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SSC-I NATIONAL BOOK FOUNDATION FBISE

CHEMISTRY TEST - CHAPTER 9: CHEMICAL EQUILIBRIUM

Name:		Roll No.		Section:

Total Time: 2:30 Hour
Time Allowed: 150 Minutes

Total Marks: 150

PAPER OBJECTIVE
SECTION-A (MARKS 150)

NOTE: Section-A is compulsory. All parts of this section are to be answered on these pages and handed over to the center superintendent. Deleting / overwriting is not allowed. Do not use lead pencil.

Q.1 Fill the relevant bubble for each part. All parts carry one mark.

Questions	A	B	C	D	A B C D
1. A reaction in which all reactants are converted to products is a:	Complete reaction	Reversible reaction	Equilibrium reaction	Partial reaction	●○○○
2. Many important reactions are not complete and form a mixture of:	Only products	Products and reactants	Only catalysts	Only reactants	○●○○
3. A reaction in which products can react to re-form the original reactants is:	Irreversible	Reversible	Explosive	Complete	○●○○
4. A reversible reaction proceeds in:	No direction	Upward direction only	Both directions	One direction only	○○●○
5. A reversible reaction occurs under the _____ conditions in both directions.	Different	Opposite	Same	Changing	○○●○
6. A reversible reaction is shown by a:	Double arrow	Equal sign	Single arrow	Plus sign	●○○○
7. Reversible reactions never:	End	Start	Change	Occur	●○○○
8. Equilibrium reactions are involved in the commercial production of ammonia and:	Sulphuric acid	Cement	Glass	Salt	●○○○
9. When a liquid is placed in a closed container, it:	Freezes	Evaporates and condenses	Only condenses	Only evaporates	○●○○
10. At equilibrium in a liquid-vapour system, the rate of evaporation equals the rate of:	Condensation	Melting	Boiling	Freezing	●○○○
11. The liquid ⇌ vapour system shows a balance between forward and _____ changes.	Nuclear	Backward	Forward only	Upward	○●○○
12. $2SO_2 + O_2 \rightleftharpoons 2SO_3$ is the reaction used to make:	Ammonia	Carbon dioxide	Nitric oxide	Sulphur trioxide	○○○●

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Questions	A	B	C	D	A B C D
13. $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is the reaction forming:	Methane	Sulphur trioxide	Nitrogen dioxide	Ammonia	○○○●
14. $N_2 + 2O_2 \rightleftharpoons 2NO_2$ is a reversible reaction forming:	Nitrogen dioxide	Ammonia	Ozone	Water	●○○○
15. In $2SO_2 + O_2 \rightleftharpoons 2SO_3$, the forward reaction produces:	SO	SO_2	O_2	SO_3	○○○●
16. In $2SO_2 + O_2 \rightleftharpoons 2SO_3$, the reverse reaction produces:	SO_3 only	O_3	H_2O	SO_2 and O_2	○○○●
17. In the beginning of $2SO_2 + O_2 \rightleftharpoons 2SO_3$, the rate of the reverse reaction is:	Maximum	Equal to forward	Zero	Infinite	○○●○
18. In the beginning, the forward reaction rate is highest due to high concentration of:	Solvents	Reactants	Catalysts	Products	○●○○
19. As the reaction progresses, the forward reaction rate:	Decreases	Increases	Stays the same	Doubles	●○○○
20. As the product concentration increases, the reverse reaction rate:	Halves	Stays zero	Increases	Decreases	○○●○
21. At equilibrium, the rates of the forward and reverse reactions are:	Zero	Different	Infinite	Equal	○○○●
22. The state in which forward and reverse reactions occur at the same rate is:	Chemical decomposition	Combustion	Chemical equilibrium	Neutralization	○○●○
23. Chemical equilibrium is a _____ equilibrium.	Static	Frozen	Solid	Dynamic	○○○●
24. At equilibrium, reactions:	Stop completely	Reverse	Become explosive	Do not stop	○○○●
25. At equilibrium, individual molecules are constantly:	Stopped	Vanishing	Reacting	Frozen	○○●○
26. At equilibrium, the concentrations of reactants and products become:	Constant	Zero	Infinite	Equal always	●○○○
27. Equilibrium is achieved in a _____ container.	Broken	Closed	Open	Metal only	○●○○
28. Equilibrium can be achieved starting from pure reactants, pure products or a:	Solid only	Gas only	Catalyst only	Mixture of both	○○○●
29. One condition of equilibrium is that the temperature remains:	Increasing	Changing	Constant	Decreasing	○○●○

