

UNIT TEST II  
Date-14.01.2023 II-UT  
SUB-CHEMISTRY

CLASS-XI

Max. Marks=40

Time-90 Minutes

Instructions:

- (i) All questions are compulsory.  
(ii) Question 1 to question 11 are objective/ competency based. Each carry 1 mark each.

Q.1. Formation of  $\text{SO}_3$  take place according to the reaction



Which of the following factors favours the formation of  $\text{SO}_3$

- (a) Increase in temperature      (b) Increase in pressure  
(c) Removal of oxygen          (d) Increase in volume

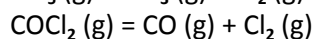
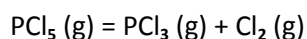
Q. 2. In a reversible reaction, two substances are in equilibrium. If the concentration of each one is doubled, the equilibrium constant will be

- (a) Reduced to half its original value      (b) Reduced to one fourth its original value  
(c) Doubled      (d) Constant

Q. 3. The equilibrium constant for the reaction  $\text{N}_2 (\text{g}) + \text{O}_2 (\text{g}) = 2\text{NO} (\text{g})$  is  $4 \times 10^{-4}$  at 2000 K. In presence of a catalyst, equilibrium is attained ten times faster. Therefore, the equilibrium constant, in presence of the catalyst, at 2000K K is :

- (a)  $40 \times 10^{-4}$       (b)  $4 \times 10^{-4}$   
(c)  $4 \times 10^{-3}$       (d) Difficult to compute without more data

Q. 4. The following two equilibria exist simultaneously in a closed vessel:



If some  $\text{CO}$  is added in to the vessel, then after the equilibrium is attained again, the concentration of

- a)  $\text{PCl}_5$  will increase      (b)  $\text{PCl}_5$  will decrease  
c)  $\text{PCl}_5$  will remain unaffected      d)  $\text{Cl}_2$  will increase

Q. 5. Oxidation number of P in  $\text{NaH}_2\text{PO}_4$  is :

- (a) + 6      (b) + 5  
(c) + 7      (d) + None of these

Q. 6. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen.

- (a)  $\text{HNO}_3, \text{NO}, \text{NH}_4\text{Cl}, \text{N}_2$       (b)  $\text{HNO}_3, \text{NO}, \text{N}_2, \text{NH}_4\text{Cl}$   
(c)  $\text{HNO}_3, \text{NH}_4\text{Cl}, \text{NO}, \text{N}_2$       (d)  $\text{NO}, \text{HNO}_3, \text{NH}_4\text{Cl}, \text{N}_2$

Q. 7. Oxidation state of each Cl in  $\text{CaOCl}_2$  is/ are

- (a) 0      (b) +1      (c) -1      (d) +1, -1

Q.8. we know that the relationship between  $k_c$  and  $k_p$

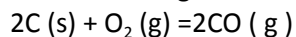
$$K_p = k_c (RT)^{\Delta n}$$

What would be value of  $\Delta n$  for the reaction



- (a) 1      (b) 0.5      (c) 1.5      (d) 2

Q.9. According to Le-Chatelier principle, What is the effect of reducing the volume on the system



- (a) Reaction will shift backward      (b) Reaction will shift forward  
(c) No change      (d) None of these

Q.10. Example of acidic buffer

- (a)  $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$       (b)  $\text{HCOOH} + \text{HCOONa}$   
(c)  $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$       (d) None of these

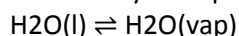
Q.11. Oxidation number of Carbon in  $\text{CH}_2\text{Cl}_2$

- (a) + 1      (b) + 2  
(c) + 3      (d) 0

**Q. 12. Case Study – 1**

When a liquid evaporates in a closed container, molecules with relatively higher kinetic energy escape the liquid surface into the vapour phase and number of liquid molecules from the vapour phase strike the liquid surface and are retained in the liquid phase. It gives rise to a constant vapour pressure because of an equilibrium in which the

number of molecules leaving the liquid equals the number returning to liquid from the vapour. We say that the system has reached equilibrium state at this stage. However, this is not static equilibrium and there is a lot of activity at the boundary between the liquid and the vapour. Thus, at equilibrium, the rate of evaporation is equal to the rate of condensation. It may be represented by



