ABUNE GORGORIOS SCHOOL

2012E.C SECOND SEMESTER CHEMISTRY MODEL EXAM FOR GRADE 12

Time Allowed: 2:30hrs

DIRECTIONS : EACH OF THE FOLLOWING QUESTIONS IS FOLLOWED BY FOUR POSSIBLE ALTERNATIVES. CHOOSE THE BEST ANSWER AND BLAKEN THE LETTER OF YOUR CHICE ON THE SEPARATE ANSWER SHEET PROVIDED.

You may refer to the information given below when you work on some of the questions.

SI units and conversion factors

A) 1 ton= 907.185kg
B) 1 metric ton =1000kg
C) 1 $A^0 = 10^{-10}$m
D) 1 L.atm=101.3J
E) Coulombs = amperes × seconds

Physical constants

1. Avogadro's No. = 6.02×10^{23} mol^{-1}
2. Plank's constant, h=6.626×10^{-34} J.S
3. Rydberg's constant , R_H= 109,678 cm^{-1}
4. Velocity of light , c=$3 \times 10^8 ms^{-1}$
5. Mass of electron = 9.11×10^{-31}kg
6. Faraday's constant(F) = 96,500 coulomb's/mol
7. Universal gas constant, R =8.31 J/mol.K
8. 1cal=4.184 J

Atomic Numbers (Z) and Atomic Weights (A)

Element	H	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl
Z	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A	1.0	6.9	9.0	10.8	12.0	14.0	16.0	19.0	20.18	22.98	24.3	27	28.1	31.0	32.1	35.5

Element	Ar	K	Ca	Cr	Mn	Fe	Ni	Cu	Zn	As	Kr	I	Xe	Se
Z	18	19	20	24	25	26	28	29	30	33	36	53	54	34

A	39.95	39.1	40.08	52	54.9	55.9	58.71	63.5	65.4	75.0	83.8	126.9		

1. A measuring cylinder has a precision ±0.01ml. a liquid sample that has a volume of 10ml is measured by the measuring cylinder. How many significant figures should be reported for this measurement?
   A. 1 B. 2 C. 3 D. 4
2. Which one of the following electromagnetic radiation has the longest wavelength?
   A. Gamma rays C. radio waves
   B. Microwaves D. x- rays
3. Which one of the following is not a basic SI unit?
   A. Candela B. Gram C. Mole D. Second
4. Which of the following properties of a substance does not represent an intensive physical property?
   A. Boiling point C. Density
   B. Color D. Volume
5. What is the mass of one molecule of water?
   A. 3.0×10^{-23}g C. 0.0003g
   B. 1.8×10^{-23}g D. 18.0g
6. What is the number of significant figures in 0.0030050?
   A. 4 B. 5 C. 7 D.8
7. What is the number of chloride ions (Cl^-) present in 1.0×10^{-5} mol of $AlCl_3$?
   A. 1.80×10^{19} C. 6.02×10^{23}
   B. 6.02×10^{18} D. 6.02×10^{28}
8. What is the wavelength associated with an electron of mass, m = 9.11×10^{-28}g, travelling at 40% of the velocity of light?
   A. 6.06×10^{-15}m C. 6.06×10^{-12}m
   B. 2.42×10^{-15}m D. 2.42×10^{-11}m
9. Which of the following hybrid orbitals is favoring the formation of trigonal bipyramidal?
   A. sp^3d B. sp^3 C. sp^3d^2 D. sp^3d^3
10. The Hydrogen line spectrum provides evidence for the
    A. Heisenberg uncertainty principle C. Wave like properties of light
    B. Diatomic nature of H_2 D. Quantized nature of atomic energy states
11. What is the complete chemical symbol for the ion contains 19 protons, 18 electrons, 20 neutrons?
    A. $^{38}_{19}K^+$ B. $^{40}_{20}K^+$ C. $^{39}_{19}K^+$ D. $^{29}_{20}K^+$
12. Which of the following radiations has the highest photon energy?

