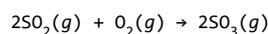


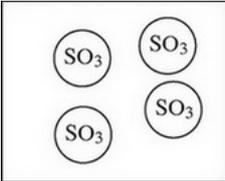
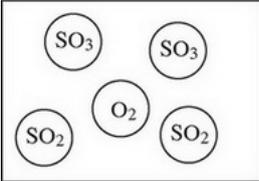
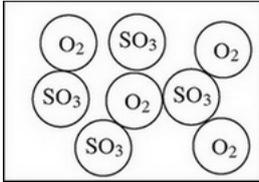
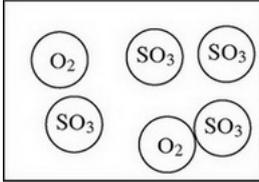
## AP Chemistry Practice Test 4

Real AP Past Papers with Multiple-Choice Questions

Questions 1-4 refer to the following information.

4.0 mol of gaseous  $\text{SO}_2$  and 6.0 mol of  $\text{O}_2$  gas are allowed to react in a sealed container.

1. Which particulate drawing best represents the contents of the flask after the reaction goes to completion?

- A. 
- B. 
- C. 
- D. 

2. What percentage of the original pressure will the final pressure in the container be equal to?

- A. 67%
- B. 80%
- C. 100%
- D. 133%

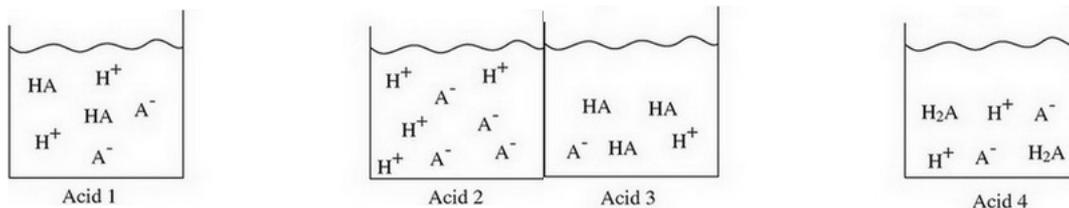
3. At a given point in the reaction, all three gases are present at the same temperature. Which gas molecules will have the highest velocity and why?

- A. The  $\text{O}_2$  molecules, because they have the least mass
- B. The  $\text{O}_2$  molecules, because they are the smallest
- C. The  $\text{SO}_3$  molecules, because they are products in the reaction
- D. Molecules of all three gases will have the same speed because they have the same temperature.

4. Under which of the following conditions would the gases in the container most deviate from ideal conditions and why?

- A. Low pressures because the gas molecules would be spread far apart
- B. High pressures because the gas molecules will be colliding frequently
- C. Low temperatures, because the intermolecular forces between the gas molecules would increase
- D. High temperatures, because the gas molecules are moving too fast to interact with each other

5. Four different acids are added to beakers of water, and the following diagrams represent the species present in each solution at equilibrium. Which acid has the highest pH?

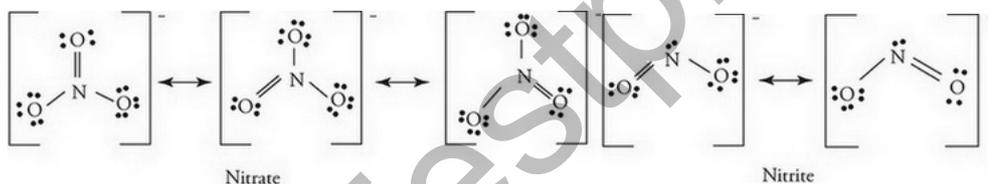


- A. Acid 1
- B. Acid 2
- C. Acid 3
- D. Acid 4

6. Which expression below should be used to calculate the mass of copper that can be plated out of a 1.0 M  $\text{Cu}(\text{NO}_3)_2$  solution using a current of 0.75 A for 5.0 minutes?

- A.  $\frac{(5.0)(60)(0.75)(63.55)}{(96500)(2)}$
- B.  $\frac{(5.0)(60)(63.55)(2)}{(0.75)(96500)}$
- C.  $\frac{(5.0)(60)(96500)(0.75)}{(63.55)(2)}$
- D.  $\frac{(5.0)(60)(96500)(63.55)}{(0.75)(2)}$

7. Lewis diagrams for the nitrate and nitrite ions are shown below. Choose the statement that correctly describes the relationship between the two ions in terms of bond length and bond energy.



- A. Nitrite has longer and stronger bonds than nitrate.
- B. Nitrite has longer and weaker bonds than nitrate.
- C. Nitrite has shorter and stronger bonds than nitrate.
- D. Nitrite has shorter and weaker bonds than nitrate.

8. Examining data obtained from mass spectrometry supports which of the following?

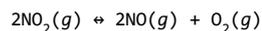
- A. The common oxidation states of elements
- B. Atomic size trends within the periodic table
- C. Ionization energy trends within the periodic table
- D. The existence of isotopes

9. A 2.0 L flask holds 0.40 g of helium gas. If the helium is evacuated into a larger container while the temperature is held constant, what will the effect on the entropy of the helium be?

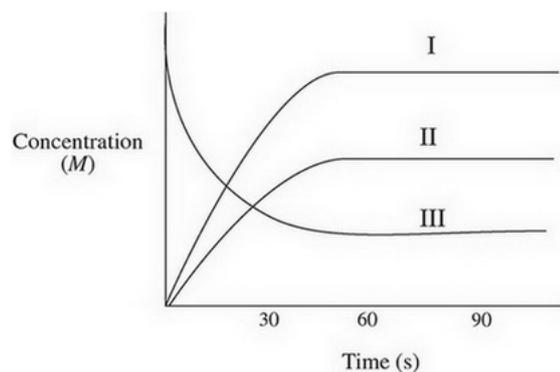
- A. It will remain constant as the number of helium molecules does not change.
- B. It will decrease as the gas will be more ordered in the larger flask.
- C. It will decrease because the molecules will collide with the sides of the larger flask less often than they did in the smaller flask.
- D. It will increase as the gas molecules will be more dispersed in the larger flask.

Questions 10-14 refer to the following information.

$\text{NO}_2$  gas is placed in a sealed, evacuated container and allowed to decompose via the following equation:



The graph below indicates the change in concentration for each species over time.



10. Using the numbers of the lines on the graph, identify which line belongs to which species.

**Line I**      **Line II**      **Line III**

- A.
- B.
- C.
- D.

11. What is happening to the rate of the forward reaction at  $t = 60$  s?

- A. It is increasing.
- B. It is decreasing.
- C. It is remaining constant.
- D. It is zero.

12. As the reaction progresses, what happens to the value of the equilibrium constant  $K_p$  if the temperature remains constant?

- A. It stays constant.
- B. It increases exponentially.
- C. It increases linearly.
- D. It decreases exponentially.

13. What would happen to the slope of the  $\text{NO}_2$  line if additional  $\text{O}_2$  were injected into the container?

- A. It would increase, then level off.
- B. It would decrease, then level off.
- C. It would remain constant.
- D. It would increase, then decrease.

14. Using the graph, how could you determine the instantaneous rate of disappearance of  $\text{NO}_2$  at  $t = 30$  s?

- A. By determining the area under the graph at  $t = 30$  s
- B. By taking the slope of a line tangent to the  $\text{NO}_2$  curve at  $t = 30$  s
- C. By using the values at  $t = 30$  s and plugging them into the  $K_p$  expression
- D. By measuring the overall gas pressure in the container at  $t = 30$  s