Chemistry

Chapterwise Practise Problems (CPP) for NEET

Chapter - Chemical Kinetics

1. The activation energy of the reaction,

   $A+B \rightleftharpoons C+D + 38$ kcal is 20 kcal. What would be the activation energy of the following reaction $C+D \rightarrow A+B$?

   (1) 20 kcal (2) –20 kcal

   (3) 18 kcal (4) 58 kcal

2. According to Arrhenius equation a straight line is to be obtained by plotting the logarithm of the rate constant (log K) of a chemical reaction against

   (1) T (2) log T

   (3) $\frac{1}{T}$ (4) $\log\frac{1}{T}$

3. A hypothetical reaction

   $A_2 + B_2 \rightarrow 2AB$ follows the mechanism as given below

   $A_2 \rightleftharpoons A + A$(Fast)

   $A + B_2 \rightleftharpoons AB + B$(Slow)

   $A + B \rightarrow AB$(Fast)

   Overall order of reaction will be

   (1) 2 (2) 1

   (3) 3/2 (4) Zero

4. Bicyclohexane was found to undergo parallel first order reactions at 730K to form cyclohexane and methyl cyclopentene. Rate constant for the formation of cyclohexane was $1.26\times10^{-4}s^{-1}$ and for the formation of methyl cyclopentene was 3.8×10^{-5} sec^{-1}. Fraction of cyclohexane in the product is

   (1) 0.768 (2) 0.232

   (3) 0.013 (4) 0.987

5. Consider the first order reaction,

   $A(g) \rightarrow B(g) + C(g)$

   Initial pressure of A(g) is 10 atm, after decomposition pressure became 12 atm in 10 sec. Then $t_{\frac{1}{2}}$ of the decomposition reaction is approximately

   (1) 30 sec (2) 80 sec

   (3) 60 sec (4) 100 sec

6. Consider the reaction, $2A + B \rightarrow$ Product. When concentration of B alone was doubled, the rate of reaction increased by two times and when the concentration of both A and B were doubled, the rate became 4 times. The unit of rate constant for this reaction is

   (1) L mol^{-1} s^{-1} (2) Unitless

   (3) mol L^{-1} s^{-1} (4) s^{-1}

7. If half lives of a first order and zero order reaction are same, then the ratio of the initial rates of the first order reaction to that of zero order reaction with same initial concentration is

   (1) $\frac{1}{0.693}$ (2) 2 × 0.693

   (3) $\frac{2}{0.693}$ (4) 6.93

8. In a reaction $2A \rightarrow$ Product, the concentration of A decreases 0.5 M to 0.4 M in 10 minutes. The average rate of reaction during this interval is

   (1) 0.01 M min^{-1} (2) 0.001 M min^{-1}

   (3) 0.05 M min^{-1} (4) 0.005 M min^{-1}

9. The burning of coal represented by the equation $C(s) + O_2(g) \rightarrow CO_2(g)$. The rate of this reaction is increased by

   (1) Decrease in the concentration of oxygen

   (2) Powdering the lumps of coal

   (3) Decreasing the temperature

   (4) Providing inert atmosphere for burning

10. A reaction involving two different reactants can never be a

    (1) Second order reaction

    (2) Unimolecular reaction

    (3) First order reaction

    (4) Pseudo first order reaction

11. For a 1st order reaction, the ratio of time to complete 99.9% and half of the reaction is approximately

(1) 5 (2) 2

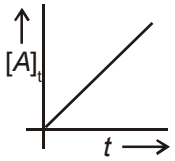
(3) 10 (4) 8

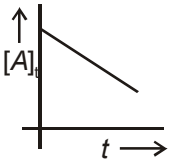
12. On increasing the temperature of a reaction by 40K, the rate of reaction increases by 16 times. Temperature co-efficient of the reaction is

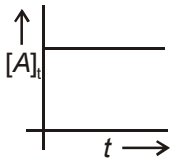
(1) 5 (2) 2.8

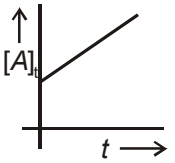
(3) 3 (4) 2

13. For a zero order reaction, which of the following plots is correct for [A] vs. time?

(1) 

(2) 

(3) 

(4) 

14. For the reaction A+B → product, initial rates of reaction are measured for different concentrations of reactants A and B as follows