A. UV B. IR C. Microwaves D. Visible

13. In which case are the metals arranged in order of increasing metallic character?
    A. Mg, Ca, K, Cs C. Mg, Ca, Cs, K
    B. Ca, Mg, K, Cs D. K, Mg, Ca, Cs
14. What did Rutherford conclude from the experiments he carried out in which a beam of alpha particles was directed at a thin piece of metal foil?
    A. The positive charged parts of atoms are moving about with a velocity approaching the speed of light
    B. The positively charged parts of atoms are extremely small and extremely heavy particles
    C. The diameter of an electron is approximately equal to that of the nucleus
    D. Electrons travel in circular orbits around the nucleus
15. Which one of the following sets of quantum numbers could be those of the last electron of Mo?
    A. n=4, L=0, ms=+1/2 C. n=4, L=2, m_L=-1, ms=+1/2
    B. n=5, L=0, m_L=9, ms=-1/2 D. n=3, L=2, m_L=0, ms=+1/2

16. Which of the electromagnetic spectrum is capable of inducing electron transition with the greatest energy?
    A. Infrared B. Microwave C. Ultraviolet D. Visible

17. As atomic number increases within a group, what happens to the electronegativity of the elements?
    A. The electronegativity decreases, because the atomic number increases
    B. The electronegativity decreases, because the atomic size increases
    C. The electronegativity increases, because the number of energy levels increases
    D. The electronegativity increases, because the atomic number increases
18. Which atom in the ground state has three half-filled orbitals?
    A. P C. Al
    B. Si D. Li

19. Which conclusion is based on the Rutherford's gold foil experiment and the resulting model of the atom?
    A. An atom is mainly empty space, and the nucleus has a positive charge
    B. An atom is mainly empty space, and the nucleus has a negative charge
    C. An atom has hardly an empty space, and the nucleus has a positive charge
    D. An atom has hardly an empty space, and the nucleus has a negative charge

20. Which element of group 4A forms the most acidic oxide?
    A. Carbon B. Silicon C. Germanium D. Tin

21. An element with a partially filled d sublevels in the ground state is classified as
    A. A halogen C. An alkali metal
    B. A transition metal D. An alkaline earth metal

22. Which one of the following statements is correct about Millikan Oil Drop Experiment?
    A. It demonstrates that most of the mass and positive charge of the atom is located in small region called the nucleus
    B. It measures the mass to charge ratio of the proton
    C. It determines the magnitude of the electron charge
    D. It measures the mass of the neutron

23. Which one of the following statements is NOT correct about quantum mechanical model of the atom?
    A. The energy and position of an electron cannot be determined simultaneously
    B. Lower energy orbitals are filled with electron before higher energy orbitals
    C. When filling orbitals of equal energy, two electrons will occupy the same orbitals before filling a new orbitals
    D. No two electrons can have the same four quantum numbers

24. How many spectral lines are emitted from a hydrogen atom excited to the state designated by the principal quantum number, n=3?
    A. 1 B. 2 C. 3 D. 4

25. Which element corresponds to the electron configuration $[Ne]3s^2 3p^1$?
    A. Mg B. Al C. Si D. Ga

26. What is the correct order of the atomic radius in the elements below?

A. Mg<Al<Cl C. Mg>Al>Cl

B. Al<Mg<Cl D. Cl>Al>Mg

27. The outermost electron(s) of which of the following experiences the greatest effective nuclear charge?

A. K B. Ca C. Br D. P

28. Within a specified period, an increase in atomic number is usually accompanied?

A. An increase in atomic radius and an increase in electronegativity

B. A decrease in atomic radius and an increase in electronegativity

C. An increase in atomic radius and a decrease in electronegativity

D. A decrease in atomic radius and a decrease in electronegativity

29. Which of the following sets of quantum numbers is not allowed in the hydrogen atom?

A. n=2, l=1, m_l=-1

B. n=1, l=0, m_l=0

C. n=8, l=7, m_l=-6

D. n=2, l=0, m_l=2

30. Which metal atoms can form ionic bonds by losing electrons from both the outermost and next to outermost principal energy levels?

A. Fe B. Mg C. Pb D. Ca

31. What is the difference between chlorine -35 and chlorine -37?

A. Chlorine -37 has two more protons than chlorine -35

B. Chlorine -37 has two more neutrons than chlorine -35

C. Chlorine -37 has two more electrons than chlorine -35

D. Chlorine -37 has one more proton and one more neutron than chlorine -35

32. Which of the following is the right order of the steps of a scientific method?

A. Performing experiments – formulating hypothesis – making observations

B. Forming hypothesis – making observations – performing experiments

C. Making observations – formulating hypothesis – performing experiments

D. Making observations –performing experiments – formulating hypothesis

33. Which of the following quantum number(s) determine the energy of an element in a hydrogen atom?

A. n B. n and 1 C. n, l and m D. n, l, m and s

34. What did Rutherford's alpha particle experiment show?

A. Electrons have a negative charge
B. A proton is a hydrogen atom without electron
C. Electrons circle the nucleus of an atom in orbits
D. Most of the mass and all of the positive charge of an atom is found in nucleus

