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CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

UNIT TEST 5

Questions

1. For the reacton:

$A + B \rightarrow C + D$

if the concentration of the reactants are increased by three times, the rate of the reaction will increase by :

A. 9 times

B. 81 times

C. 26 times

D. 27 times

Answer: B

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2. The activation energy of a reaction :

$X \rightarrow Y$

is 9.0 kcal/mol.` The increase in rate constnat when the temperature is increased from 298 K to 308 K is :

A. $10\ \%$

B. $50\ \%$

C. $100\ \%$

D. 63.2%`

Answer: C

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3. Which of the following solutions will have maximum freezing point ?

A. $0.01MNaCl$

B. $0.01MBaCl_2$

C. $0.01M$ glucose

D. $0.001M$Urea.

Answer: D

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4. In spinel structure, O^{2-} ions are cubic-closed packed, whereas 1/8th of the tratrhedral holes are occupled by A^{2+} cations and 1/2 of the octahedral holes are occupied by cations B^{3+}. The general formula of this compound is

A. A_2BO_4

B. AB_2O_4

C. A_2B_4O

D. A_4B_2O

Answer: B

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5. How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1.0 g ?

A. 5.14×10^{21}

B. 1.28×10^{21}

C. $1.\ 71 \times 10^{21}$

D. 2.57×10^{21}

Answer: D

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6. Copper crystallizes in fcc with a unit cell length of 361 pm. What is the radius of copper atom ?

A. 108 pm

B. 127 pm

C. 157 pm

D. 181 pm

Answer: B

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7. The standard reduction potentials of $Cu^{2+}|Cu$ and $Cu^{2+}|Cu^{+}$ are 0.337 and $0.153V$ respectively. The standard electrode potential of $Cu^{+} \mid Cu$ half cell is

A. $0.184V$

B. $0.827V$

C. $0.521V$

D. $0.490V$

Answer: C

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8. Molar conductivity of a solution is $1.26 \times 10^2 \Omega^{-1} cm^2 mol^{-1}$. Its solarity is $0.01M$. Its specific conductivity will be

A. 1.26×10^{-25}

B. $1.\ 26 \times 10^{-3}$

C. 1.26×10^{-4}

D. 0.0063

Answer: B

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9. Consider the gaseous reaction having rate $= k[A][B]$

The volume of the reaction vessel containing these gases is suddenly reduced to one-fourth the initial volume. The rate of reaction relative to original rate would be :

A. $\frac{1}{16}$ times

B. $\frac{1}{8}$ times

C. 16 times

D. 4 times

Answer: C

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10. Sixteen gram of a radioactive substance are reduced to 1 g in one hour. The half life period of the radioactive substance is :

A. 15 min

B. 30 min

C. 45 min

D. 20 min

Answer: A

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11. If 5 g of an isotope sample has a half life of 30 days, the half life of 2 g of sample is :

A. 15 days

B. 30 days

C. 12 days

D. 75 days

Answer: B

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12. An aqueous solution of urea containing 6 g in 500 ml has a density equal to 1.05. If the molar mass of urea is 60, then the molality of the solution is :

A. $0.20m$

B. $0.10m$

C. $0.193m$

D. $0.0193m$

Answer: C

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13. For the reaction $A \Leftrightarrow B$, it is found that the rate of reaction doubles when the concentration of A is increased four times. The units of its rate constant are :

A. $\sec^{-1}$

B. $molL^{-1}\sec^{-1}$

C. $mol^{1/2}L^{-1/2}\sec^{-1}$

D. $mol^{-1/2}L^{1/2}\sec^{-1/2}$

Answer: C

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14. Which of the following statements is not correct regarding lyophilic and lyophobic sols . ?