[A] mol L^{-1}	[B] mol L^{-1}	initial rate (mol $L^{-1}s^{-1}$)
0.01	0.02	1.02×10^{-2}
0.01	0.04	1.02×10^{-2}
0.02	0.04	2.04×10^{-2}

The order of reaction with respect to A and B respectively are

(1) 1, 0 (2) 1, 1

(3) 0, 0 (4) 0, 1

15. In the following reaction, xA → yB

$$\log\left[\frac{-d[A]}{dt}\right] = \log\left[\frac{d(B)}{dt}\right] + 0.301$$

where –ve sign indicates rate of disappearance of the reactant. Thus x : y is

(1) 1 : 2 (2) 2 : 1

(3) 3 : 1 (4) 3 : 10

16. For the reaction $NO_2(g) + CO(g) \rightarrow CO_2(g) + NO(g)$, the experimental rate expression is $\frac{-dc}{dt} = k[NO_2]^2$. The number of molecules of CO involved in the slowest step of the reaction will be

(1) 0 (2) 1

(3) 2 (4) 3

17. Time difference between $\frac{1}{3}$rd and $\frac{2}{3}$rd completion of a first order reaction is 30 minutes. The time needed for 25% completion of the reaction is

(1) 150.5 minutes (2) 12.5 minutes

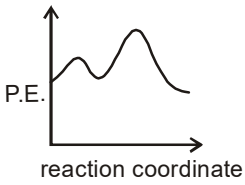
(3) 180.5 minutes (4) 165.5 minutes

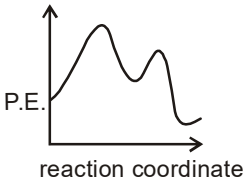
18. For a given reaction energy of activation for forward reaction (E_a) is 80 $kJmol^{-1}$. $\Delta H = -40$ $kJmol^{-1}$ for the reaction. A catalyst lowers E_a by 20 kJ mol^{-1}. The ratio of energy of activation for reverse reaction before and after addition of catalyst is

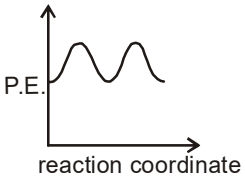
(1) 1.0 (2) 0.5

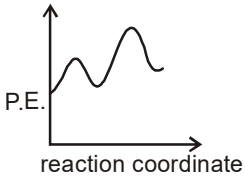
(3) 1.2 (4) 2.0

19. Select the correct plot for an endothermic reaction that proceeds through two steps with the second step is rate determining

(1) 

(2) 

(3) 

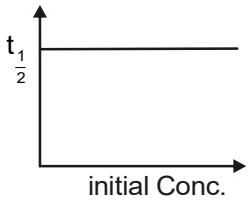
(4) 

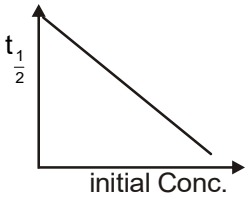
20. When a graph between log k and 1/T is drawn a straight line is obtained. The points at which the line cuts y-axis and x-axis respectively correspond to the temperatures

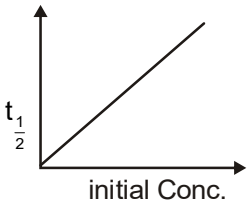
(1) 0, $E_a/2.303R$ logA (2) ∞, $E_a/(R\ \ell n\ A)$

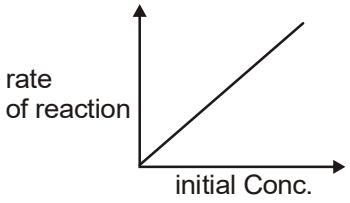
(3) 0, logA (4) ∞, log A

21. Correct plot regarding zero order reaction is

(1) 

(2) 

(3) 

(4) 

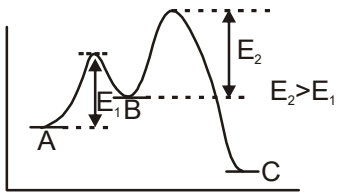
22. If half life of a first order reaction is 10 min, the time required for 87.5% consumption of the reactant is