35. For which of the following element is Hund's rule used in writing the electron configuration?

A. C B. B C. Be D. Li

36. Which of the following statement is true?

A. Ultraviolet light has longer wavelength than visible light
B. The energy of radiation decrease as the wavelength decreases
C. The frequency of radiation increases as the wavelength as the wavelength decreases
D. Wave number of an electromagnetic radiation increases as wavelength increase

37. What sizes of the particles and velocities can consider quantum effect?

A. Particles with very large mass and large velocities
B. Particles with large mass and small velocities
C. Particles with very small mass and large velocities
D. Particles with small mass and velocities

38. Which one of the following molecules is a non-polar?

A. CS_2 B. SO_2 C. $CHCl_3$ D. SF_4

39. Which of the following molecules is not paramagnetic?

A. O_2^+ B. O_2 C. O_2^- D. O_2^{2-}

40. Which of the following molecules has the shortest bond length?

A. O_2 B. Cl_2 C. N_2 D. Br_2

41. Which molecule has the largest bond angle?

A. CF_4 B. NF_3 C. BF_3 D. OF_2

42. Which of these statements explains what makes graphite useful as an electrode material?

A. The carbon sheet in graphite are close enough for electrons to freely jump from one sheet to another
B. The three – dimensioned network of carbon in graphite allows electrons to move freely in all directions
C. The electrons in the Pi bond in graphite are free to move within the structure
D. The London dispersion forces allow electrons to freely move through graphite

43. Which of the following statements about intermolecular interactions is incorrect?

A. Dispersion interaction are greater for Xe than for He

B. Dipole – dipole interactions are greater for CF_4 than for H_2O

C. Individual hydrogen bonds are stronger for HF than for HCl

D. H_2O boils at a higher temperature than H_2S because of hydrogen bonding

44. Which type of intermolecular forces exist between nonpolar covalent bonds

A. Dipole – dipole forces C. Ion – dipole forces

B. Dispersion forces D. hydrogen bonding

45. A substance that does NOT conduct electricity as a solid but does conduct electricity when melted is most likely classified as?

A. An ionic compound C. a metal

B. A molecular compound D. a non-metal

46. Which of the following ionic compounds has the smallest lattice energy?

A. LiF B. Csl C. NaF D. Lil

47. Silicon dioxide (SiO_2) and diamonds are best described as?

A. Molecular substances with coordinate covalent bonding

B. Molecular substances with ionic bonding

C. Network solids with covalent bonding

D. Network solids with ionic bonding

48. Which compound contains both ionic and covalent bonds?

A. $CaCO_3$ C. MgF_2

B. PCl_3 D. CH_2O

49. What does the correct Lewis structure for the CCl_4 molecule show?

A. 5 bonds C. No unshared electrons

B. 24 unshared electrons D. 10 shared electrons

50. Which of the following statement is not true about ionic compounds?

A. They have high boiling and melting points

B. They conduct heat and electricity

C. Their unit particles are ions

D. They are ductile

51. Which one of the following is the geometry of ICl_4?

A. Octahedral C. Tetrahedral

B. Square planar D. trigonal planar

52. A covalent bond is unlikely to exist in which of the following substance?

A. H_2 B. SeH_2 C. SiF_4 D. CaO

53. Which one of the following is NOT true of metallic bonding?

A. It gives rise to excellent electrical conductivity

B. Electrons are free to move throughout the structure

C. The strength of metallic bonds increases down a group

D. The strength of metallic bonding affects the boiling points of metals

54. All of these are characteristics of most ionic compounds in the solid phase EXCEPT

A. High melting point

B. Solubility in water

C. High electrical conductivity

D. Insolubility in organic solvents

55. Which set contains only covalently bonded molecules?

A. BCl_3, $SiCl_4$, PCl_3 C. I_2, H_2S, Nal

B. NH_4Br, N_2H_4, HBr D. Al, O_3, AS_4

56. Which of the following compounds would be expected to have the highest melting point?

A. BaF_2 C. $BaBr_2$

B. $BaCl_2$ D. BaI_2

57. Which is likely to have the largest intermolecular dispersion forces?

A. Br_2 C. HCl

B. Ne D. N_2

58. According to the molecular orbital theory, which one of the following is paramagnetic?

A. F_2 B. H_2 C. NO^+ D. NO

59. Which term describes the units that make up compounds with covalent bonds?

A. Ions B. Acids C. Salts D. Molecules

60. There is a strong covalent bond between the N atoms in nitrogen gas, N_2. Why does nitrogen have such a low boiling point of -196 ˚C?

