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| Division | 12th |
| Subject | Chemistry |
| Chapter | Chemical Kinetics |
| Author | Ruhani kashni |
| Category | 01 |

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| Which among the following determines the rate of reaction intermediates  (2011) |
| Concentration of reactants |
| Thermodynamics |
| Catalyst effect |
| Temperature |
| a |
| The branch of chemistry which deals with the rates of chemical reactions and the factors which influences the rate of reactions and the mechanisms by which the reaction proceeds known as chemical kinetics. |
| The rate of the reaction intermediates can be determined by the study of concentration of the reactants. Rate of reaction may be defined as the change in any one of the reactants or products per unit time. |
| Rate of a Chemical Reaction |

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| Which among the given options cannot affect the rate of reaction  (2003) |
| Concentration |
| Temperature |
| Catalyst |
| None of the above |
| d |
| Rate of reaction may be defined as the change in any one of the reactants or products per unit time. |
| The rate of a chemical reaction depends upon the experimental conditions such as concentration of reactants (pressure in case of gases) temperature and catalyst. |
| Rate of a Chemical Reaction |

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| The Representation of rate of reaction in terms of concentration of the reactant is known as  (2011) |
| Product |
| Kinetics |
| Rate law |
| All of the above |
| c |
| The branch of chemistry which deals with the rates of chemical reactions and the factors which influences the rate of reactions and the mechanisms by which the reaction proceeds known as chemical kinetics. |
| The Representation of rate of reaction in terms of concentration of the reactant is known as rate law. It is also called as rate equation or rate expression. |
| Average rate |

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| What is the order of zero order reaction  (2006) |
| 2 |
| 0 |
| 1 |
| 5 |
| b |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| A number of zero order reactions are known in which the rate of the reaction is independent of the concentration of the reactants.  Here, rate = -dx/dt=k, so the order is 0. |
| Average rate |

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| s⁻¹ is the unit of rate constant for which reaction  (2008) |
| First order reaction |
| Second order reaction |
| Zero order reaction |
| None of the above |
| a |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| Unit of rate constant for first order reaction is s⁻¹  Rate = k[A]  Mol L⁻¹/s = k (mol L⁻¹)  = k = s⁻¹ |
| Instantaneous rate |

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| Which of the following assumption is true about molecularity  (2010) |
| Molecularity can be zero |
| Molecularity can be a non-integer |
| Both a and b |
| None of the above |
| d |
| The number of reacting species taking part in an elementary reaction which must collide simultaneously in order to bring about chemical reaction is called molecularity of a reaction. |
| order of reaction is an experimental quantity it can be zero or even a fraction but molecularity cannot be zero or a non-integer. |
| Instantaneous rate |

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| Which of the following decides the order of reaction  (2002) |
| Molecularity |
| Temperature |
| Pressure |
| Mechanism of reaction as well as relative concentration of reactants |
| d |
| The branch of chemistry which deals with the rates of chemical reactions and the factors which influences the rate of reactions and the mechanisms by which the reaction proceeds known as chemical kinetics. |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| Factors Influencing Rate of a Reaction |

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| First order reaction doesn’t depend upon  (2007) |
| Temperature |
| Pressure |
| Volume |
| All of the above |
| d |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| Order of reaction is independent upon the factors like temperature, pressure and volume and that’s why first order reaction doesn’t depend on any of these considerations. |
| Factors Influencing Rate of a Reaction |

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| Decomposition of N₂O₅ is the example of  (2010) |
| Zero order of reaction |
| First order reaction |
| Second order reaction |
| None of the above |
| b |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| Decomposition of N₂O and N₂O₅ is the example of first order reaction.  N₂O₅→ 2NO₂ + 1/2 O₂ |
| Concentration |

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| Which statement is not true about reaction rate constant  (2013) |
| Its unit depends upon the order of reaction |
| It depends upon the initial concentration of the reactants |
| It is the proportional constant in the rate law |
| None of the above |
| b |
| Rate constant is a measure of the rate of reaction larger the value of rate constant faster is the reaction. |
| Reaction rate constant is independent upon the initial concentration of the reactants and its unit depends upon the order of reaction. |
| Concentration |

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| Which among the following is the rate constant of first order reaction  (2001) |
| mol s⁻¹ |
| L mol⁻¹s⁻¹ |
| S⁻¹ |
| mol L⁻¹ s⁻¹ |
| c |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| Unit of rate constant for first order reaction is s⁻¹  Rate = k[A]  Mol L⁻¹/s = k (mol L⁻¹)  = k = s⁻¹ |
| Temperature |