(1) 30 min (2) 25 min

(3) 60 min (4) 20 min

23. $A \rightarrow B \rightarrow C$

The energy plot of the above reaction is as follows



The correct statement is

(1) A → B is rate determining step

(2) The reaction is endothermic

(3) It is an example of elementary reaction

(4) B → C is the rate determining step

24. A catalyst lowers the activation energy of a certain reaction at 27°C from 75 to 29 kJ/mole. If other parameters are same, rate constant of the reaction

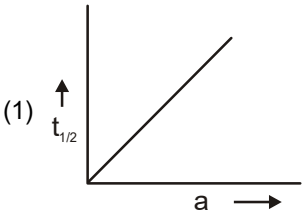
(1) increases by 10^8 times

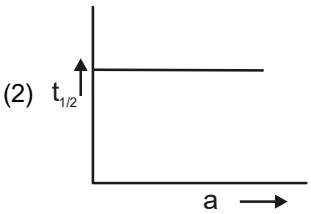
(2) decreases by 10^4 times

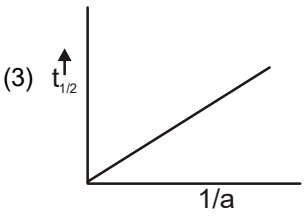
(3) increases by 10^4 times

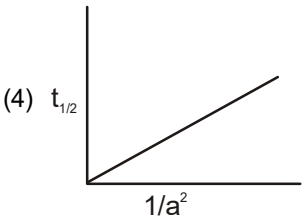
(4) decreases by 10^8 times

25. Select the correct representation of the variation of half life with initial concentration of a zero order reaction

(1) 

(2) 

(3) 

(4) 

26. Select from the following that is an example of zero order reaction

(1) $2NH_3(g) \xrightarrow[\text{High pressure}]{\text{Pt,1130K}} N_2(g) + 3H_2(g)$

(2) $H_2O_2(\ell) \rightarrow H_2O(g) + ½O_2(g)$

(3) $C_{12}H_{22}O_{11} + H_2O \xrightarrow{H^+} C_6H_{12}O_6 + C_6H_{12}O_6$

(4) $SnCl_2 + 2FeCl_3 \rightarrow SnCl_4 + 2FeCl_2$

27. At 500K, the half life period of a gaseous reaction at an initial pressure of 80 kPa is 350 sec. When the pressure is 40 kPa, the half-life period is 175 sec. The order of the reaction is

(1) Zero (2) One

(3) Two (4) Three

28. The temperature coefficient of a reaction is

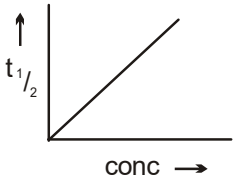
(1) Ratio of rate constant at two temperature differing by 1°C

(2) Ratio of rate constant at temperature 35°C and 25°C

(3) Ratio of rate constant at temperature 30°C and 25°C

(4) Specific reaction rate at 25°C

29. The following graph relates the initial concentration with Half-life period for ___ order reaction



(1) Zero (2) First

(3) Second (4) Third

30. In a first order reaction, the concentration of reactant decreases from 800 mol/dm^3 to 50 mol/dm^{3}n 2×10^4 sec. The rate constant (in sec^{-1}) is

(1) 2×10^4 (2) 3.45×10^{-5}

(3) 1.386×10^{-4} (4) 2×10^{-4}

31. The reaction 2NO + Br_2→2NOBr, obeys the following mechanism

$NO+Br_2 \overset{fast}{\rightleftharpoons} NOBr_2$

$NOBr_2+NO \xrightarrow{slow} 2\ NOBr$

The rate expression of the above reaction can be written as

(1) r=K[NO]^2 [Br_2] (2) r=K[NO] [Br_2]

(3) r=K[NO] [Br_2]^2 (4) r=K[$NOBr_2$]

32. For a first order reaction, the time required for 75% of the reaction to complete is

(1) Twice that required for 50% of the reaction to complete

(2) Thrice that required for 50% of the reaction to complete

(3) One and half times that required for 50% of the reaction to complete

(4) Equal to that required for 50% of the reaction to complete

33. The rate constant, the activation energy and the pre-exponential factor of a chemical reaction at 25°C are 3.0 × 10^{-4} sec^{-1}, 104.4 kJ mol^{-1} and 6.0 × 10^{14} sec^{-1} respectively. The value of the rate constant as T → ∞ is