The double half arrows indicate that the processes in both the directions are going on simultaneously. The mixture of reactants and products in the equilibrium state is called an equilibrium mixture.

i) When there is no change in the concentrations of either of the reactants or products, this stage of the system is the ...

a) static equilibrium    b) dynamic equilibrium    c) physical equilibrium    d) chemical equilibrium

ii) A ... solution means no more of solute can be dissolved in it at a given temperature.

a) unsaturated

b) supersaturated

c) saturated

d) None of these.

iii) The equilibrium involving ions in aqueous solutions which is called as ...

a) static equilibrium    b) dynamic equilibrium    c) physical equilibrium    d) ionic equilibrium

iv) The concentration of the solute in a saturated solution depends upon the ...

a) solvent    b) pressure    c) temperature    d) system

Q 13. Assertion and Reason Questions

Directions : In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given .

Choose the correct option out of the choices given below .

(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true and R is not correct explanation of A.

(c) A is true but R is false.

(d) Both A and R are false.

Q.(i) Assertion : A solution containing a mixture of acetic acid and sodium acetate maintains a constant value of pH on addition of small amounts of acid or alkali

Reason : A solution containing a mixture of acetic acid and sodium acetate acts as a buffer solution around pH 4.75.

Q.(ii) Assertion : An aqueous solution of ammonium acetate can act as a buffer.

Reason : Acetic acid is a weak acid and  $\text{NH}_4\text{OH}$  is a weak base. Or

Assertion : In dissociation of  $\text{PCl}_5$  at constant pressure and temperature addition of helium at equilibrium increases the dissociation of  $\text{PCl}_5$ .

Reason : Helium removes  $\text{Cl}_2$  from the field of action.

Q 14 Explain buffer action with example. ( 1 mark)

Q. 15 . Justify that the reaction :  $2\text{Na} (\text{s}) + \text{H}_2 (\text{g}) = 2 \text{NaH}(\text{s})$  is a redox reaction .

( 1 mark)

Q. 16. Define acid and bases accordingly to Arrhenius concept of acids and bases.

( 1 mark)

Q. 17. Calculate  $\text{p}^{\text{H}}$  value of 0.2 M  $\text{H}_2\text{SO}_4$  (Log 0.4 = -0.3979 ( 2 mark)

Q 18. Calculate the hydrogen ion concentration of 0.01M solution of NaOH at 298 K ( 2 mark )

Q.19. Write the expressions for the equilibrium constant,  $K_c$  for each of following reactions (any two)

(2 Marks)

(a)  $2\text{NOCl}(\text{g}) = 2\text{NO} (\text{g}) + \text{Cl}_2 (\text{g})$

(b)  $2\text{Cu} (\text{NO}_3)_2 (\text{s}) = 2\text{CuO} (\text{s}) + 4\text{NO}_2 (\text{g}) + \text{O}_2 (\text{g})$

(c)  $\text{CH}_3\text{OOC}_2\text{H}_5 (\text{aq}) + \text{HO}_2 (\text{l}) = \text{CH}_3\text{COOH} (\text{aq}) + \text{C}_2\text{H}_5\text{OH} (\text{aq})$

Q. 20. What is  $K_c$  for the following equilibrium when the equilibrium concentration of each substance is:

3 marks

$(\text{SO}_2) = 0.60 \text{ M}$ ,  $(\text{O}_2) = 0.82 \text{ M}$  and  $(\text{SO}_3) = 1.90 \text{ M}$

$2\text{SO}_2 (\text{g}) +$

$\text{O}_2 (\text{g}) = 2\text{SO}_3 (\text{g})$

Q. 21 Derive relationship between  $K_p$  and  $K_c$ . ?

( 3 marks)

Q. 22. State Le-Chatelier's Principle Explain effect of concentration temperature and pressure with Example.

( 4 marks)

Q. 23. The species :  $\text{H}_2\text{O}$ ,  $\text{HCO}_3^-$ ,  $\text{HSO}_4^-$  and  $\text{NH}_3$  can act both as Bronsted acid and base. For each case give the corresponding conjugate acid and base.

( 4 marks)