DPP-1 [Characterstics of Equilibrium]

Chapter: Chemical Equilibrium

"Mummy: 'Beta padh le.' Tu: 'Abhi mood nahi hai.' Mood kab aayega? Jab result thappad maarega?"

NEET

Q1: Which of the following statement is correct regarding chemical equilibrium:

(1) Based on extent to which the reactions proceed to reach the equilibrium we may have negligible concentrations of reactants left
(2) Equilibrium is not static
(3) Concentration of reactants and products becomes constant at equilibrium
(4) All of these

Q2: Find out the correct statement:

(1) Equilibrium condition is a state of reversible reaction
(2) Chemical equilibrium is important in numerous biological processes like transport and delivery of O_2
(3) Reversible reactions can be homogeneous and heterogeneous both
(4) All of these

Q3: Which of the following reaction is endothermic:

(1) Bond formation by two unstable atoms at certain condition
(2) Combustion reactions
(3) Conversion of more stable allotrope to less stable allotrope
(4) Condensation of vapour to its liquid state

Q4: In any chemical reaction, equilibrium is supposed to be established when:

(1) Mutual opposite reactions undergo
(2) Concentration of reactants and resulting products are equal
(3) Velocity (rate) of mutual reactions becomes equal
(4) The temperature of mutual opposite reactions becomes equal

Q5: When a volatile liquid is introduced into an evacuated closed vessel at a particular temperature, both evaporation and condensation take place simultaneously. The system reaches equilibrium when:

(1) The liquid is completely transformed into vapour
(2) Equal amounts of liquid and vapour are present in the system
(3) The rate of evaporation becomes equal to the rate of condensation
(4) Liquid cannot be converted into vapour and vice versa

Q6: $x \rightleftharpoons y$ reaction is said to be in equilibrium, when:

(1) Only 10% conversion of x to y takes place
(2) Complete conversion of x to y takes place
(3) Conversion of x to y is only 50% complete
(4) The rate of change of x to y is just equal to the rate of change of y to x in the system

Q7: In the chemical reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at equilibrium, state which is true:

(1) Equal volumes of N_2 and H_2 are reacting
(2) Equal masses of N_2 and H_2 are reacting
(3) The reaction has stopped
(4) The same amount of ammonia is formed as is decomposed into N_2 and H_2

Q8: In a reversible chemical reaction, equilibrium will be established when:

(1) Reactant completely converted into product
(2) Rate of forward and backward reaction is equal
(3) Minimum yield of product
(4) Concentration of reactant and product is equal

Q9: Which of the following is *not* a characteristic of equilibrium:

(1) Rate is equal in both directions
(2) Measurable quantities are constant at equilibrium
(3) Equilibrium occurs in reversible condition
(4) Equilibrium occurs only in open vessel at constant temperature

Q10: In reversible chemical reaction equilibrium will be established when:

(1) Reactant completely converted into product
(2) Rate of forward and backward reaction is equal
(3) Minimum yield of product
(4) Concentration of reactant and product is equal

JEE

Q11: A reversible reaction is one which:

(A) Achieves an equilibrium state
(B) Proceeds in both forward and backward directions
(C) Does not occur at all
(D) Both (A) and (B)

Q12: A chemical reaction is at equilibrium when:

(A) Measurable properties become constant
(B) The rates of forward and backward reactions are equal
(C) Net rate of reaction is zero
(D) All are correct

Q13: A chemical reaction is at equilibrium when:

(A) Reactants are completely transformed into products
(B) The rates of forward and backward reactions are equal
(C) Formation of products is minimised
(D) Equal amounts of reactants and products are present

Q14: Which of the following statements is *incorrect*?

(A) At equilibrium, vapour pressure of solution and refractive index of mixture become constant
(B) Equilibrium can be attained in both homogeneous and heterogeneous reactions
(C) At equilibrium, concentrations of reactants and products become constant *and equal*
(D) Equilibrium is dynamic in nature

Q15: Which one of the following statements is *incorrect* about chemical equilibrium?