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| If 10.8 × 10⁻⁵ mol dm⁻³ s⁻¹ is the rate constant of the reaction then What would be the order of reaction  (2005) |
| First order |
| Second order |
| Zero order |
| None of the above |
| c |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| In this question the unit of rate constant is given by the formula mol dm⁻³ s⁻¹. This is the unit of rate constant of zero order reaction. |
| Temperature |

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| Catalyst is used for increasing the rate of reaction by  (2008) |
| Increasing activation energy |
| Decreasing enthalpy |
| Decreasing internal energy |
| Decreasing activation energy |
| d |
| A catalyst is substance a element or a compound that increases the rate of chemical reaction. |
| A catalyst increases the rate of reaction by decreasing activation energy. A catalyst is substance an element or a compound that increases the rate of chemical reaction. |
| Catalyst |

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| Among given options which one is responsible for deciding the order of reaction  (2014) |
| Molecularity |
| Temperature |
| Pressure |
| None of the above |
| d |
| The branch of chemistry which deals with the rates of chemical reactions and the factors which influences the rate of reactions and the mechanisms by which the reaction proceeds known as chemical kinetics. |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. So none of these options decides the order of reaction. |
| Catalyst |

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| What is the order of the reaction for the given reaction  A + 2B→ C and it’s rate is R = [A][B]²  (2014) |
| 6 |
| 5 |
| 7 |
| 3 |
| d |
| The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction. |
| Order is the sum of the power of the concentrations terms in rate law expression.  Order of reaction = 1+2 = 3 |
| Integrated Rate Equations |

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| Half-life for zero order reaction is  (2004) |
| 0.693/k |
| [R]o/2k |
| ln2 |
| None of the above |
| b |
| A number of zero order reactions are known in which the rate of the reaction is independent of the concentration of the reactants.  Here, rate = -dx/dt=k, so the order is 0 |
| The half-life for zero order reaction is given by  = K = [R]o – ½ [R]o/ t/2  = t/2 = [R]o/ 2k |
| Integrated Rate Equations |

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| In the given Arrhenius equation k = A e⁻Ea/RT which statement is true  (2007) |
| Ea is the energy of activation |
| K is equilibrium constant |
| A is adsorption constant |
| None of the above |
| a |
| For a chemical reaction with rise in temperature by 10°, the rate constant is nearly doubled. |
| The given equation is Arrhenius equation k = A e⁻Ea/RT, Here A is the Arrhenius factor or the frequency factor. It is also called pre – exponential factor. R is a gas constant and Ea is an activation energy measured in joule/mole. |
| Temperature Dependence of the Rate of a Reaction |

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| The rate constant k = Co -Ct/t is for which order reaction  (2003) |
| 3 |
| 2 |
| 1 |
| 0 |
| d |
| Rate constant for a reaction is independent upon the concentration and it doesn’t change with concentration. |
| For zero order reaction the rate constant is equals to  = k = Co – Ct/t  The equation has negative plot and non zero intercept. |
| Temperature Dependence of the Rate of a Reaction |

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| The reaction which involves two different reactants can never be  (2009) |
| Unimolecular reaction |
| Bimolecular reaction |
| Zero order reaction |
| First order reaction |
| a |
| order of reaction is an experimental quantity it can be zero or even a fraction but molecularity cannot be zero or a non-integer. |
| The molecularity of a reaction is the number of reactant molecules taking part in a single step of the reaction. Thus the reaction involving two different reactant can never be Unimolecular. |
| Collision Theory of Chemical Reaction |

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| Inversion of cane sugar is the example of  (2002) |
| Zero order reaction |
| First order reaction |
| Second order reaction |
| Pseudo first order reaction |
| d |
| The reactions which are not truly of first order but under certain conditions become reaction of first order are called pseudo first order reactions. |
| Inversion of cane sugar is the example of pseudo first order reaction. |
| Collision Theory of Chemical Reaction |

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| When is the plot of conc. Vs time is linear for zero order reaction |
| +Ve slope and non-zero intercept |
| -Ve slope and non-zero intercept |
| -Ve slope and zero intercept |
| +Ve slope and zero intercept |
| b |
| A number of zero order reactions are known in which the rate of the reaction is independent of the concentration of the reactants.  Here, rate = -dx/dt=k, so the order is 0 |
| For zero order reaction k = Co – C/t or C = Co – kt  This equation has negative slope and non-zero intercept. |
| Definition of Molecularity of a reaction |