A. Lyphilic sols, are highly hydrated while lyophobic sols, are partly hydrated

B. Lyophilic sols, can be prepared by simple and direct methods while lyophobic sols. Can be prepared by indirect

methods

C. Lyophilic sols, are irreveersible while lyophobic sols, are reversible.

D. Lyophobic sols, are less stable and get easily coagulated while lyophilic sols,are stable.

Answer: C

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15. The decompostion of hydrogen peroxide in the presence of I^- ion has been found to be first order reaction with rate constnat 1.01×10^{-2} $\min^{-1}$. The concnetration of H_2O_2 which would give rate equal to $1.12 \times 10^{-2} molL^{-1}$ $\min^{-1}$ is :

A. $1.13 \times 10^{-4} molL^{-1}$

B. $1.11 molL^{-1}$

C. $1.11 \times 10^{-2} mol^{-1}$

D. $1.\ 13 \times 10^{4} molL^{-1}$

Answer: B

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16. Blue colour of sea water is due to

A. Reflection of blue sky by sea-water

B. Scattering of blue light by water molecules

C. Absorption of all colours except the blue colour by water molecules

D. Reflection of the blue light by the impurities in sea-water

Answer: B

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17. The boiling point of a solution containing 2.62 g of a substance A in 100 g of water is higher by $0.0512^{\circ}C$ than the boiling point of pure water. The molar mass of the substance ($K_b = 5.12Km^{-1}$) is :

A. 131

B. 2620

C. 26.2

D. $262.$

Answer: B

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18. The rate constnat of a reaction :

A. increase linearly with increase of temperature

B. decreases linearly with decrease of temperature

C. increases exponentially with increse of temperature

D. decreases exponentially with decrease of temperature

Answer: C

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19. If K_1 and K_2 are the rate constants at temperatures T_1 and T_2 respectively and E_a is the activatino energy, then :

A. $\log \frac{k_1}{k_2} = -\frac{E_a}{2.303R\left[\frac{1}{T_1} - \frac{1}{T_2}\right]}$

B. $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{1}{T_2} - \frac{1}{T_2}\right]$

C. $\log \frac{k_1}{k_2} = \frac{E_a}{2.303}\left[\frac{1}{T_1 - \frac{1}{T_2}}\right.$

D. $\log \frac{k_1}{k_2} = -\frac{E_a}{2.303}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]$

Answer: A

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20. The hydrolysis of an ester was carried out separately with 0.1 M HCl and $0.1MH_2SO_4$. Which of the following expressions between the rate constant is expected to be true ?

A. $k(HCl)k(H_2SO_4)$

B. $k(HCl) > k(H_2SO_4)$

C. $k(HCl) < k(H_2SO_4)$

D. $k(H_2SO_4) = 2k(H_2SO_4)$

Answer: B

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21. When the concentration of a particular reactant is increased by a factor of 5, the reactin rate becomes 25 times. The order of that reactant is :

A. 2

B. 3

C. 5

D. 2.5

Answer: A

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22. A substance with initial concentration A_0 reacts according to zero order kinetics. The time taken for the completion of the reaction is :

A. $\frac{A_0}{k}$

B. $\frac{2A_0}{k}$

C. $\frac{k}{A_0}$

D. $\frac{A_0}{2k}$

Answer: A

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23. The rusting of iron takes place as follows :

$$2H^+ + 2e^- + \frac{1}{2}O_2(g) \rightarrow H_2O(l) E^\circ = +1.23V$$

$Fe^{2+} + 2e^- \rightarrow Fe(s) E^\circ = -0.44V$

Calculate ΔG° for the net process

A. $-322kJmol^{-1}$

B. $-161kJmol^{-1}$

C. $-152kJmol^{-1}$

D. $-76kJmol^{-1}$

Answer: A

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24. 4.5 g of aluminium (at mass $= 27.\ a.\ m.\ u$) is deposited at cathode from Al^{3+} solution by certain quantity of electric charge. The volume of hydrogen produced at STP from H^+ ions in soution by the same quantity of electric charge will be

A. $44.8L$

B. $22.4L$

C. $11.2L$

D. $5.6L$

Answer: D

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25. The reaction : $A \rightarrow B$ follows first order kinetics . The time taken for 0.8 mol of A to produce 0.6 mol of B is 1 hour . What is the time taken for conversion of 0.9 mol of A to produce 0.675 mol of B ?