A. The bond between the N-atoms is triple

B. N is very electromagnetic, only next to F and O

C. The strong bond, at intramolecular one, determines the boiling point of the substance

D. Boiling point is determine by intermolecular force, which In this case is weak as this molecule is non-polar

61. Which of the following below best explains why atoms react chemically with each other?

A. When atoms react, they gain protons and are more stable

B. When atoms react, they lose all their electrons and become more stable

C. When atoms react, they lose, they gain, or share electrons and are then less stable

D. When atoms react, they lose, gain, or share electrons to attain in full outer energy level and are then more stable

62. Which one of the following ionic compounds is formed from the reaction between magnesium and nitrogen

A. MgN_2 B. Mg_2N_2 C. Mg_3N_2 D. Mg_2N_3

63. How many types of cubic cells are known?

A. 2 B. 3 C. 4 D. 5

64. Which of the following crystals possess high electrical and thermal conductivities?

A. Ionic crystals C. Molecular crystals

B. Metallic crystals D. Covalent network crystals

65. Which of the following molecules has a trigonal pyramidal structure?

A. SF_4 B. IF_5 C. IC_4^- D. BrF_5

66. Which of the following is the most important type of solute – solvent interaction in a solution of n – butanol in water?

A. Dispersion C. Dipole-dipole

B. Ion- dipole D. Hydrogen bonding

67. Which one of the following molecules/molecular ions is paramagnetic according to the molecular orbital theory?

A. O_2^{2-} B. O_2 C. F_2 D. O_2^{2+}

68. Which of the following molecules has dipole moment?

A. XeF_4 B. H_2S C. SO_3 D. CH_4

69. Two reactant particles collide with proper orientation. The collision will be effective if the particles have

A. High activation energy C. High ionization energy

B. Sufficient kinetic energy D. Sufficient potential energy

70. Which of the following statement is FALSE?

A. The reaction vessel cools when an endothermic reaction occurs

B. An exothermic reaction is characterized by a negative value of ΔH

C. An endothermic reaction causes the surrounding to absorb heat

D. Heat is evolved when an exothermic reaction occurs

71. Based on the energy values given for the forward reaction, which of the following reaction would be fastest in the reverse direction?

A. Ea=30KJ/mol;ΔE=-10KJ/mol C. Ea=45KJ/mol;ΔE=+15KJmol

B. Ea=60KJ/mol;ΔE=+10KJ/mol D. Ea=20KJ/mol;ΔE=-20KJ/mol

72. Which of the following increases when the concentration of reactant molecules increases?

A. The frequency of molecular collisions C. The rate constant

B. The average kinetic energy D. The activation energy

73. How does a catalyst increase the rate of a chemical reaction?

A. By shifting the equilibrium to the right

B. By shifting the equilibrium to the left

C. By lowering the activation energy

D. By increasing the activation energy

74. For the reaction $2A + B \rightarrow 2C$, the following data were obtained:

Experiment	Initial conc.of A mol/l	Initial conc.of Bmol/l	Initial rate (mol/l sec)
1.	0.5	0.5	10
2.	0.5	1.0	20
3.	0.5	1.5	30
4.	1.0	0.5	40

A. $r=K[A]^2$ B. $r=K[A]^2[B]$ C. $r=K[A][B]$ D. $r=K[A]^2[B][C]$

75. The reaction of NO_2 with CO is believed to occur according to the following mechanism.what would be the rate expression if the mechanism is correct?

