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| Division | 12th |
| Subject | Chemistry |
| Chapter | Chemical Kinetics |
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| Category | 02 |

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| Which among the following represent intercepted in Arrhenius plot  (2012) |
| Ln A |
| -2.303/k |
| -Ea/R |
| Log10 a |
| a |
| 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 a activation energy measured in joule/mole. |
| In the Arrhenius plot, slope = -Ea/R and intercept = Ln A  = Ln k = ln A – EA/RT  SO intercept is Ln A |
| Rate of a Chemical Reaction |

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| Half-life period in first order reaction depends upon  (2011) |
| Square root of final concentration |
| Cube root of initial concentration |
| Both a and b |
| Initial concentration |
| c |
| 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. |
| Half-life period of first order reaction depends upon the square root of final concentration and cube root of initial concentration and it is independent upon the initial concentration. |
| Rate of a Chemical Reaction |

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| What would be the unit of k in the given reaction  K  A +B → C and the given reaction is a homogeneous reaction  (2015) |
| Sec⁻¹ mol⁻¹ L |
| Sec⁻¹ |
| Sec⁻¹ mol⁻² L² |
| 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 |
| k = (mol lit⁻¹)¹⁻ⁿ time⁻¹  In this given homogenous reaction n = 2  So here k = mol⁻¹ lit sec⁻¹ |
| Average rate |

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| Which among the following can increase the rate constant of reaction  (2010) |
| Increasing the temperature |
| Increasing the pressure |
| Increasing the concentration of reactants |
| Increasing the concentration of products |
| 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 |
| According to the given equation  = log k = log A – Ra/2.303 .1/T  The value of k increases with the increase in temperature |
| Average rate |

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| The given reaction is  2N₂O₅ ⇔2N₂O₄ + O₂  (2008) |
| Unimolecular |
| Multimolecular |
| Bimolecular |
| None of the above |
| c |
| 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. |
| The given reaction 2N₂O₅ ⇔2N₂O₄ + O₂  It is bimolecular and first order reaction because rate is directly proportional to the reactant [N₂O₅]. |
| Instantaneous rate |

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| Calculate the half-life period of a first order reaction where specific rate constant is 2min⁻¹  (2003) |
| 0.3465 min |
| 0.234 min |
| 0.5555 min |
| 0.1234 min |
| a |
| 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 first order reaction  Half-life period t1/2 = 0.693/k  = 0.693/2  = 0.3465 min |
| Instantaneous rate |

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| In Arrhenius plot slope Is  (2002) |
| Ln k |
| Ln A |
| -Ea/R |
| Log10 a |
| c |
| 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 a activation energy measured in joule/mole. |
| In the Arrhenius plot, slope = -Ea/R and intercept = Ln A  = Ln k = ln A – EA/RT  So slope is -Ea/R |
| Factors Influencing Rate of a Reaction |

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| Find the time taken for completing half reaction if the initial concentration of zero order reaction is reduced to 1/4thh  (2004) |
| Doubles |
| Does not change |
| Become 4 times |
| Becomes one fourth |
| d |
| 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, t = a/k  t= 1/4k and t1 = 1/2k  So, t1 = 2t |
| Factors Influencing Rate of a Reaction |

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| For the zero-order reaction rate constant is equals to  (2017) |
| K = Co -Ct/t |
| K=Co/2t |
| K=Co/t² |
| K=ln Co -Ct/2t |
| a |
| 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 – C/t or Co – kt  The equation has negative plot and non-zero intercept. |
| Concentration |

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| Half-life for second order reaction is  (2003) |
| t1/2 = 1/k[A]o |
| t1/2 = 2.303/k |
| t1/2 = 0.693/ k |
| None of the above |
| a |
| 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. |
| Half-life for the second order reaction is  t1/2 = 1/k[A]o  half-life of a reaction is the time in which the concentration of a reactant is reduced to one half of its initial concentration. |
| Concentration |