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| Which among the following is true about zero order reaction  (2001) |
| t1/2 is proportional to [R]o |
| t1/2 is independent of [R]o |
| t1/2 is equals to ln 2/k |
| None of the above |
| a |
| A number of zero order reactions are known in which the rate of the reaction is independent of the concentration of the reactants. |
| For zero order reaction t1/2 is proportional to [R]o and for first order reaction t1/2 is independent of [R]o. |
| Definition of Molecularity of a reaction |

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| If the specific rate constant for a reaction is 8 years⁻¹, find the half-life period for first order reaction  (2016) |
| 0.1732 year |
| 0.2341 year |
| 2.451 year |
| 0.086625 years |
| d |
| The half-life of a reaction is the time in which the concentration of a reactant is reduced to one half of its initial concentration. |
| For the first order reaction  Half-life, t1/2 = 0.693/k  = 0.693/8  = 0.086625 years |
| Definition of Rate law |

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| The rate constant is 6.93 × 10⁻³ min⁻¹ at 300 k for the gas phase decomposition A → 2B. The percentage of a remaining at the end of 300 minute is  (2017) |
| 17.3 |
| 12.5 |
| 6.4 |
| 2.5 |
| b |
| Unit of rate constant for first order reaction is s⁻¹  Rate = k[A]  Mol L⁻¹/s = k (mol L⁻¹)  = k = s⁻¹ |
| For first order reaction t½ = 0.693/6.93 × 10⁻³ = 100 min  300 = 100 × n  Percentage left = 100/(2)³  = 12.5 % |
| Definition of Rate law |

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| Which among the following depends upon the initial concentration of reactants  (2017) |
| Rate of reaction |
| Reaction rate constant |
| Order of reaction |
| None of the above |
| a |
| Rate law is the expression in which reaction rate is given in term of Molar concentration of reactants with each term raised to some power which may or may not be same as the stoichiometric coefficient of the reaction species in a balanced chemical equation |
| Rate of the reaction is the speed with which reactants are converted into products and it depends upon the initial concentration of the reactants. |
| Specific rate constant |

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| What is the order of reaction if the rate of reaction is equals to the rate constant  (2012) |
| Zero order |
| Pseudo order |
| First order |
| Second order |
| a |
| Unit of rate constant for first order reaction is s⁻¹  Rate = k[A]  Mol L⁻¹/s = k (mol L⁻¹)  = k = s⁻¹ |
| For zero order reaction the rate of reaction is equals to the rate constant  If A → B + C  Suppose this reaction is zero order then  Rate is directly proportional to to [A]°  Rate = k [A]° = k |
| Specific rate constant |

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| For the reaction A → B the rate constant is 0.6 × 10⁻³ mole per second. If the concentration of A is 5M then the concentration of B after 20 min is  (2018) |
| 0.72 M |
| 1.08 M |
| 0.36 M |
| 3.60 M |
| a |
| Unit of rate constant for first order reaction is s⁻¹  Rate = k[A]  Mol L⁻¹/s = k (mol L⁻¹)  = k = s⁻¹ |
| For a zero-order reaction unit of rate constant is mole per second. Hence we can easily calculate concentration of B after 20 Min by the given formula  = X = Kt  X = kt = 0.6 × 10⁻³ × 20 × 60  = 0.72 M |
| Integrated rate equations |

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| What would be the negative slop first order reaction if a plot of log (a-x) is straight line  (2011) |
| -2.303 k |
| 2.303/k |
| -k/2.303 |
| None of the above |
| c |
| Unit of rate constant for first order reaction is s⁻¹  Rate = k[A]  Mol L⁻¹/s = k (mol L⁻¹)  = k = s⁻¹ |
| t = 2.303/k log a/a-x  Or we can write it as  t= 2.303/k log a – 2.303/k log (a-x) |
| Integrated rate equations |

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| The given reaction is a  2FeCl₃ + SnCl₂ → 2FeCl₂ + SnCl₄  (2013) |
| Zero order reaction |
| First order reaction |
| Second order reaction |
| Third order reaction |
| d |
| order of reaction is an experimental quantity it can be zero or even a fraction but molecularity cannot be zero or a non-integer. |
| The given reaction  2FeCl₃ + SnCl₂ → 2FeCl₂ + SnCl₄  It is a example of third order reaction |
| Zero order reaction |

