms diatomic molecules will occupy
- 11.2 L
  - 22.4 L
  - 33.6 L
  - 67.2 L
  - 1.06 quarts
58. Inelastic collisions occur in
- Real and ideal gases
  - Ideal gases and fusion reactions
  - Real gases and fusion reactions
  - Real gases
  - Ideal gases
59. The extremely high melting point of diamond (carbon) may be explained by the
- network covalent bonds
  - ionic bonds
  - hydrogen bonds
  - van der Waals forces
  - none of the above

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|-----|----------|
| 1.  | E        |
| 2.  | A        |
| 3.  | B        |
| 4.  | C        |
| 5.  | D        |
| 6.  | B        |
| 7.  | A        |
| 8.  | B        |
| 9.  | C        |
| 10. | D        |
| 11. | T, T, CE |
| 12. | T, F     |
| 13. | F, T     |
| 14. | T, T, CE |
| 15. | T, T, CE |
| 16. | T, F     |
| 17. | F, T     |
| 18. | F, F     |
| 19. | T, T, CE |
| 20. | B        |
| 21. | B        |
| 22. | A        |
| 23. | B        |
| 24. | C        |
| 25. | C        |
| 26. | C        |
| 27. | D        |
| 28. | A        |
| 29. | B        |
| 30. | D        |
| 31. | B        |
| 32. | E        |
| 33. | C        |
| 34. | A        |
| 35. | A        |
| 36. | B        |
| 37. | C        |
| 38. | C        |
| 39. | E        |
| 40. | C        |
| 41. | B        |
| 42. | E        |
| 43. | A        |
| 44. | B        |
| 45. | C        |
| 46. | B        |
| 47. | C        |
| 48. | A        |
| 49. | D        |
| 50. | B        |
| 51. | A        |
| 52. | A        |
| 53. | B        |
| 54. | C        |
| 55. | D        |
| 56. | D        |
| 57. | A        |
| 58. | C        |
| 59. | A        |