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| Rate constant for first order reaction is 2.6 × 10⁻¹⁴ s⁻¹. Find the half-life period of the reaction  (2010) |
| 1.26 × 10¹³ s |
| 2.5 × 10⁴ s |
| 1.15 × 10¹³ s |
| 3.45× 10² s |
| c |
| 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  =t1/2 = 0.693/k  = 0.693/2.6 × 10⁻¹⁴ s  = 1.15 × 10¹³ s |
| Temperature |

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| Which among the following is equals to threshold energy  (2009) |
| Activation energy – normal energy of reactants |
| Activation energy + normal energy of reactants |
| Normal energy of reactants – Activation energy |
| None of the above |
| b |
| Activation energy is the minimum amount of energy that must be provided to compounds to result in a chemical reaction. The activation energy (Ea) of a reaction is measured in joules per mole (J/mol). |
| Threshold energy is equals to activation energy + normal energy of reactants. Or  Threshold energy = energy of activation + internal energy |
| Temperature |

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| The given reaction is the example of  SO₂Cl₂ → SO₂ + Cl₂  (2007) |
| Zero order reaction |
| First order reaction |
| Second order reaction |
| Third order reaction |
| 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 SO₂Cl₂ to SO₂ + Cl₂ is the number of first order 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 |
| Catalyst |

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| Which statement is not true about the rate of reaction  (2004) |
| It depends upon the initial concentration of the reactant |
| It is the speed with which reactants are converted into products |
| It is independent upon the initial concentration of reactants |
| Its unit are always mol L⁻¹ time⁻¹ |
| c |
| 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. |
| Catalyst |

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| If the value of k is 5.48 × 10⁻¹⁴ s⁻¹, calculate two third life of a first order reaction  (2003) |
| 2.5 × 10¹³ s |
| 3.2 × 10¹³ s |
| 12.3 × 10¹³ s |
| None of the above |
| d |
| 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 two third of a reaction  [A]o = a, [A] = a- 2/3 a = a/3  t2/3 = 2.303/ k log [A]o/[A]  = 2.303/k log a/a/3 = 2.303/k log 3  = t2/3 = 2.303/ 5.48× 10⁻¹⁴ 1og 3  = 2.01 × 10¹³ s |
| Integrated Rate Equations |

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| The order of the given reaction is  2N₂O₅ ⇔2N₂O₄ + O₂  (2008) |
| 0 |
| 1 |
| 2 |
| 3 |
| b |
| 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. |
| The given reaction 2N₂O₅ ⇔2N₂O₄ + O₂  It is bimolecular and first order reaction because rate is directly proportional to the reactant [N₂O₅]. |
| Integrated Rate Equations |

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| Find the rate constant, if the concentration of reactant is increased by x  (2011) |
| K |
| K/x |
| K+x |
| Ln k/x |
| 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 |
| If the concentration of the reactants of the reactants are increased the rate constant k remains same because it doesn’t depend upon the concentration and it doesn’t change with concentration. |
| Temperature Dependence of the Rate of a Reaction |

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| The subject of chemical kinetics can be explained by  (2001) |
| Arrhenius equation |
| Collision theory of bimolecular reaction |
| The activated Complex theory |
| All 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 subject of chemical kinetics can be explained by the Arrhenius equation, the activation complex theory and also by the collision theory of bimolecular reaction. |
| Temperature Dependence of the Rate of a Reaction |

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| The plot of concentration versus time is linear for zero order reaction when  (2006) |
| -ve slope |
| Nonzero intercept |
| Both a and b |
| +Ve |
| c |
| 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 the rate constant is equals to =  = k = Co – C/t or Co – kt  The equation has negative plot and non-zero intercept. |
| Collision Theory of Chemical Reaction |

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| L²mol⁻²s⁻¹ is the unit of rate constant for  (2003) |
| First order reaction |
| Second order reaction |
| Zero 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. |
| Rate = k[A]³  = mol L⁻¹/s = k(mol L⁻¹ )³  = k= 1/mol²L⁻²s  = L²mol⁻²s⁻¹ |
| Collision Theory of Chemical Reaction |