(1) 2.0 × 10^{18} sec^{-1} (2) 6.0 × 10^{14} sec^{-1}

(3) Infinity (4) 3.6 × 10^{30} sec^{-1}

34. For the reaction H_2 (g) + I_2 (g) → 2HI(g), the rate of disappearance of H_2 is 1.0 × 10^{-4} mol L^{-1} sec^{-1}. The rate of appearance of HI will be

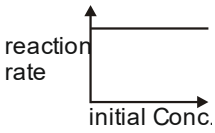
(1) 1.0 × 10^{-4} mol L^{-1} sec^{-1}

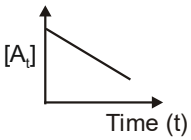
(2) 0.5 × 10^{-4} mol L^{-1} sec^{-1}

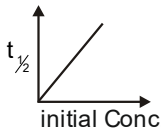
(3) 2.0 × 10^{-4} mol L^{-1} sec^{-1}

(4) 4.0 × 10^{-4} mol L^{-1} sec^{-1}

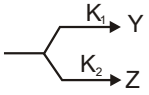
35. Which of the following is correct graph(s) regarding zero order kinetics?

(1) 

(2) 

(3) 

(4) All of these

36. A compound X undergoes through first order decomposition in Y and Z as follows 

The rate of reaction of X can be expressed as

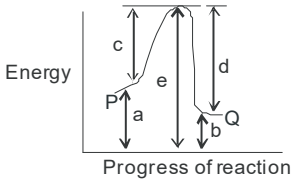
(1) (K_1 + K_2) [X]

(2) K_1[Y]

(3) K_2[Z]

(4) (K_1 + K_2) [[Y]+[Z]]

37. For the chemical process P → Q, energies are plotted in graph as shown



Select from the following that is correct regarding activation energy

(1) Activation energy for forward direction = c

(2) Activation energy for backward direction = d

(3) Activation energy for forward direction = e – a

(4) All of these

38. Nitric oxide (NO) reacts with oxygen to produce nitrogen dioxide as follows

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

If the mechanism of the reaction is

$NO(g) + O_2(g) \overset{K}{\rightleftharpoons} NO_3(g)$ (fast)

$NO_3(g) + NO(g) \overset{K_1}{\rightleftharpoons} NO_2(g) + NO_2(g)$ (slow)

Then order of the reaction is

(1) 2 (2) 3

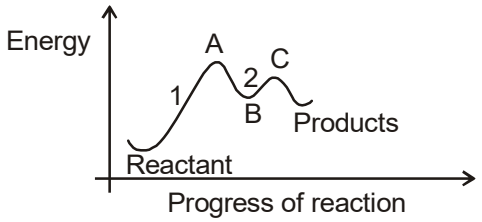
(3) 1 (4) $\frac{3}{2}$

39. The rate constant of a reaction is 1.5×10^7 sec^{-1} at 50°C and 4.5×10^7 sec^{-1} at 100°C. The value of activation energy of the reaction is

(1) 2.2×10^3 J/mol (2) 2300 J/mol

(3) 2.2×10^4 J/mol (4) 220 J/mol

40.



Consider the above graph and select the correct option

(1) It is a 2 steps reaction, step 1 is slower than step 2

(2) It is a 2 steps reaction, step 2 is slower than step 1

(3) Single step reaction where B is a activated complex

(4) Single step reaction in which B is a reaction intermediate

41. Half life of a chemical reaction at a particular concentration is 50 minutes. When the concentration of the reactant is doubled, the half life becomes 100 minutes. The order of reaction is

(1) Zero order (2) First order

(3) Second order (4) Third order

42. The temperature coefficient of a reaction is 3. Rate of reaction will be increased by _____ if temperature is changed from 35° to 65°.