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| Mechanism of a hypothetical reaction is given below  The overall order of the reaction will be  (2017) |
| 1 |
| 2 |
| 0 |
| 1.5 |
| d |
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| We know that, slowest step is the rate determining step.  (i)  Now, from equation. (i), i.e.  fast  Now, substitute the value of from equation. (ii) in equation. (i), we get  Order of reaction |
| Zero order reaction |

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| In a reaction, Product, rate is doubled when the concentration of is doubled and rate increases by a factor of 8 when the concentrations of both the reactants ( and ) are doubled. Rate law for the reaction can be written as  (2012) |
| rate |
| rate |
| rate |
| rate |
| d |
|  |
| Let the order of reaction with respect to and is and respectively. So, the  rate law can be given as  When the concentration of only is doubled,  the rate is doubled, so  If concentrations of both the reactants and are doubled, the rate increases by a factor of 8, so  ..(iv)  From Eqs. (i) and (ii), we get  rom Eqs. (i) and (iv), we get  or  Substitution of the value of gives  R=k |
| First order reaction |

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| The value of rate of disappearance of is given as . The rate of formation of and is given respectively as  (2010) |
| and |
| and |
| and |
| and |
| b |
| Rate of disappearance of reactant rate of appearance of product |
| Rate of disappearance of reactant rate of appearance of product  or  of reactant  of product  For the reaction, |
| First order reaction |

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| --- |
| The rate constant for a first order reaction is . The time required to reduce of the reactant to is  (2020) |
|  |
|  |
|  |
|  |
| b |
|  |
| For a first order reaction, Rate constant  Initial amount  Final amount  So, time required, |
| Third order reaction |

|  |
| --- |
| The half-life for a zero order reaction having initial concentration of reactant is . The rate constant (in ) for the reaction is  (2020) |
|  |
|  |
|  |
|  |
| a |
| t |
| For a zero order reaction t  at |
| Third order reaction |

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| --- |
| first order reaction has a rate constant of . The time required for of this reactant to reduce to will be [Given that ]  (2019) |
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|  |
| d |
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| Half-life of a reaction |

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| If the rate constant for a first order reaction is , the time required for the completion of of the reaction is given by  (2019) |
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| c |
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| For first order reaction,    where, initial concentration, final concentration.  Let the initial concentration  After time t, final concentration  We know that,  On substituting the given values in above  eqn. we get |
| Half-life of a reaction |

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| The correct difference between first-and second- order reactions is that  (2018) |
| A first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed |
| the half-life of a first-order reaction does not depend on ; the half-life of a second-order reaction does depend on |
| the rate of a first-order reaction does not depend on reactant concentrations; the rate of a second-order reaction does depend on reactant concentrations |
| the rate of a first-order reaction does depend on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations |
| b |
| Rate [where, constant ] Half-life |
| For first order reactions, the rate of reaction is proportional to the first power of the concentration of the reactant.  For, Rate [where, constant ] Half-life Rate of first order reaction depends upon reactant concentrations and half life does not depend upon initial concentration of reactant, .  For second order reactions, the rate of reaction is proportional to the second power of the concentration of the reactant.  For,  Rate of second order reaction depends upon reactant concentration and half life also does depend on . |
| Definition of half-life of a reaction |

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| When initial concentration of the reactant is doubled, the half-life period of a zero order reaction  (2018) |
| is tripled |
| is doubled |
| is halved |
| remains unchanged |
| b |
|  |
| For zero order reaction,    where, Initial concentration of the reactant.  Rate constant.  Thus, for zero order reaction is directly proportional to the initial concentration of the reactant.  For zero order reaction, when the concentration of reactant is doubled, the half-life will also get doubled. |
| Definition of half-life of a reaction |

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| A first order reaction has a specific reaction rate of . How much time will it take for of the reactant to reduce to ?  (2017) |
|  |
|  |
|  |
|  |
| b |
| Rate constant |
| For a first order reaction,  Rate constant  where, initial concentration  concentration after time ' '  time in sec.  Given, |
| Half-life of a zero-order reaction |

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| The rate constant of the reaction is mole per second. If the concentration of is then concentration of after 20 min is  (2015) |
|  |
|  |
|  |
|  |
| d |
|  |
| For a zero order reaction unit of rate constant is mole per second. Hence, we can easily calculate concentration of after 20 min by the following formula, |
| Half-life of a zero order reaction |