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| Half-life period of a first order reaction is 1386 s. The specific rate constant of the reaction is  (2009) |
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| c |
| k = ln(2) / t(1/2) |
| Specific rate constant,  k = ln(2) / t(1/2)  where k is the specific rate constant and t(1/2) is the half-life period. |
| Definition of Molecularity of a reaction |

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| If of a first order reaction was completed in of the same reaction would be completed in approximately ,  (2007) |
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| b |
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| From first order reaction,  Rate constant  ?  From Eqs. (i) and (ii) |
| Definition of Molecularity of a reaction |

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| In a first order reaction, if is rate constant and initial concentration of the reactant is , then the half-life is  (2007) |
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| d |
| Rate constant, |
| For first order reaction,  Rate constant, |
| Definition of Rate law |

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| For a first order reaction, ,  the reaction rate at reactant concentration of is found to be . The half-life period of the reaction is  (2005) |
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| d |
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| For first order reaction, |
| Definition of Rate law |

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| If the rate of a reaction is equal to the rate constant, the order of the reaction is  (2003) |
| 2 |
| 3 |
| 0 |
| 1 |
| c |
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| Rate of reaction is equal to the rate constant for zero order reaction.  Let us consider the following hypothetical change. |
| Specific rate constant |

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| The reaction, follows first order kinetics. The time taken for 0.8 mole of to produce 0.6 mole of is 1h. What is the time taken for the conversion of 0.9 mole of to 0.675 mole of ?  (2003) |
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| c |
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| Specific rate constant |

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| For a first-order reaction, the half-life period is independent of  (2003) |
| initial concentration |
| cube root of initial concentration |
| first power of final concentration |
| square root of final concentration |
| a |
| of order reaction |
| of order reaction  where, initial concentration of reactant  order of reaction  for first order reaction  or  So, for a first order reaction half-life is independent on initial concentration of reactants. |
| Integrated rate equations |

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| The plot of concentration of the reactant versus time for a reaction is a straight line with a negative slope. This reaction follows  (2001) |
| zero order rate equation |
| first order rate equation |
| second order rate equation |
| third order rate equation |
| b |
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| Integrated rate equations |

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| A substance decomposes by a first order reaction starting initially with and after , becomes . For this reaction is  (2006) |
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| a |
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| Zero order reaction |

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| The decomposition of N2O5 follows a zero-order reaction. If the initial concentration of N2O5 is 0.2 M and the rate constant is 0.05 M/s, what will be the concentration of N2O5 after 10 seconds?  (2013) |
| 0.15 M |
| 0.2 M |
| 0.05 M |
| 0.00 M |
| b |
| zero-order reaction |
| In a zero-order reaction, the rate of the reaction is independent of the concentration of the reactant. Therefore, the concentration of N2O5 will remain the same (0.2 M) even after 10 seconds |
| Zero order reaction |

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| Which of the following statements is true for a first-order reaction?  (2002) |
| The reaction rate is directly proportional to the concentration of the reactant. |
| The reaction rate is independent of the concentration of the reactant. |
| The reaction rate is inversely proportional to the concentration of the reactant. |
| The reaction rate is directly proportional to the square of the concentration of the reactant. |
| a |
| first-order reaction |
| In a first-order reaction, the reaction rate is directly proportional to the concentration of the reactant. As the concentration of the reactant decreases, the rate of the reaction also decreases proportionally. |
| First order reaction |

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| The reaction order can be determined from  (2005) |
| The balanced chemical equation. |
| The rate law expression. |
| The stoichiometric coefficients in the reaction. |
| The activation energy of the reaction. |
| b |
| The rate law expression for the reaction |
| The reaction order can be determined by examining the rate law expression for the reaction. The rate law expression shows the relationship between the rate of the reaction and the concentrations of the reactants. The exponents in the rate law expression indicate the reaction order with respect to each reactant. |
| First order reaction |

