University of Mumbai
Online Examination 2020

Program: BE Chemical Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: CHC504

Course Name: Chemical Reaction Engineering I

Time: 1-hour Max. Marks: 50

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Note to the students: - All Questions are compulsory and carry equal marks.

1 The rate of a chemical reaction tells us about

A] the reactants taking part in the reaction

B] the products formed in the reaction

C] how slow or fast the reaction is taking place

D] none of the above

2 Which one of the following represents the relationship between rate constant, k, and absolute temperature, T, as predicted by the Arrhenius equation?

A] A plot of log k against 1/T will be linear

B] A plot of log k against T will be linear

C] A plot of k against T is linear with a negative slope

D] A plot of k against T is linear with a positive slope

3 A reaction which proceeds in one step is called

A] Elementary reaction

B] Non elementary reaction

C] Complex reaction

D] All of the above

4 At equilibrium

A] the rate of forward reaction is equal to the rate of backward reaction

B] the rate of forward reaction is less than the rate of backward reaction

C] the rate of forward reaction is more than the rate of backward reaction

D] rate of forward reaction and the rate of backward reaction are independent of each other

5 What will be the order from the following if, l/(mol.s) is the unit of rate constant?

A] Zero

B] First

C] Second

D] Third

6 A reaction is zero order when the rate of reaction is independent of the _____ of the reactant.

A] Concentration

B] Pressure

C] Temperature

D] Time

7 What is the dimension of the rate constant for the nth order reaction?

A] $(time)^{1}.(concentration)^{n}$

B] $(time)^{1.}(concentration)^{1-n}$

C] $(time)^{-1}.(concentration)^{n}$

D] $(time)^{-1}.(concentration)^{1-n}$

8 In which of the following reaction one of the products acts as a catalyst?

A] Non-catalytic

B] Auto-catalytic

C] Mono-catalytic

D] None of above

9 The sequence in which three CSTR's of volumes 5, 10 and 15 m3 will be connected in series to obtain the maximum production in a second order irreversible reaction is

A] 15,10,5

B] 5,10,15

C] 10,5,15

D] 15,5,10

10 For all positive reaction orders for a particular duty,

A] Mixed reactor is always larger than the plug-flow reactor

B] Ratio of the volume of the mixed reactor to that of the plug-flow reactor decreases with order

C] Reactor size is independent of the type of flow

D] Density variation during reaction affects design

11 Pick out the wrong statement.

A] For a first order consecutive reaction, a tubular flow reactor as compared to a stirred tank reactor provides higher overall selectivity

B] For an ideal mixed reactor at steady state, the exit stream has the same composition as fluid within the reactor and the space time is equivalent to holding time for constant density system

C] Plug flow reactor (PFR) is always smaller than mixed reactor for all positive reaction orders for a particular duty

D] Reaction rate does not decrease appreciably as the reaction proceeds in case of an autocatalytic reaction

12 The space time is equivalent to the holding time in a steady state mixed reactor for

A] Non-isothermal gas reaction

B] Variable fluid density systems

C] Constant fluid density systems

D] Gas reactions with changing number of moles

13 For identical flow rate and feed composition, X plug flow reactors (PFR) in series with a total volume V gives the same conversion as single