A. 1 hour

B. 0.5 hour

C. 0.25 hour

D. 2 hour

Answer: A

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26. The half life of a radioisotope is 4 hr. If the initial mass of the isotope was 200 g, the mass remaining after 24 hr undecayed is:

A. $3.125g$

B. $2.084g$

C. $1.042g$

D. $4.167g$

Answer: A

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27. The rate of a first order reaction is 1.5×10^{-2} mol $L^{-1}\text{min}^{-1}$ at 0.5 M concentration of the reactant . The half life of the reaction is :

A. 23.1 min

B. 8.73 min

C. 7.53 min

D. 0.383 min

Answer: A

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28. The half life period of a zero order reaction is equal to :

A. $\frac{2k}{[A]_0}$

B. $\frac{[A]_0}{2k}$

C. $\frac{0.693}{k}$

D. $\frac{0.693}{k[A]_0}$

Answer: B

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29. AN aqueous solution of a substacne freezes at $-0.186^\circ C$. The boiling point of the same solution $\left(k_f = 1.86 Km^{-1}, K_b = 0.512 Km^{-1}\right)$ is :

A. $100.0512^\circ C$

B. $100.512^\circ C$

C. $100.186^\circ C$

D. $\frac{100.512}{0.186}$

Answer: A

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30. 0.01 M solution each of urea, common salt and Na_2SO_4 are taken, the ratio of depression of freezing point is :

A. $1:2:1$

B. $2:2:3$

C. $1:3:2$

D. $1:2:3.$

Answer: D

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31. When potassium iodide is added to silver nitrate solution. The sol formed may be written as :

A. $AgII^-$

B. $AgIAg^+$

C. $AgINO_3^-$

D. $NO_3^- AgIAg^+$

Answer: B

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32. If $E^\circ\left(Fe^{2+} \mid Fe\right) = -0.441V$ and $E^\circ\left(Fe^{3+} \mid Fe^{2+}\right) = 0.771V$, the standard E.M.F. of the reaction :

$Fe + 2Fe^{3+} \rightarrow 2Fe^{2+}$ will be

A. 1.653

B. $1.212V$

C. 0.111

D. $0.330V$

Answer: B

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33. Resistance of a conductivity cell filled with a solution of an electrolyte of concentration $0.1M$ is 100Ω. The conductivity of this solution is $1.29Sm^{-1}$. Resistance of the same cell when filled with $0.2M$ of the same solution is 520Ω. The molar conductivity of $0.2M$ solution of the electrolyte will be

A. $1240 \times 10^{-4}Sm6(2)mol^{-1}$

B. $1.24 \times 10^{-4} Sm^2 mol^{-1}$

C. $12.4 \times 10^{-4} Sm^2 mol^{-1}$

D. $124 \times 10^{-4} Sm^2 mol^{-1}$

Answer: C

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34. The coulombs of electricity required for reduction of 1 mol of MnO_4^- to Mn^{2+} are :

A. $96500C$

B. $1.93 \times 10^5 C$

C. $4.83 \times 10^5 C$

D. $9.65 \times 10^6 C$

Answer: C

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35. The cell $Zn\left|Zn^{2+}(1M)\right|\left|Cu^{2+}(1M)\right|Cu(E^{\circ}\_(cell)=1.10V)$ was allowed to be completely discharged at 298 K. The relative concentration of Zn^{2+} to $Cu^{2+}\left(\frac{[Zn^{2+}]}{[Cu^{2+}]}\right)$ is :

A. 37.3

B. $10^{37.3}$

C. 9.65×10^{4}

D. antilog (24.08)

Answer: B

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36. Calculate the equilibrium constant for the reaction

$Cu(s) + 2Ag + (aq) \rightarrow Cu^{+2}(aq) + 2Ag(s), E^{\circ}_{\text{cell}} = 0.46V.$

A. 2.0×10^{10}

B. 4.0×10^{10}

C. 4.0×10^{15}

D. 2.4×10^{10}

Answer: C

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37. Electrolysis of dilute aqueous sodium chloride solution was carried out by passing 10 milliampere current. The time required

to liberate 0.01 mol of H_2 gas at the cathode is (1 Faraday = 96500 C mol^{-1}).

