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CHEMISTRY TEST - CHAPTER 9: ACIDS AND BASES

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. Acids were first identified as substances having a:	salty taste	bitter taste	sour taste	sweet taste	○○●○
2. Bases (alkalis) are characterised by their:	sour taste	sweet taste	bitter taste and slippery feel	sticky feel	○○●○
3. Vinegar tastes sour because it is a dilute solution of:	citric acid	acetic acid	formic acid	lactic acid	○●○○
4. Citric acid is responsible for the sour taste of:	lemon	milk	tomato only	vinegar	●○○○
5. Acids are classified into mineral acids and:	organic acids	alkalis	salts	oxides	●○○○
6. Compared with mineral acids, organic acids are:	much stronger	always gaseous	much weaker	equally strong	○○●○
7. A soluble base is called a(n):	acid	alkali	salt	buffer	○●○○
8. An alkali forms which ion when dissolved in water?	Cl^-	H^+	OH^-	Na^+	○○●○
9. Caustic soda is the common name of:	NaOH	$Ca(OH)_2$	KOH	NH_4OH	●○○○
10. Hydrogen chloride is covalent and forms H_3O^+ ions only in the presence of:	vacuum	benzene	ether	water	○○○●
11. An ionic substance obtained from the neutralisation of an acid and a base is called a:	salt	indicator	buffer	solvent	●○○○
12. Alkalis are important in the manufacture of:	glass fibre only	rubber only	soap and detergents	plastics only	○○●○
13. A conjugate acid is a species formed when a base:	donates an electron pair	accepts an electron pair	accepts a proton	donates a proton	○○●○
14. A conjugate base is the species that remains after an acid:	donates an electron	accepts a proton	donates a proton	accepts an electron	○○●○

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Questions	A	B	C	D	A B C D
15. Conjugate acid-base pairs differ from each other by:	one neutron	one proton	one electron	two protons	○●○○
16. The conjugate base of HCl is:	H^+	Cl^-	HCl_2^-	OH^-	○●○○
17. The conjugate base of H_2O is:	H^+	OH^-	O^{2-}	H_3O^+	○●○○
18. The conjugate acid of NH_3 is:	N_2H_4	NH_4^+	NH_2OH	NH_2^-	○●○○
19. The conjugate acid of H_2O is:	H_3O^+	H^-	OH^-	H_2O_2	●○○○
20. The conjugate base of H_2SO_4 is:	HSO_4^-	SO_3	$H_3SO_4^+$	SO_4^{2-}	●○○○
21. The conjugate base of CH_3COOH is:	CH_3OH	$CH_3COOH_2^+$	CH_3COO^-	CH_4	○○●○
22. The conjugate acid of CO_3^{2-} is:	H_3O^+	CO_2	H_2CO_3	HCO_3^-	○○○●
23. The weaker an acid, the ___ its conjugate base.	neutral	stronger	weaker	the same	○●○○
24. A strong acid produces a relatively ___ conjugate base.	strong	neutral	weak	amphoteric	○○●○
25. A substance which can behave as both an acid and a base is called:	neutral	amphoteric	anhydrous	buffer	○●○○
26. Water is amphoteric because it can:	only accept protons	only donate protons	donate as well as accept protons	neither donate nor accept protons	○○●○
27. In the reaction $NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^-$, water acts as a:	Brønsted base	Brønsted acid	Lewis base	catalyst	○●○○
28. In the reaction $HCl + H_2O \rightarrow H_3O^+ + Cl^-$, water acts as a:	Lewis acid	Brønsted acid	neutral solvent	Brønsted base	○○○●
29. Substances such as SO_2, CO_2, CaO and BF_3 behave as acids or bases even though they cannot donate or accept protons. Their nature is explained by the:	Dalton theory	Arrhenius theory	Brønsted–Lowry theory	Lewis theory	○○○●
30. The Lewis theory of acids and bases was proposed in the year:	1923	1869	1887	1905	●○○○
31. A Lewis acid is a substance that can:	donate a pair of electrons	accept a pair of electrons	accept a proton only	donate a proton	○●○○

