

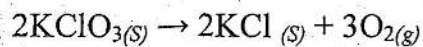
11. The solution must be  
 a) Homogenous      b) Transparent      c) Both of a and b      d) None of these
12. Number of moles of solute dissolved in 1 kilogram of solvent is  
 a) Molality      b) Molarity      c) mass/mass percentage      d) mass/volume percentage
13. The Free energy change ( $\Delta G$ ) in equilibrium has  
 a) -ve value      b) +ve value      c) zero value      d)  $\Delta n$  value
14. The solubility of gas in liquid increase by  
 a) Increase temperature      b) increase pressure      c) gas density      d) all of them
15. The system, which **does not allow** the transfer of either mass or energy is  
 a) Closed system      b) open system      c) Isolated system      d) a and c

Answer

1. A
2. A
3. C
4. C
5. B
6. A
7. A
8. B
9. B
10. C
11. C
12. A
13. C
14. B
15. C

**Question 2 (5 marks)**

A sample of solid potassium chlorate ( $\text{KClO}_3$ ) was heated in a test tube and decomposed by the following reaction



Ministry of Higher Education  
The Higher Institute of Engineering  
and Technology in New Damietta  
Course title: General Chemistry  
Course code: BAS 014  
Semester First Semester (Midterm Exam)



Department: Basic Science  
Level: one  
Time allowed: 60 min  
Date: 11-11-2019 Day: Monday  
Full Mark: 25  
No. of exam pages: 2

The oxygen produced was collected at 22 °C and a pressure of 733 torr. The volume of the gas collected was 650 mL, *Calculate*

- Partial pressure of O<sub>2</sub>
- The mass of KClO<sub>3</sub> (Mol. Wt. = 122.6 g/mol) in the sample that was decomposed.

Answer

$$\text{Since } P_{\text{Total}} = P_{\text{O}_2} + P_{\text{H}_2\text{O}}$$

$$\text{So } 754 \text{ torr} = P_{\text{O}_2} + 21 \text{ torr}$$

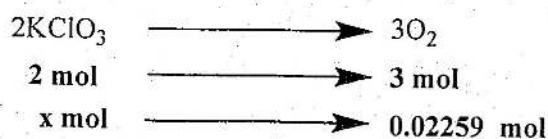
$$P_{\text{O}_2} = 733 \text{ torr} = 733/760 = 0.964 \text{ atm}$$

### Calculation of mass of KClO<sub>3</sub>

$$\text{Since } P_{\text{O}_2}V = n_{\text{O}_2}RT$$

$$\text{So } n_{\text{O}_2} = P_{\text{O}_2}V/RT = 0.964(0.65)/0.08206(295) = 0.02259 \text{ mol}$$

Since



$$\text{So number of moles of KClO}_3 = 0.02259 (2)/3 = 0.0173 \text{ mole}$$

$$\text{Since mass of KClO}_3 = n_{\text{KClO}_3} \times \text{Mol. Wt}_{\text{KClO}_3}$$

$$\text{Mass of KClO}_3 = 0.0173 \times 122.6 = 2.12 \text{ g}$$

### Question 3 (3 marks)

An aqueous solution is 2 molar urea (Molecular weight of urea = 60 g/mol). The density of the solution is 1.029 g/mL. What is the molal concentration of urea in the solution?

Answer

$$\text{Since molality} = \frac{1000 \times \text{Molarity}}{(1000 \times \text{density}) - (\text{Molarity} \times \text{Molecular weight})} = \frac{1000 \times 2}{(1000 \times 1.029) - (2 \times 60)} = 2.2 \text{ molar}$$

### Question 4 (2 marks)

The work done when a gas is compressed in a cylinder is 462 J. During this process, there is a heat transfer of 128 J from the gas to the surroundings. Calculate the energy change for this process.

**Answer**

$$\Delta E = Q + W = -128 \text{ J} + 462 \text{ J} = 334 \text{ J}$$

*With my best wishes*

*Associate Professor Dr: Khaled Samir Mohammed*

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Choose the correct answer

[15 marks, one mark for each point]

1. The mixing of different gases by random molecular motion with frequent collisions

- a) Diffusion      b) Fission      c) Effusion      d) a and c

2. The work done in the system equal zero

- a) Isochoric process      b) Isoenthalpic process      c) Isobaric process      d) Isothermal process

3. The gas which has highest rate of diffusion is

- a)  $N_2$       b)  $O_2$       c)  $H_2$       d)  $CH_4$

4. All of these are state functions except

- a) Enthalpy      b) Entropy      c) Heat      d) Temperature

5. The intensive property is depending on

- a) Mass of matter      b) Type of matter      c) Both a and b      d) None of them

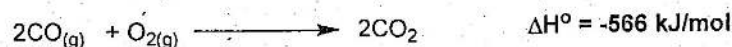
6. The internal energy equal the work done in

- a) Adiabatic process      b) Isobaric Process      c) Isothermal process      d) Isochoric process

7. The deviation of gases from ideal behavior may occur due to

- a) High pressure      b) higher temperature      c) both a and b      d) None of them

8. The following reaction is spontaneous at



- a) Higher temperature      b) lower temperature      c) All temperatures      d) a and b

9. The internal energy for the reaction in question 8 equal

- a) +563.5 kJ/mol      b) -563.5 kJ/mol      c) -563.5 J/mol      d) +563.5 J/mol

10. The relation between partial pressure of individual gas in a gas mixture and total pressure is given by

- a) Graham law      b) Van-Der Waal equation      c) Dalton law      d) Amagat's law