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| What is the overall order of a third-order reaction if the individual orders of the reactants are 2, 1, and 0, respectively?  (2012) |
| 0 |
| 1 |
| 2 |
| 3 |
| d |
| order of a reaction is the sum of the individual orders of the reactants |
| The overall order of a reaction is the sum of the individual orders of the reactants. In this case, the sum of the individual orders (2 + 1 + 0) gives an overall order of 3. |
| Third order reaction |

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| The half-life of a third-order reaction depends on the:  (2015) |
| Initial concentration of the reactants. |
| Temperature of the reaction. |
| Pressure of the reaction |
| Catalyst used in the reaction. |
| a |
| concentration decreases over time, the half-life of the reaction changes accordingly |
| The half-life of a third-order reaction is dependent on the initial concentration of the reactants. As the concentration decreases over time, the half-life of the reaction changes accordingly. The temperature, pressure, and catalyst may influence the rate of the reaction but not specifically the half-life. |
| Third order reaction |

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| The half-life of a second-order reaction depends on  (2013) |
| Initial concentration of the reactant. |
| Temperature of the reaction |
| Pressure of the reaction. |
| Catalyst used in the reaction. |
| a |
| The concentration decreases, the half-life increases |
| The half-life of a second-order reaction is inversely proportional to the initial concentration of the reactant. As the concentration decreases, the half-life increases. The temperature, pressure, and catalyst may influence the rate of the reaction but not specifically the half-life. |
| Half-life of a reaction |

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| The half-life of a zero-order reaction is directly proportional to:  (2007) |
| Initial concentration of the reactant. |
| Temperature of the reaction. |
| Pressure of the reaction. |
| Catalyst used in the reaction. |
| a |
| As the concentration decreases, the half-life also decreases. |
| The half-life of a zero-order reaction is directly proportional to the initial concentration of the reactant. As the concentration decreases, the half-life also decreases. The temperature, pressure, and catalyst do not have a direct effect on the half-life of a zero-order reaction. |
| Half-life of a reaction |

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| The half-life of a zero-order reaction is:  (2002) |
| Constant. |
| Proportional to the initial concentration of the reactant. |
| Proportional to the square root of the initial concentration of the reactant. |
| Inversely proportional to the initial concentration of the reactant. |
| a |
| half-life of a zero-order reaction |
| The half-life of a zero-order reaction is constant and independent of the initial concentration of the reactant. It does not change as the reaction progresses. |
| Half-life of a zero order reaction |

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| If the initial concentration of a reactant in a zero-order reaction is doubled, how does the half-life change?  (2012) |
| It doubles. |
| It halves |
| It remains the same. |
| It quadruples. |
| c |
| doubling the initial concentration does not affect the half-life. |
| The half-life of a zero-order reaction is independent of the initial concentration of the reactant. Therefore, doubling the initial concentration does not affect the half-life, and it remains the same. |
| Half-life of a zero order reaction |

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| The half-life of a first-order reaction is:  (2001) |
| Constant |
| Proportional to the initial concentration of the reactant. |
| Proportional to the square root of the initial concentration of the reactant. |
| Inversely proportional to the initial concentration of the reactant. |
| a |
| does not depend on the initial concentration of the reactant. |
| The half-life of a first-order reaction remains constant and does not depend on the initial concentration of the reactant. It remains the same throughout the reaction. |
| Half-life of a first order reaction |

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| For a first-order reaction, the relationship between the rate constant (k) and the half-life (t1/2) is:  (2013) |
| t1/2 ∝ k |
| t1/2 ∝ 1/k |
| t1/2 = k |
| t1/2 = 1/k |
| b |
| half-life is inversely proportional to the rate constant (k). |
| In a first-order reaction, the half-life is inversely proportional to the rate constant (k). As the rate constant increases, the half-life decreases, and vice versa. The relationship can be expressed as t1/2 ∝ 1/k. |
| Half-life of a first order reaction |