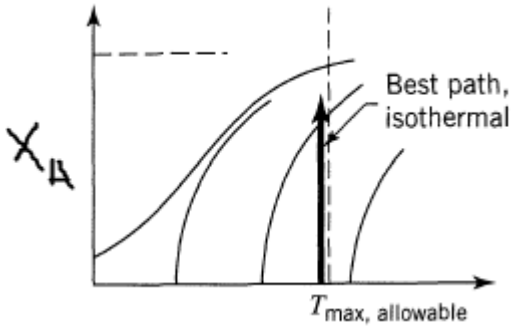
A] CSTR of volume V

B] PFR of volume V

C] CSTR of volume V/X

D] PFR of volume V/X

14 Following figure indicates the optimum temperature progression for….



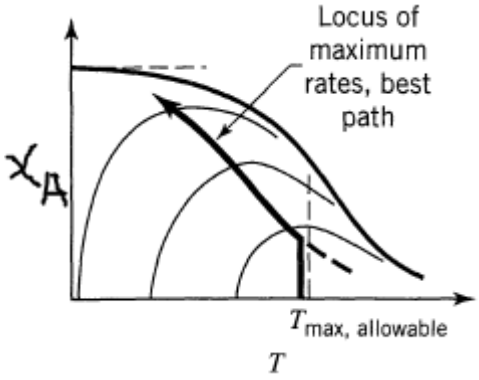
A] Irreversible reaction

B] Reversible exothermic reaction

C] Reversible endothermic reaction

D] Data insufficient

15 Following figure indicates the optimum temperature progression for….



A] Irreversible reaction

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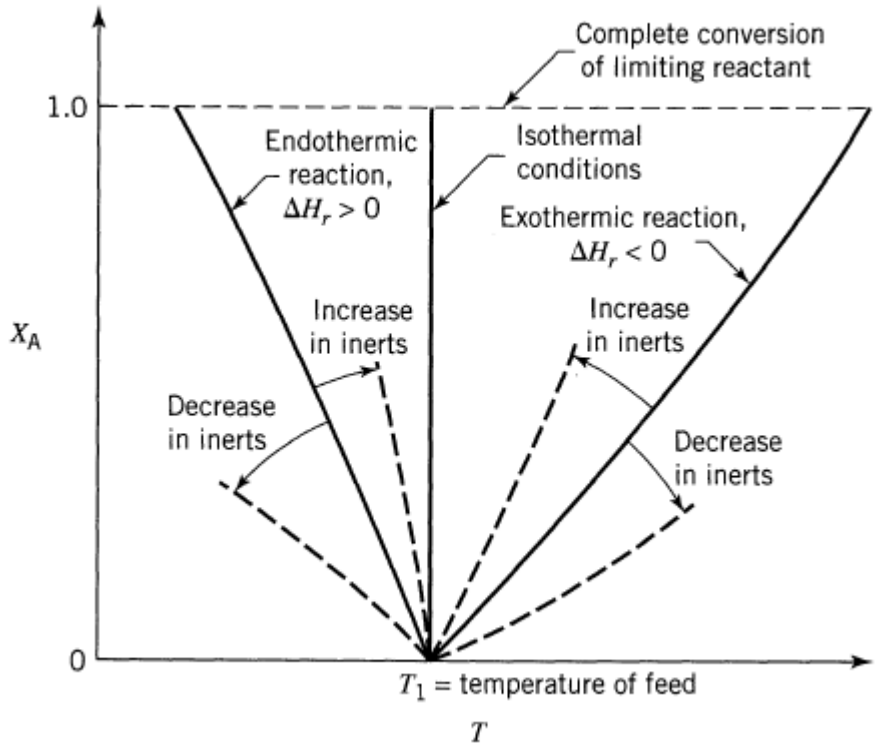
16 Following figure represents, energy balance equation for ……



A] Adiabatic operation

B] Non-adiabatic operations

C] For both type of operations

D] Can't say

17 A reaction which proceeds with a n absorption of heat is termed as

A] exothermic reaction

B] endothermic reaction

C] thermo-chemical reaction

D] photochemical reaction

18 a reaction which proceeds with evolution of heat is called

A] thermo-nuclear reaction

B] endothermic reaction

C] exothermic reaction

D] photochemical reaction

19. For a reaction $2A + B \xrightarrow{k} C$, the rate equation is given as $-r_A = kC_A^2.C_B$, the order of reaction will be

A] one

B] two

C] three

D] four

20 If the rate of reaction is independent of the concentration of reactant , the order of reaction is

A] zero

B] one

C] two

D] three

21 At equilibrium

A] the rate of forward reaction is equal to the rate of backward reaction

B] the rate of forward reaction is less than the rate of backward reaction

C] the rate of forward reaction is more than the rate of backward reaction

D] rate of forward reaction and the rate of backward reaction are independent of each other

22 The rate constant of the reaction depends on

A] the temperature of the system

B] the time of reaction

C] the extent of reaction

D] the initial concentration of the reactants

23 The rate of reaction of any component is a function of

A] Temperature of the system only

B] Pressure of the system only

C] Composition of the component only

D] Temperature, pressure and composition

24 The half-life period of a first order reaction ($t_{1/2}$) and the rate constant(k) are related by

A] $t_{1/2} = k$

B] $t_{1/2}=2.303/k$

C] $t_{1/2} = 0.693/k$

D] $t_{1/2} = 7.67/k$

25 The space velocity is the proper performance measure of flow reactors. The space velocity has the units of

A] time

B] $(time)^{-1}$

C] velocity

D] $(velocity)^{-1}$