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Questions	A	B	C	D	A B C D
30. One condition of equilibrium is that the pressure or volume remains:	Changing	Decreasing	Constant	Increasing	○○●○
31. One condition of equilibrium is that concentrations remain:	Zero	Changing	Unchanged	Doubling	○○●○
32. How many physical conditions are listed for maintaining equilibrium?	Three	Four	Five	Two	●○○○
33. If the temperature of an equilibrium system changes, the equilibrium:	Shifts	Stops	Disappears	Stays exactly the same	●○○○
34. Hydrated copper(II) sulphate is _____ in colour.	Pink	Blue	Green	White	○●○○
35. Anhydrous copper(II) sulphate is _____ in colour.	Black	Pink	White	Blue	○○●○
36. The formula of hydrated copper(II) sulphate is:	Cu_2SO_4	$CuSO_4 \cdot H_2O$	$CuSO_4 \cdot 5H_2O$	$CuSO_4$	○○●○
37. On heating, hydrated copper(II) sulphate turns from blue to:	Green	Red	Pink	White	○○○●
38. When water is added to anhydrous copper(II) sulphate, it turns:	Black	Pink	White	Blue	○○○●
39. When heated, hydrated copper(II) sulphate loses:	Copper	Oxygen	Sulphur	Water	○○○●
40. Anhydrous means:	With water	With acid	Without water	With salt	○○●○
41. Hydrated means:	Containing water	Without water	Pure	Burnt	●○○○
42. In $CuSO_4 \cdot 5H_2O \rightleftharpoons CuSO_4 + 5H_2O$, heating shifts the equilibrium to the:	Right	Nowhere	Up	Left	●○○○
43. In $CuSO_4 \cdot 5H_2O \rightleftharpoons CuSO_4 + 5H_2O$, adding water shifts the equilibrium to the:	Nowhere	Up	Right	Left	○○○●
44. Hydrated cobalt(II) chloride is _____ in colour.	Green	White	Pink	Blue	○○●○
45. Anhydrous cobalt(II) chloride is _____ in colour.	White	Blue	Red	Pink	○●○○
46. The formula of hydrated cobalt(II) chloride is:	$CoCl_2 \cdot 6H_2O$	$CoCl_2 \cdot 2H_2O$	$CoCl_3$	$CoCl_2$	●○○○
47. On heating, pink cobalt(II) chloride turns:	Green	Blue	Black	White	○●○○

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Questions	A	B	C	D	A B C D
48. When water is added to blue cobalt(II) chloride, it turns:	Green	Blue	White	Pink	○○○●
49. In $CoCl_2 \cdot 6H_2O \rightleftharpoons CoCl_2 + 6H_2O$, heating shifts the equilibrium to the:	Right	Left	Up	Nowhere	●○○○
50. In $CoCl_2 \cdot 6H_2O \rightleftharpoons CoCl_2 + 6H_2O$, adding water shifts the equilibrium to the:	Left	Nowhere	Up	Right	●○○○
51. Cobalt chloride paper is commonly used to test for:	Bases	Acids	Oxygen	Water	○○○●
52. Which of the following is true about the equilibrium state?	Both forward and reverse reactions continue at the same rate	Both reactions stop	The reverse reaction stops	The forward reaction stops	●○○○
53. In a sealed flask of H_2 and I_2 at 25 °C, the equilibrium mixture contains:	H_2 only	HI only	H_2, I_2 and HI	I_2 only	○○●○
54. The equilibrium equation for hydrogen iodide is:	$2HI \rightarrow H_2$	$H_2 + I_2 \rightleftharpoons 2HI$	$H + I \rightarrow HI_2$	$H_2 + I_2 \rightarrow HI$	○●○○
55. Which does NOT happen at equilibrium?	Rates become equal	Concentrations stop changing	Forward and reverse reactions stop	Reactions continue in both directions	○○●○
56. In an irreversible reaction, equilibrium is:	Never established	Established when it stops	Established slowly	Established quickly	●○○○
57. Which of these is a reversible reaction?	$Fe + S \rightarrow FeS$	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	$2Mg + O_2 \rightarrow 2MgO$	$N_2 + 3H_2 \rightleftharpoons 2NH_3$	○○○●
58. The forward reaction of $CO + 3H_2 \rightleftharpoons CH_4 + H_2O$ produces:	C and O	CO and H_2	H_2 only	CH_4 and H_2O	○○○●
59. The reverse reaction of $CO + 3H_2 \rightleftharpoons CH_4 + H_2O$ produces:	CH_4 and H_2O	CO and H_2	C only	O_2 only	○●○○
60. Coal reacts with hot steam to form CO and:	H_2	N_2	O_2	CO_2	●○○○
61. CO and H_2 react further in the presence of a catalyst to give methane and:	Water vapour	Oxygen	Nitrogen	Carbon	●○○○
62. The temperature effect on cobalt chloride equilibrium is shown by a change in:	Mass	Density	Colour	Volume only	○○●○
63. The forward reaction is the one proceeding from:	Left to right	Right to left	Nowhere	Top to bottom	●○○○
64. The reverse reaction is the one proceeding from:	Left to right	Nowhere	Top to bottom	Right to left	○○○●