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| For exothermic reaction, the energy of activation of the reactants is  (2011) |
| equal to the energy of activation of products |
| less than the energy of activation of products |
| greater than the energy of activation of products |
| sometimes greater and sometimes less than that of the products |
| b |
| Activation energy versus reaction coordinates |
| The plot of activation energy versus reaction coordinates is given below for exothermic reaction.    It is clear from the above plot that the activation energy of reactant is less than the activation energy of products. |
| Half-life of a first order reaction |

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| A chemical reaction is catalyzed by a catalyst . Hence, X is  (2006) |
| reduces enthalpy of the reaction |
| decreases rate constant of the reaction |
| increases activation energy of the reaction |
| does not affect equilibrium constant of the reaction |
| d |
| A catalyst speeds up the reaction. |
| Although a catalyst speeds up the reaction but it does not shift the position of equilibrium. This is due to the fact that the presence of catalyst reduces the height of barrier by providing an alternative path for the reaction and lowers the activation energy. However, the lowering in activation energy is to the same extent for the forward as well as the backward reaction. |
| Half-life of a first order reaction |

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| In a reversible reaction, the energy of activation of the forward reaction is . The energy of activation for the reverse reaction will be  (2011) |
|  |
|  |
| either greater than or less than |
|  |
| c |
| In a reversible reaction, the energy of activation for the forward and reverse reactions can be different. |
| The activation energy of a reverse reaction decide whether the given reaction is exothermic or endothermic, so, the energy of activation of reverse reaction is either greater or less than . In case of exothermic reaction, the activation energy for reverse reaction is more than activation energy of the forward reaction and in case of endothermic reaction, the activation energy for reverse reaction is less than activation energy of the forward reaction |
| Concept of collision theory |

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| Activation energy of a chemical reaction can be determined by  (2002) |
| evaluating rate constant at standard temperature |
| evaluating velocities of reaction at two different temperatures |
| evaluating rate constants at two different temperatures |
| changing concentration of reactants |
| c |
|  |
| Activation energy can be calculated by using Arrhenius equation. The Arrhenius equation is  where, and rate constants at two different temperatures, i.e. and respectively.  Activation energy  Gas constant  So, activation energy of a chemical reaction can be determined by evaluating rate constants at two different temperatures |
| Concept of collision theory |

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| When a biochemical reaction is carried out in laboratory from outside of human body in the absence of enzyme, the rate of reaction obtained is times, then activation energy of the reaction in the presence of enzyme is  (2002) |
| P is required |
| different from obtained in laboratory |
| cannot say any things |
|  |
| b |
| K=Ae **-Ea/RT** Arrhenius equation |
| When a biochemical reaction is carried out in laboratory from outside of human body in the absence of enzyme, then rate of reaction obtained is times than activation energy of reaction in the presence of enzyme. It is different from obtained in laboratory because for a given chemical reaction.  K=Ae **-Ea/RT** Arrhenius equation  Also activation energy have different value in absence or presence of enzyme. |
| Concept of Activation energy |

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| The temperature dependence of rate constant of a chemical reaction is written in terms of Arrhenius equation, . Activation energy of the reaction can be calculated by plotting  (2003) |
|  |
|  |
| kvsT |
| VS |
| a |
|  |
|  |
| Concept of Activation energy |

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| The activation energy for a simple chemical reaction, is in forward direction. The activation energy for reverse reaction  (2013) |
| can be less than or more than |
| is always double of Ea |
| is negative of Ea |
| is always less than |
| a |
|  |
|  |
| Activation Energy Diagram |

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| For an endothermic reaction, energy of activation is Ea and enthalpy of reaction is (both of these in . Minimum value of Ea will be  (2014) |
| less than |
| equal to |
| more than |
| equal to zero |
| c |
| In endothermic reactions, energy of reactants is less than that of the products. |
| In endothermic reactions, energy of reactants is less than that of the products.  Potential energy diagram for endothermic reactions |
| Activation Energy Diagram |

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| In a zero order reaction for every rise of temperature, the rate is doubled. If the temperature is increased from to , the rate of the reaction will become  (2015) |
| 256 times |
| 512 times |
| 64 times |
| 128 times |
| b |
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| Arrhenius equation |

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| The activation energy of a reaction can be determined from the slope of which of the following graphs?  (2012) |
| vs T |
| vs |
|  |
|  |
| c |
| straight line equation of  By Arrhenius equation |
| By Arrhenius equation    Compare the above equation w.r.t. straight line equation of . Thus, if a plote of In is a straight line, the validity of the equation is confirmed |
| Arrhenius equation |