(A) Chemical equilibrium can be attained whether we start with reactants or products

(B) Chemical equilibrium is dynamic in nature

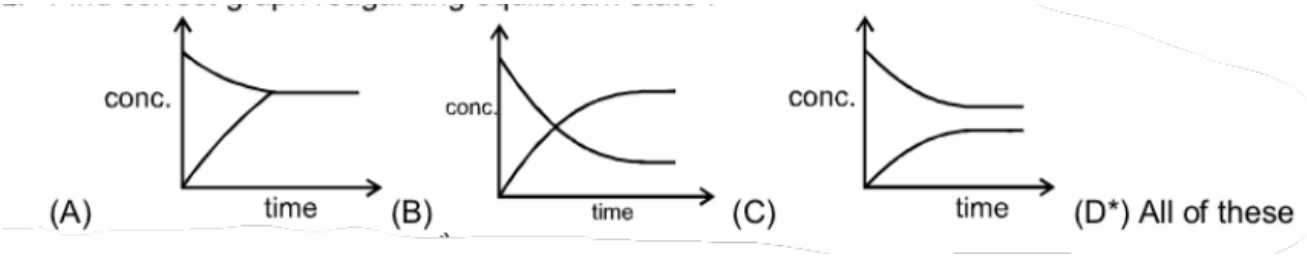
(C) $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ is attained when $CaCO_3$ is heated in an *open* vessel

(D) At equilibrium, concentration of each reactant and product becomes constant

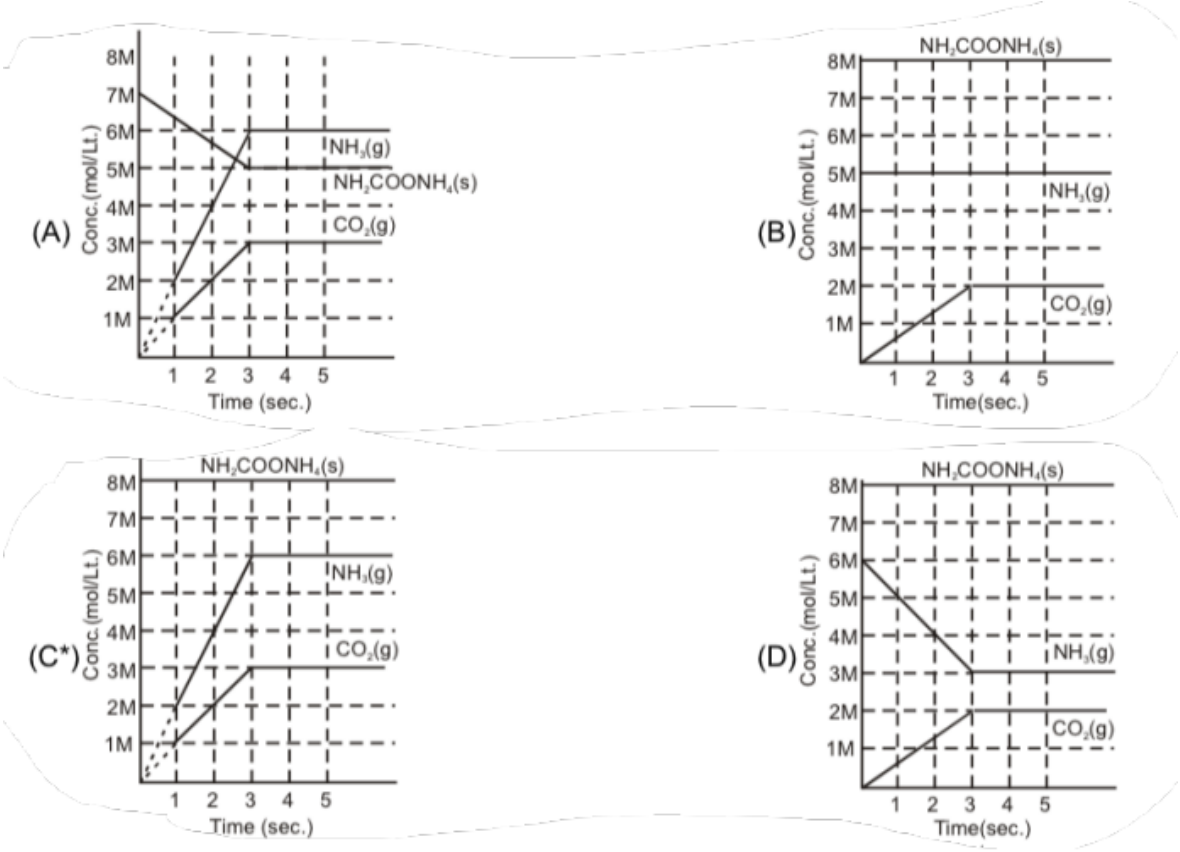
Q16: State True/False for dynamic equilibrium:

(a)	Concentration of reactants and products are always equal.	**F**
(b)	Rate of forward and backward reaction are equal.	**T**
(c)	Ratio of concentrations of reactants and products is constant.	**T**
(d)	Ratio of partial pressures of reactants and products is constant.	**T**
(e)	Vapour density of a mixture is constant.	**T**
(f)	Concentrations of reactants and products are constant.	**T**
(g)	Equilibrium constant depends only on stoichiometry, not on mechanism.	**T**

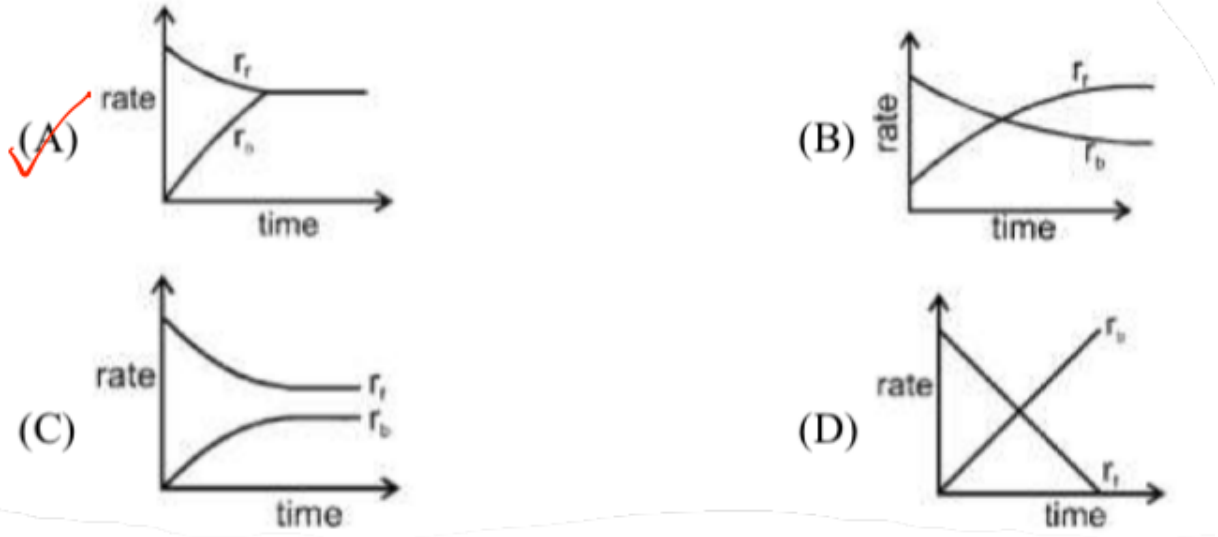
Q17: Find the correct graph regarding equilibrium state (concentration vs time):



Q18: Solid ammonium carbamate dissociates as $NH_2COONH_4(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$. Which concentration–time graph correctly represents equilibrium in a closed system?



Q19: **Rate–time curves for a reaction approaching equilibrium can be:**



Q20: **An example of a reversible reaction is:**

(A) $Pb(NO_3)_2(aq) + 2NaI(aq) \rightleftharpoons PbI_2(s) + 2NaNO_3(aq)$

(B) $AgNO_3(aq) + HCl(aq) \rightleftharpoons AgCl(s) + HNO_3(aq)$

(C) $2Na(s) + H_2O(\ell) \rightleftharpoons 2NaOH(aq) + H_2(g)$

(D) $KNO_3(aq) + NaCl(aq) \rightleftharpoons KCl(aq) + NaNO_3(aq)$

Q21: **Two containers at equilibrium are mixed into one closed container c:**

$a : N_2 + 3H_2 \rightleftharpoons 2NH_3$; $b : N_2 + 3D_2 \rightleftharpoons 2ND_3$.

At the new equilibrium, the total number of different chemical species present will be:

(A) 5

(B) 7

(C) 6

(D) 8

(Hint: expect $N_2, H_2, D_2, NH_3, ND_3, NH_2D, NHD_2, HD$*.)*