$NO_2 + NO_2 \rightarrow NO_3 + NO$ (slow)

$NO_3 + CO \rightarrow NO_2 + CO_2$ (fast)

A. $Rate=K[NO_2]^2$ B. $Rate=K[NO_2][CO]$ C. $Rate=k[NO_2]^2[CO]$ D. $Rate=K[NO_2]$

76. Which of the following rate law is third order overall?

A. $Rate=K[A]^1[B]^3$ B. $Rate=K[A][B]^2$ C. $Rate=K[A]^3[B]^3$ D. $Rate=K[A]^5[B]^2$

77. For the decomposition of acetaldehyde the rate expression is: $Rate = k[Acetaldehyde]^{1.5}$. If the concentration of acetaldehyde is doubled, then the rate would increase by a factor of:

A. 5.50 B. 2.83 C. 3.0 D. 4.83

78. A possible mechanism for the reaction, $2A + B \rightarrow C + D$, is

1. $A + A \rightarrow A_2$ fast equilibrium
2. $A_2 + A \rightarrow A_3$ slow
3. $A_3 + B \rightarrow A + C + D$ fast

According to the mechanism, the rate law will be:

A. Rate = K[A] C. Rate = $K[A]^3$

B. Rate = $K[A]^2$ D. Rate = $K[A]^2[B]$

79. A particular reaction was found to depend on the concentration of the hydrogen ion, $[H^+]$. The initial rate changed as a function of $[H^+]$ as follows:

$[H^+](M)$	0.005	0.001	0.02
Initial rate(M/s)	3.4×10^{-7}	1.7×10^{-7}	0.85×10^{-7}

What is the order of the reaction in $[H^+]$?

A. -1 C. 2

B. 1 D. 0

80. For the reaction,

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

The following data were obtained:

$[NO]_\circ$ (M): 0.10 0.10 0.40

$[O_2]_\circ$ (M): 0.10 0.20 0.20

Rate(M/s): 2.5×10^{-4} 5.0×10^{-4} 8.0×10^{-3}

What is the rate for the reaction?

A. Rate=$K[NO][O_2]$ C. Rate=$K[NO]^2[O_2]$

B. Rate=$K[NO][O_2]$ D. Rate=$K[NO]^2[O_2]$

81. Which of the following does NOT affect the rate of a chemical reaction?

A. Enthalpy of the reaction C. Surface area

B. Concentration of reactants D. Temperature

82. Each of the choices below gives a reaction and the corresponding rate law, of these choices, which one could be an elementary process or individual step in a chemical reaction?

A. $2A \rightarrow P$ rate = K[A]

B. $A + B \rightarrow P$ rate = $K[A][B]$

C. $A + 2B \rightarrow P$ rate = $K[A]^2$

D. $A + B + C \rightarrow$ rate = $K[A][C]$

83. Consider the reaction in which nitric oxide is oxidized to nitrogen dioxide:

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

For which the rate law is rate = $K[NO]^2[O_2]$. If this reaction takes place in as sealed vessel and the partial pressure of nitric oxide is doubled, what effect would this have on the rate of reaction?

A. The reaction rate would increase by a factor of four

B. The reaction rate would increase by a factor of three

C. The reaction rate would increase by a factor of eight

D. The reaction rate would increase by a factor of two

84. Which of the following is NOT probable shape of a molecule?

A. A tetrahedral, $GeCl_4$

B. A bent, HCN

C. A triangular bipyramidal , PCl_5

D. A T – shaped, BrF_3

85. Which of the following factors does NOT affect the rate of a chemical reaction that is of zero order?

A. Concentration of reactants

B. Surface area of reactants

C. Temperature

D. Presence of a catalyst

86. What is the Half-life ,$t_{1/2}$, for zero order reaction A--------→B , (k is rate constant)

A. ln2k B. $[A]_0/2k$ C. $lnk/[A]_0$ D. $ln2/ [A]_0K$

87. . The reaction between NO and I_2 is second- order in NO and first-order in I_2 . What change occurs in the rate of the reaction if the concentration of NO is doubled and I_2 Left unchanged ?

A. Doubled B. Quadraple C. Eight times D. Three times

88. Consider the following reaction: $2S_2O_3^{2-}(aq) + I_2(aq) \dashrightarrow S_4O_6^{2-}(aq) + 2I(aq)$, if in an experiment 0.05mol $S_2O_3^{2-}$ is consumed in 1.0L of solution each second ,at what rates $S_4O_6^{2-}$ and I^- Produced in this solution ?