A. $9.65 \times 10^4 s$

B. $19.3 \times 10^4 s$

C. $28.95 \times 10^4 s$

D. $38.6 \times 10^4 s$

Answer: B

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38. The rate constant for the reaction :

$2N_2O_5 \rightarrow 4NO_2 + O_2$

is $3.0 \times 10^{-5} \text{sec}^{-1}$. If the rate is 2.40×10^{-5} mol $\text{litre}^{-1} \text{sec}^{-1}$ then the concentration of N_2O_5 (in mol litre^{-1}) is :

A. 1.4

B. 1.2

C. 0.04

D. 0.8

Answer: D

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39. For a general chemical charge $2A + 2B \rightarrow$ products, the rates with respect to A is r_1, and with respect to B is r_2. The rates r_1 and r_2 are related as :

A. $3r_1 = 2r_2$

B. $r_1 = r_2$

C. $2r_1 = 3r_2$

D. $r_1^2 = 2r_2$

Answer: A

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40. The vlaue of observed and theoretical molecular masses of an electrolyte AB are $65.4 \text{ and } 114.45$ respectively. The electrolyte AB in the solution dissociates to the extent of :

A. $85\ \%$

B. $25\ \%$

C. $90\ \%$

D. $75\ \%$

Answer: D

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41. 5 ml of 1 NHCl, 20 ml of $\frac{N}{2}H_2SO_4$ and 30 ml of $\frac{N}{3}HNO_3$ are mixed together and the final volume is made upto 1L. The normality of the resulting solution is :

A. $\frac{N}{5}$

B. $\frac{N}{20}$

C. $\frac{N}{40}$

D. $\frac{N}{50}$

Answer: C

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42. Given

$E^{\circ}\left(Cr^{3+} \mid Cr\right) = -0.72V$ and $E^{\circ}\left(Fe^{2+} \mid Fe\right) = -0.42V.$

The potential for the cell

$Cr\left|Cr^{3+}(0.1M)\right|\left|Fe^{2+}(0.01M)\right|Fe$ is

A. $-0.26V$

B. $0.26V$

C. $0.339V$

D. $-0.339V$

Answer: B

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43. A solution oof nickel sulphate in which nickel rod is dipped is dilute 10 times. The reduction potential of Ni at 298 K

A. Decreases by 60 mV

B. Decreases by 30 mV

C. Decreases by 30 mV

D. Increases by 30 mV

Answer: B

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44. The equivalent conductance of M/32 solution of a work monobasic acid is 8 mho cm^2 and at infinite dilution is 400 mho cm^2. The dissociation constant of this acid is

A. 1.25×10^{-6}

B. 6.25×10^{-4}

C. 1.25×10^{-4}

D. 1.25×10^{-5}

Answer: D

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45. When ln k is poltted against 1/T, the slope was found to be $-10.7 \times 10^3 K,$ activation energy for the reaction would be :

A. $-78.9 kJmol^{-1}$

B. $2.26 kJmol^{-1}$

C. $88.9 kJmol^{-1}$

D. $10.7 kJmol^{-1}$

Answer: C

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46. For the first order reaction the half life period is (if k is rate constant and a is initial concentration) :

A. $\frac{\log 2}{k}$

B. $\frac{1}{ka}$

C. $\frac{\ln k}{a}$

D. $\frac{\log k}{2}$

Answer: A

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47. For the first order reaction, time required for $99\,\%$ completion is :

A. half the time required for completion of $90\,\%$ of reaction

B. thrice the time required for $90\ \%$ completion of reaction

C. twice the time required for $90\ \%$ completion of reaction

D. none of these

Answer: C

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48. In the reversible reaction $2NO_2 \Leftrightarrow N_2O_4$, the rate of disappearance of NO_2 is equal to :