(1) 9 times (2) 27 times

(3) 3 times (4) 8 times

43. Which of the following statement is incorrect ?

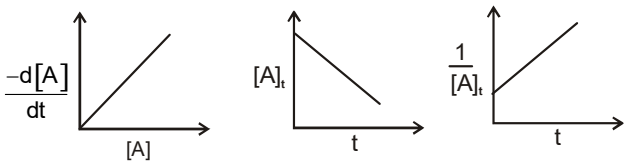
(1) A 2nd order reaction must be a bimolecular elementry reaction

(2) A bimolecular elementry reaction must be 2nd order reaction

(3) Zero order reaction must be a complex reaction

(4) First order reaction may be complex or elementry reaction

44. Consider the plots for the types of reaction, $nA \rightarrow B + C$



These plots respectively correspond to the reaction orders

(1) 0, 2, 1 (2) 0, 1, 2

(3) 1, 1, 2 (4) 1, 0, 2

45. Which is example of zero order reaction ?

(i) $H_2(g) + Cl_2(g) \xrightarrow{h\nu} 2HCl(g)$

(ii) $2HI(g) \xrightarrow{Au} H_2(g) + I_2(g)$

(iii) $NH_4NO_2(aq.) \rightarrow 2H_2O(\ell) + N_2(g)$

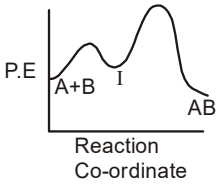
(iv) $N_2O_5(g) \rightarrow 2NO_2(g) + \frac{1}{2}O_2(g)$

(1) (i) only (2) (i) and (ii) only

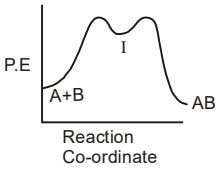
(3) (i), (ii) and (iii) only (4) (i), (ii), (iii) and (iv)

46. For an exothermic reaction following two steps are involved step – 1 : A + B → I (slow), step – 2 : I → AB (fast). Which of the following graphs correctly represent this reaction

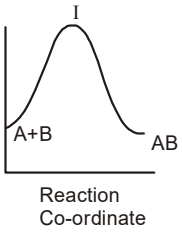
(1)



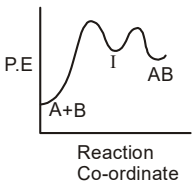
(2)



(3)



(4)

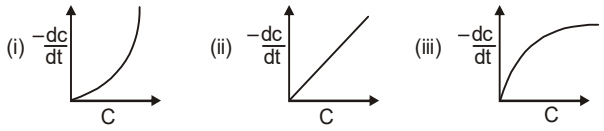


47. How much faster would a reaction proceed at 47°C than at 27°C if the activation energy of reaction is 65 $kJmol^{-1}$?

(1) 2 times (2) 5 times

(3) 11 times (4) 16 times

48. In three different reactions, involving a single reactant in each case, a plot of rate of the reaction on the y-axis, versus concentration of the reactant on the x-axis, gives three different curves shown below



The possible orders of the reactions (i), (ii) and (iii) respectively are

(1) 1, 2, 3 (2) 2, 1, $^1/_2$

(3) 0, 1, 2 (4) 0, 1, $^1/_2$

49. In which of the following option, the example and the given order is incorrectly matched ?

(1) $H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2$ (1st order)

(2) $2NO + Cl_2 \rightarrow 2NOCl$ (2nd order)

(3) $CH_3COOCH_3 + NaOH \rightarrow CH_3COONa + CH_3OH$ (2nd order)

(4) $HI(g) \xrightarrow{Au} H_2(g) + I_2(g)$ (Zero order)

50. Consider the reaction, 2x (g) → 3y (g) + 2z(g). At constant temperature and volume, partial pressure of 'x' (p_x) varies as follows :

Time (min)	p_x(mm Hg)
0	800
100	400
200	200

Order of the reaction is

(1) 0 (2) 0.5

(3) 1 (4) 2

51. The rate of reaction gets doubled when the temperature changes from 7°C to 17°C. By what factor will it change for the temperature change from 17°C to 27°C assuming activation energy does not change with temperature ?

(1) 1.3 (2) 1.5

(3) 2 (4) 3.5

52. For the reaction 2A → B + 3C, if $-\frac{d[A]}{dt} = K_1[A]^2$, $\frac{d[B]}{dt} = K_2[A]^2$, $\frac{d[C]}{dt} = K_3[A]^2$ the correct relation between K_1, K_2 and K_3 is

(1) $K_1 = K_2 = K_3$ (2) $2K_1 = K_2 = 3K_3$

(3) $4K_1 = K_2 = 3K_3$ (4) $3K_1 = 6K_2 = 2K_3$

53. For a 1st order reaction, if 180 minutes are required for completion of 99.9% of reaction, time are required (in minutes) for completion of 90% of the reaction would be

(1) 30 (2) 10

(3) 60 (4) 80

54. Which of the following expression represents the time required for completion of $\frac{3}{4}$th life of first order reaction ?