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Questions	A	B	C	D	A B C D
65. Which pair of arrows represents reversible reaction?	→	⇌	↑	=	○●○○
66. The state of equilibrium is reached when the concentrations of reactants and products:	Double	Become equal	Become zero	Stop changing	○○○●
67. Equilibrium means that no _____ change in concentration is observed.	Visible only	Absolute	Total	Net	○○○●
68. During equilibrium the reaction mixture contains:	Only products	Both reactants and products	Only a catalyst	Only reactants	○●○○
69. Which statement is correct about dynamic equilibrium?	Only reverse continues	Forward and reverse reactions continue	Only forward continues	Everything stops	○●○○
70. At equilibrium, the amount of reactants and products:	Changes constantly	Does not change	Reaches zero	Becomes infinite	○●○○
71. The equilibrium of the water-vapour system in a closed container is:	Chemical equilibrium only	Nuclear equilibrium	Physical equilibrium	Not equilibrium	○○●○
72. The evaporation of water in a closed container reaches equilibrium when the rate of evaporation equals that of:	Condensation	Boiling	Melting	Freezing	●○○○
73. Reversible changes can be physical or:	Biological only	None	Chemical	Nuclear only	○○●○
74. The unit that follows Chemical Equilibrium in the book is:	Acids, Bases and Salts	Energetics	Electrochemistry	Stoichiometry	●○○○
75. The unit before Chemical Equilibrium in the book is:	Energetics	Acids, Bases and Salts	Electrochemistry	Matter	●○○○
76. A closed system exchanges energy but not _____ with surroundings in an equilibrium container.	Heat	Matter	Work	Light	○●○○
77. Sulphuric acid is produced via the _____ process, which uses an equilibrium step.	Contact	Haber	Solvay	Bessemer	●○○○
78. Ammonia is produced via the _____ process, which uses an equilibrium step.	Contact	Haber	Bessemer	Solvay	○●○○
79. The Haber process uses nitrogen and:	Oxygen	Chlorine	Carbon	Hydrogen	○○○●
80. The Contact process uses SO_2 and:	Oxygen	Hydrogen	Nitrogen	Chlorine	●○○○

Questions	A	B	C	D	A B C D
81. In the Haber process, ammonia is the:	Catalyst	Product	Reactant	Solvent	○●○○
82. In the Contact process, SO_3 is the:	Reactant	Catalyst	Solvent	Product	○○○●
83. A spark is required to form NO_2 from N_2 and O_2 in the example because the reaction is:	Nuclear	Exothermic only	Energy demanding	Fast	○○●○
84. Concentrations remain unchanged at equilibrium as long as _____ are unchanged.	Names	Containers	Physical conditions	Colours	○○●○
85. A change in pressure or volume affects:	Nothing	The equilibrium position of gases	Only solids	Only liquids	○●○○
86. Which of these shows a complete reaction?	Evaporation in closed container	Burning of paper	Making ammonia	Making SO_3 from SO_2	○●○○
87. Which of these is a reversible physical change?	Liquid ⇌ vapour in a closed container	Rusting of iron	Cooking an egg	Burning of wood	●○○○
88. In $H_2 + I_2 \rightleftharpoons 2HI$, HI is the:	Catalyst	Reactant of the forward reaction	Product of the forward reaction	Solvent	○○●○
89. In $H_2 + I_2 \rightleftharpoons 2HI$, H_2 and I_2 are the _____ of the forward reaction.	Products	Reactants	Catalysts	Solvents	○●○○
90. If both forward and reverse rates are zero in a closed system, the system:	Is exploding	Is not dynamic	Is in dynamic equilibrium	Is hot	○●○○
91. Which factor does NOT need to remain constant for equilibrium?	Colour of the vessel	Pressure or volume	Concentration	Temperature	●○○○
92. Equilibrium can be started from:	Only products	Only a catalyst	Only reactants	Either side of the equation	○○○●
93. The dehydration of copper(II) sulphate is the loss of:	Sulphur	Water of crystallization	Oxygen	Copper	○●○○
94. The white solid formed when blue vitriol is heated is:	Hydrated copper(II) sulphate	Anhydrous copper(II) sulphate	Copper oxide	Copper	○●○○
95. A reversible reaction can be driven to the right by:	Removing a product	Stopping the reaction	Cooling always	Adding product	●○○○
96. The double arrow was introduced to show that the reaction is:	Reversible	Explosive	Irreversible	Complete	●○○○
97. At the start of a reversible reaction with only reactants present, the reverse reaction rate is:	Equal to forward	Infinite	Zero	Maximum	○○●○