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| According to collision theory, a chemical reaction occurs when  (2009) |
| The temperature is high enough. |
| The reactants collide with sufficient energy and proper orientation. |
| The concentration of reactants is high. |
| The reaction is exothermic. |
| b |
| collision theory |
| According to collision theory, for a chemical reaction to occur, the reactant molecules must collide with sufficient energy and proper orientation. |
| Concept of collision theory |

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| Collision theory states that an increase in temperature:  (2006) |
| Decreases the rate of reaction. |
| Has no effect on the rate of reaction. |
| Increases the rate of reaction. |
| None of above |
| c |
| an increase in temperature increases the kinetic energy |
| Collision theory states that an increase in temperature increases the kinetic energy of the reactant molecules, leading to more frequent and energetic collisions, thereby increasing the rate of reaction. |
| Concept of collision theory |

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| Which of the following factors can affect the magnitude of the activation energy?  (2011) |
| Temperature |
| Catalysts |
| Concentration of reactants |
| All of the above |
| d |
| activation energy can be influenced by various factors |
| The magnitude of the activation energy can be influenced by various factors, including temperature, presence of catalysts, and the concentration of reactants. These factors can alter the rate of the reaction by either lowering or increasing the activation energy required. |
| Concept of Activation energy |

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| Increasing the temperature generally affects the activation energy by  (2015) |
| Increasing it. |
| Decreasing it. |
| Not affecting it. |
| Inverting its sign |
| b |
| Higher temperature increases the average kinetic energy of the reactant molecules |
| Increasing the temperature typically decreases the activation energy required for a reaction. This is because a higher temperature increases the average kinetic energy of the reactant molecules, leading to more frequent and energetic collisions and a greater likelihood of overcoming the activation energy barrier. |
| Concept of Activation energy |

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| In an activation energy diagram, the energy difference between the reactants and the transition state represents:  (2014) |
| Activation energy. |
| Enthalpy change. |
| Gibbs free energy. |
| Potential energy. |
| a |
| activation energy |
| The energy difference between the reactants and the transition state on an activation energy diagram represents the activation energy. It represents the energy barrier that reactant molecules must overcome for the reaction to proceed. |
| Activation Energy Diagram |

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| The activated complex or transition state in an activation energy diagram corresponds to a:  (2006) |
| Stable intermediate product. |
| High-energy, unstable arrangement of reactant molecules. |
| Lower-energy state compared to the reactants. |
| Product molecule formed after the reaction. |
| b |
| activation energy |
| The activated complex or transition state in an activation energy diagram corresponds to a high-energy, unstable arrangement of reactant molecules. It is a temporary state that occurs during the reaction, where the old bonds are partially broken, and new bonds are forming. |
| Activation Energy Diagram |

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| The Arrhenius equation relates the rate constant (k) of a chemical reaction to which of the following factors?  (2013) |
| Temperature and pressure. |
| Temperature and concentration. |
| Pressure and concentration. |
| Temperature and activation energy. |
| d |
| Arrhenius equation |
| The Arrhenius equation describes the relationship between the rate constant (k) of a chemical reaction, temperature, and the activation energy (Ea). It provides a quantitative expression of how the rate of a reaction changes with temperature. |
| Arrhenius equation |

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| According to the Arrhenius equation, as the temperature increases, the rate constant (k) of a reaction: |
| Decreases. |
| Remains constant. |
| Increases. |
| Depends on the activation energy. |
| c |
| An increase in temperature leads to an increase in the rate constant (k) of a reaction. |
| According to the Arrhenius equation, an increase in temperature leads to an increase in the rate constant (k) of a reaction. This is because higher temperatures provide reactant molecules with greater kinetic energy, leading to more frequent and energetic collisions, which increase the rate of the reaction |
| Arrhenius equation |