(1) $\frac{K}{2.303}\log\left(\frac{4}{3}\right)$ (2) $\frac{K}{2.303}\log\left(\frac{3}{4}\right)$

(3) $\frac{2.303}{K}\log 4$ (4) $\frac{2.303}{K}\log 3$

55. For the first order reaction A → B, the reaction rate at 0.01 M concentration of A is found to be 2.0×10^{-5} M sec^{-1}. The half life period of the reaction is approximately

(1) 30 s (2) 300 s

(3) 220 s (4) 347 s

56. If activation energy of a reaction is 800 cal/mol at temperature 200 K. The percentage of molecules having energy greater or equal to E_a is (Given: e^2 = 7.38)

(1) 2.7% (2) 13.5%

(3) 25% (4) 1.35%

57. If two first order reactions,

A $\xrightarrow{K_1}$ B, $t_{1/2}$ = a second

C $\xrightarrow{K_2}$ D, $t_{1/2}$ = b second

If a > b, then the relation between K_1 and K_2 is

(1) $K_1 > K_2$ (2) $K_1 < K_2$

(3) $K_1 = K_2$ (4) $K_1 = 2K_2$

58. Consider the elementary reaction:

$H_2(g) + I_2(g) \longrightarrow 2HI(g)$

If the volume of the container containing the gaseous mixture is increased to two times, then rate of the reaction

(1) Become four times

(2) Become $\frac{1}{4}$th of the original rate

(3) Become 2 times

(4) Become $\frac{1}{2}$ of the original rate

59. The rate of reaction increases to two times with every 10°C rise in temperature. If we raise the temperature by 40°C, the new rate of the reaction will be

(1) 4 times (2) 8 times

(3) 16 times (4) 32 times

60. Rate of a chemical reaction is independent of

(1) Surface Area of the reactant

(2) Active mass of reactant

(3) Equivalent mass of reactant

(4) Temperature

61. For a gas phase reaction of 1st order :

$A(g) \rightarrow B(g) + C(g)$, initial pressure is P_0 and pressure after time 't' become $P(P>P_0)$. Choose the correct expression of rate constant

(1) $\frac{2.303}{t}\log\left(\frac{P_0}{P-P_0}\right)$ (2) $\frac{2.303}{t}\log\left(\frac{2P_0}{P-P_0}\right)$

(3) $\frac{2.303}{t}\log\left(\frac{P_0}{2P_0-P}\right)$ (4) $\frac{2.303}{t}\log\left(\frac{P_0}{P_0-2P}\right)$

62. The Activation energy is lowered by 8.314 kJ/mol for the catalysed reaction. The ratio of the rate of the catalysed reaction to that of the uncatalysed reaction at 500K is (Given : $e^2 = 7.38$)

(1) 7.38 (2) 14.5

(3) 8.37 (4) 4.83

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CPP-04
ONE YEAR
MEDICAL

ANSWERS

1.	(4)	2.	(3)	3.	(3)	4.	(1)	5.	(1)	6.	(1)	7.	(2)
8.	(4)	9.	(2)	10.	(2)	11.	(3)	12.	(4)	13.	(2)	14.	(1)
15.	(2)	16.	(1)	17.	(2)	18.	(3)	19.	(4)	20.	(2)	21.	(3)
22.	(1)	23.	(4)	24.	(1)	25.	(1)	26.	(1)	27.	(1)	28.	(2)
29.	(1)	30.	(3)	31.	(1)	32.	(1)	33.	(2)	34.	(3)	35.	(4)
36.	(1)	37.	(4)	38.	(2)	39.	(3)	40.	(1)	41.	(1)	42.	(2)
43.	(1)	44.	(4)	45.	(2)	46.	(2)	47.	(2)	48.	(2)	49.	(2)
50.	(3)	51.	(3)	52.	(4)	53.	(3)	54.	(3)	55.	(4)	56.	(2)
57.	(2)	58.	(2)	59.	(3)	60.	(3)	61.	(3)	62.	(1)