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Questions	A	B	C	D	A B C D
98. As time passes in a reversible reaction, the forward rate and reverse rate become:	Infinite	Zero	Opposite	Equal	○○○●
99. A graph of rate vs time for a reversible reaction shows the two rates:	Meeting at equilibrium	Crossing then diverging	Never meeting	Both going to zero	●○○○
100. Chemical equilibrium is described as a state of:	Explosion	Chaos	Rest only	Balance	○○○●
101. The concentration of reactants at equilibrium is:	Constant	Zero	Decreasing	Increasing	●○○○
102. The concentration of products at equilibrium is:	Increasing	Constant	Decreasing	Zero	○●○○
103. A reversible reaction needs a _____ system for equilibrium.	Open	Solid	Vacuum	Closed	○○○●
104. If a reaction vessel is open, gaseous products may escape and equilibrium is:	Always established	Established faster	Not established	Reversed	○○●○
105. The prefix 'an' in anhydrous means:	Half	With	Without	Double	○○●○
106. The word 'hydro' refers to:	Earth	Air	Fire	Water	○○○●
107. Blue to white colour change on heating $CuSO_4 \cdot 5H_2O$ shows:	Oxidation	Loss of water	Neutralization	Gain of water	○●○○
108. Pink to blue colour change on heating $CoCl_2 \cdot 6H_2O$ shows:	Gain of water	Loss of water	Oxidation	Neutralization	○●○○
109. The reversibility of dehydration shows the reaction is:	Nuclear	Complete	Irreversible	Reversible	○○○●
110. Which statement about reversible reactions is correct?	They proceed only forward	They can proceed in both directions	They never occur	They proceed only backward	○●○○
111. Which statement about equilibrium is NOT correct?	The rates are equal	The reactions stop	The system is closed	The concentrations are constant	○●○○
112. The conversion of SO_2 to SO_3 is incomplete because the reaction is:	Nuclear	Explosive	Reversible	Irreversible	○○●○
113. The conversion of N_2 and H_2 to NH_3 is incomplete because the reaction is:	Explosive	Nuclear	Irreversible	Reversible	○○○●
114. Which describes the equilibrium mixture of $N_2 + 3H_2 \rightleftharpoons 2NH_3$?	Contains only NH_3	Contains only N_2	Contains only H_2	Contains N_2, H_2 and NH_3	○○○●