A. $S_4O_6^{2-}$ =o.025 ; I^- = 0.025

B. $S_4O_6^{2-}$ = 0.025 ; I^- = 0.05

C. $S_4O_6^{2-}$ =0.05 ; I^- = 0.05

D. $S_4O_6^{2-}$ =0.05 ; I^- =0.025

89. What is a valid expression for the following reaction ?

$$2NO + 2H_2 \dashrightarrow N_2 + 2H_2O$$

A. ½ $\Delta[H_2]/\Delta t$ B. -1/2 $\Delta[H_2O]/\Delta t$ C. ½ $\Delta[NO]/\Delta t$ D. $-\Delta[N_2]/\Delta t$

89. Increase in temperature of rate of a given reaction is due to the increase in the :

A. Extent of molecular dissociation

B. Activation energy of the reaction

C. Frequency of collision of the reaction species

D. Numerical value of the rate constant of the reaction

90. For the reaction :

$2A + B \dashrightarrow C$

The following experimental results were obtained:

Experiment	[A]	[B]	Rate ($molL^{-1}S^{-1}$)
1	0.50	0.50	0.300
2	0.50	0.25	0.075
3	0.25	0.25	0.075

What is the value of the rate constant?

A. 0.6 mol $L^{-1}S^{-1}$ C. 1.2L $mol^{-1}S^{-1}$

B. 0.6 $mol^{-1}S^{-1}$ D. 2.4 mol $L^{-1}S^{-1}$

91. Consider the following equilibrium: $N_2O_4(g) \dashleftarrow\dashrightarrow 2NO_2(g)$. what happens if the total pressure is increased by adding Nitrogen gas?

A. K_C increases C. The equilibrium shifts to the right

B. The equilibrium shifts to the left D. The position of equilibrium is not affected

92. Consider the gas-phase equilibrium system represented by the equation:

$2H_2O\ (g) \longleftrightarrow 2H_2\ (g) + O_2\ (g)$

Given the forward reaction is endothermic, which one of the following changes will decrease the amount of H_2O?

A. Adding more oxygen
C. Increasing the temperature at constant pressure
B. Adding a solid phase catalyst
D. Adding He gas

93. Consider the equilibrium system: $CaCO_3\ (s) + SO_2\ (g) \longleftrightarrow CaSO_4\ (s) + CO_2$. Which of the following changes will shift the equilibrium to the right?

A. Removing the $CaSO_3$ as it is formed
C. Decreasing the volume of the container
B. Adding more $CaCO_3$
D. Removing the CO_2 as it is formed

94. For specific reaction, which of the following statements is true about K, the equilibrium constant?

A. It may be changed by the addition of a catalyst
B. It increases if the concentration of one of the reaction is increased
C. It changes with changes in the temperature
D. It increases if the one concentration of one product is increased

95. Which one of the following statements describes a system that is at equilibrium?

A. The rate constants for the forward and reverse reactions are equal
B. The concentration of reactants and products are equal
C. The reaction ceases
D. The forward and reverse rates are equal

96. In what direction will the equilibrium between N_2O_4 and NO_2 shift, if the total pressure is increased by adding N_2 (g)?

$N_2O_4\ (g) \longleftrightarrow 2NO_2$

A. The equilibrium will shift to the right
B. The equilibrium will shift to the left
C. There will be no shift in the position of the equilibrium
D. The equilibrium will first shift to the right and after a while to the left

97. For the sublimation of iodine crystals, $I_2\ (s) \longleftrightarrow I_2\ (g)$ at 25°C and the atmospheric pressure, the enthalpy change, ΔH=39.37 KJ/mol and the entropy change, ΔS=86.2 J/K-mol. At what temperature will solid iodine be in equilibrium with gaseous iodine?

A. 298K B. 460K C. 520K D. 575K

98. A reaction reaches a state of equilibrium only when

A. The reactants and the products are reacting
B. The concentration of the reactants and products become equal
C. The products react together at the same rate at which they are formed
D. All the reactants and the products are in the same state of matter

99. Which one of the following is correct about a dynamic equilibrium?
A. Is a form of static equilibrium
B. Occurs when the rate constant of the forward process is equal to the rate constant of the reverse process
C. Only occurs in chemical equilibrium
D. Exists when the rate of the forward reaction is equal to the rate of the reverse reaction

100. Which one of the following indicates the correct expression for the equilibrium constant (K) for the process given below?

PCl_5 (s) ⟵⟶ PCl_3 (l) + Cl_2 (g)

A. $K=[PCl_3][Cl_2]/[PCl_5]$ C. $K=[PCl_3][Cl_2]$
B. $K=[Cl_2]$ D. $K=[PCl_5]/[PCl_3][Cl_2]$

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