A. $\frac{2k_1}{k_2}[NO_2]^2$

B. $2K_1[NO_2]^2 - k_2[N_2O_4]$

C. $2k_1[NO_2]^2 - k_2[N_2O_4]$

D. $(2k_1 - k(2))[NO_2]$

Answer: C

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49. A metal crystallized in fcc lattcie and edge of the unit cell is 620 pm. The radius of metal atom is

A. $265.5 \pm$

B. $310 \pm$

C. 219.2pm

D. 428.6 pm

Answer: C

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50. A posible mechanism for the reaction :

$2NO + 2H_2 \rightarrow N_2 + 2H_2O$ is :

(i) $2NO + \overset{k_1}{\Longleftrightarrow} N_2O_2$

$(ii) N_2O_2 + H_2 \xrightarrow{k_2} N_2O + H_2O$

(iii) $N_2O + H_2 \xrightarrow{k_3} N_2 + H_2O$

If the second step is the rate determining step then rate law may be written as : ?

A. Rate= $k[N_2O_2][H_2]$

B. Rate $= k[NO][H_2]$

C. Rate $= k[NO]^2[H_2]$

D. Rate $= k[NO][H_2]^2$.

Answer: C

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51. A radioactive isotope has half life of 27 days. Starting with 4g of the isotope, what will be the mass remaining after 75 days ?

A. $1.16g$

B. $0.58g$

C. $5.8g$

D. $13.58g$

Answer: B

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52. The appearance of colour in solid alkali halides is generally due to

A. Schottky defect

B. Frenkel defect

C. Interstitial position

D. F-centres

Answer: D

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53. The half life period of an radioactive element is 1.4×10^{10} years. The time in which the activity of the element is raduced to $90\ \%$ of its original value is :

A. 2.202×10^{11} years

B. 2.303×10^{9} years

C. 2.303×10^{16}years

D. 2.303×10^{7} years

Answer: B

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54. CsBr crystallzes in a body centred cubgic lattice . The unit cell length is 436.6 pm. Given that the atomic mass of $Cr = 133$ and that of $Br = 80$ amu and Avogadro number being $6.02 \times 10^{23} mol^{-1}$. The density of CsBr is

A. $0.\ 425 gcm^{-3}$

B. $8.25 gcm^{-3}$

C. $4.25 gcm^{-3}$

D. $42.5 gcm^{-3}$

Answer: B

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55. At low pressure and at high pressure, Freundlich adsorption isotherm may be expressed as :

A. K_p, K

B. k. p^n, $Kp^{1/n}$ (n is whole number)

C. k_p, K_p

D. K_p, K_p^{-1}

Answer: A

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56. Which of the following statements is not correct regarding physical and chemical adsorptions?

A. (i) and (iv)

B. (i) and (iii)

C. (ii) and (iii)

D. (ii), (iii) and (iv)

Answer: C

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57. If k for a first order reaction is $5.48 \times 10^{-14} s^{-1}$, its two third life is :

A. $2.01 \times 10^{13} s$

B. $7.86 \times 10^{11} s$

C. $2.01 \times 10^{11} s$

D. $7.86 \times 10^{13} s$

Answer: A

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58. A 0.5 molal solution of ethylene glycol in water is used as coolant in a car. If the freezing point constant of water be $1.86^\circ C$ per mol, the mixture will freeze at

A. $0.93^\circ C$

B. $-0.93^\circ C$

C. $1.86^\circ C$

D. -1.86°.

Answer: B

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59. Which of the following is correct graph for a second order reaction ?

A. 

B. 

C. 

D. 

Answer: A

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60. A first order reactin is $15\,\%$ complete in 20 minutes. Its rate constant is :

A. $8.13 \times 10^{-6}\ \mathrm{min}^{-1}$

B. $8.13 \times 10^{-9}\ \text{min}^{-1}$

C. $8.13 \times 10^{-3}\ \text{min}^{-1}$

D. $8.13 \times 10^{-5}\ \text{min}^{-1}$

Answer: C

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