Questions	A	B	C	D	A B C D
115. Which describes the equilibrium mixture of $2SO_2 + O_2 \rightleftharpoons 2SO_3$?	Contains only SO_2	Contains SO_2, O_2 and SO_3	Contains only SO_3	Contains only O_2	○●○○
116. The symbol ⇌ is placed between:	Two products only	Subscripts	Reactants and products	Two reactants only	○○●○
117. Which one is a physical condition for equilibrium?	Constant temperature	Constant size of crystals	Constant colour	Constant mass of vessel	●○○○
118. Equilibrium is NOT established when the vessel is:	Sealed	Open to escape of gas	Insulated	Closed	○●○○
119. Which type of reaction goes to completion?	Reversible reaction	Irreversible reaction	Equilibrium reaction	Dynamic reaction	○●○○
120. The commercial production of important chemicals depends on understanding:	Taste	Equilibrium	Density	Colour changes	○●○○
121. The dissolving of sugar in a saturated solution with undissolved sugar is an example of:	Electrolysis	Complete reaction	Combustion	Dynamic equilibrium	○○○●
122. In dynamic equilibrium, the dissolving rate equals the _____ rate.	Melting	Crystallization	Boiling	Evaporation	○●○○
123. The decomposition of SO_3 gives:	S and O_2	SO_2 and O_2	H_2S	SO_3 only	○●○○
124. Which species is consumed in the forward reaction of $2SO_2 + O_2 \rightleftharpoons 2SO_3$?	N_2	SO_2 and O_2	H_2O	SO_3	○●○○
125. Which species is produced in the reverse reaction of $N_2 + 3H_2 \rightleftharpoons 2NH_3$?	N_2 and H_2	O_2	H_2O	NH_3	●○○○
126. A system at equilibrium looks _____ at the macroscopic level.	Unchanging	Changing rapidly	Cooling	Exploding	●○○○
127. Equilibrium is an example of balance between opposing _____.	Reactions	Names	Colours	Containers	●○○○
128. Which of these is NOT a reversible equation?	$H_2 + I_2 \rightleftharpoons 2HI$	$N_2 + 3H_2 \rightleftharpoons 2NH_3$	$C + O_2 \rightarrow CO_2$	$2SO_2 + O_2 \rightleftharpoons 2SO_3$	○○●○
129. The blue colour of hydrated copper sulphate is due to the presence of:	Water of crystallization	Sulphur	Oxygen	Carbon	●○○○
130. In the cobalt chloride equilibrium, the left side is _____ in colour.	Green	Blue	White	Pink	○○○●
131. In the cobalt chloride equilibrium, the right side $CoCl_2$ is _____ in colour.	Blue	Green	Pink	White	●○○○

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Questions	A	B	C	D	A B C D
132. In the copper sulphate equilibrium, the left side is _____ in colour.	Pink	Green	Blue	White	○○●○
133. In the copper sulphate equilibrium, the right side $CuSO_4$ is _____ in colour.	Blue	Green	Pink	White	○○○●
134. When the equilibrium shifts to the right on heating, the _____ increases.	Amount of reactants	Pressure	Amount of products	Mass	○○●○
135. A student heats blue copper sulphate crystals until white. The reaction at this point is:	Oxidation	Hydration	Neutralization	Dehydration	○○○●
136. A student adds water to white anhydrous copper sulphate and it turns blue. The process is:	Combustion	Hydration	Dehydration	Oxidation	○●○○
137. Water of crystallization means water:	Absorbed from air only	Evaporated	Chemically bound in the crystal	Poured on the crystal	○○●○
138. Reversible reactions are indicated by the arrow symbol:	→	↑	⇌	↓	○○●○
139. Which of these ends when all reactants are used up?	An equilibrium	A dynamic reaction	A complete reaction	A reversible reaction	○○●○
140. The sealed H_2 and I_2 flask at 25 °C will eventually contain a constant amount of:	HI only	H_2 only	I_2 only	HI, H_2 and I_2	○○○●
141. In equilibrium, reaction rates are equal but concentrations are not necessarily:	Constant	Fixed	Equal	Steady	○○●○
142. Which phrase describes 'dynamic'?	Completely stopped	Absent	Constantly changing at the molecular level	Frozen	○○●○
143. A reaction at equilibrium appears to have stopped because the concentrations:	Vanish	Reach zero	Stop changing	Reverse	○○●○
144. The reverse of dehydration of blue vitriol is:	Neutralization	Reduction	Hydration	Oxidation	○○●○
145. A chemist wants to make ammonia efficiently; understanding _____ is important.	Smell	Density	Equilibrium	Colour	○○●○
146. The word 'equilibrium' means:	Heating	Cooling	Explosion	Balance	○○○●
147. Which statement is true for all reversible reactions in closed vessels?	They reach equilibrium	They stop at once	They never reach equilibrium	They are always fast	●○○○

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Questions	A	B	C	D	A B C D
148. The solution of salt in water with excess solid salt is an example of:	Complete reaction	Neutralization	Combustion	Physical dynamic equilibrium	○○○●
149. The state of equilibrium can be approached from the:	Product side only	Reactant side only	Neither side	Reactant side or product side	○○○●
150. In the equation $2SO_3 \rightleftharpoons 2SO_2 + O_2$, the forward reaction is the:	Formation of SO_2 only	Formation of SO_3	Decomposition of SO_3	Oxidation of SO_2	○○●○

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