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Questions	A	B	C	D	A B C D
32. A Lewis base is a substance that can:	donate a pair of electrons	donate a proton only	accept a pair of electrons	accept a proton	●○○○
33. In a Lewis acid-base reaction, the bond formed between the acid and the base is a:	metallic bond	coordinate covalent bond	ionic bond	hydrogen bond	○●○○
34. The Lewis acid in the reaction $BF_3 + NH_3 \rightarrow F_3B{\leftarrow}NH_3$ is:	BF_3	H^+	NH_3	F^-	●○○○
35. The Lewis base in the reaction $BF_3 + NH_3 \rightarrow F_3B{\leftarrow}NH_3$ is:	H^+	$F_3B{\leftarrow}NH_3$	NH_3	BF_3	○○●○
36. BF_3 acts as a Lewis acid because boron has:	a lone pair	a negative charge	a complete octet	an incomplete octet	○○○●
37. NH_3 acts as a Lewis base because its nitrogen atom has:	an incomplete octet	a lone pair of electrons	a positive charge	no electrons	○●○○
38. A Lewis base always has:	an unshared electron pair	no valence electrons	a positive charge	an incomplete octet	●○○○
39. Which of the following is a Lewis acid?	$AlCl_3$	H_2O	OH^-	NH_3	●○○○
40. Which of the following is a Lewis base?	BF_3	$AlCl_3$	H^+	OH^-	○○○●
41. H^+ is a Lewis acid because it:	donates an electron pair	accepts an electron pair	has a lone pair	has a complete octet	○●○○
42. The Lewis concept is more general than the Arrhenius and Brønsted-Lowry theories because it:	applies only to water	applies only to gases	requires a proton transfer	does not require a proton transfer	○○○●
43. The ability of an acid to donate a proton is called its:	acid dilution	acid strength	acid hydrolysis	acid concentration	○●○○
44. Hydrochloric acid is a ___ acid than acetic acid.	weaker	stronger	equally strong	neutral	○●○○
45. Ammonia is a relatively stronger base than water because it can:	donate a proton more easily	form more hydrogen bonds	dissolve more	accept a proton to a greater degree	○○○●
46. The self-ionisation of water is called:	hydration	auto ionisation	neutralisation	hydrolysis	○●○○
47. The ionic product constant of water is represented by:	K_{sp}	K_a	K_b	K_w	○○○●
48. The value of K_w at 25 °C is:	1.0×10^{-7}	1.0×10^{14}	1.0×10^{-14}	1.0×10^{-1}	○○●○

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49. K_w is expressed as:	$[H^+][OH^-]$	$[H_2O]^2$	$[H^+] + [OH^-]$	$[H^+] / [OH^-]$	●○○○
50. In pure water at 25 °C, $[H^+]$ is equal to:	1.0×10^{-14} M	1.0×10^{7} M	1.0×10^{-7} M	1.0 M	○○●○
51. An aqueous solution is neutral when:	$[H^+] = 0$	$[H^+] > [OH^-]$	$[H^+] = [OH^-]$	$[H^+] < [OH^-]$	○○●○
52. Because K_w is an equilibrium constant, it depends on:	concentration of acid	catalyst	temperature	volume of solution	○○●○
53. At 40 °C, $K_w = 3.8 \times 10^{-14}$, so $[H^+]$ in pure water is about:	1.0×10^{-7} M	3.8×10^{-14} M	1.9×10^{-7} M	1.9×10^{-14} M	○○●○
54. pH of a solution is defined as:	$-\log [OH^-]$	$\log [H^+]$	$[H^+]^2$	$-\log [H^+]$	○○○●
55. pH has:	units of g dm^{-3}	units of kelvin	no units	units of mol dm^{-3}	○○●○
56. At 25 °C, the pH of a neutral solution is:	14.00	7.00	1.00	0	○●○○
57. At 25 °C, an acidic solution has a pH:	greater than 7	less than 7	equal to 14	equal to 7	○●○○
58. At 25 °C, a basic solution has a pH:	greater than 7	equal to 7	equal to 0	less than 7	●○○○
59. At 25 °C, the sum of pH and pOH is:	14	0	7	1	●○○○
60. pOH of a solution is defined as:	$\log [OH^-]$	$[OH^-]^2$	$-\log [H^+]$	$-\log [OH^-]$	○○○●
61. The pH of a 0.001 M HCl solution is:	0.001	1.00	3.00	11.00	○○●○
62. The pH of a 0.01 M HCl solution is:	2	12	0.01	1	●○○○
63. The pH of a 0.1 M HCl solution is:	13	0.1	1	7	○○●○
64. The pOH of a 0.01 M NaOH solution is:	7	2	0.01	12	○●○○
65. The pH of a 0.01 M NaOH solution is:	0.01	7	2	12	○○○●

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Questions	A	B	C	D	A B C D
66. The pH of a 0.1 M NaOH solution is:	7	13	1	0.1	○●○○
67. The pH of a solution with $[H^+] = 1.0 \times 10^{-4}$ M is:	0.0001	10	−4	4	○○○●
68. The pH of a solution with $[OH^-] = 1.0 \times 10^{-3}$ M is:	−3	3	0.001	11	○○○●
69. A household ammonia solution has $[OH^-] = 0.005$ M. Its pOH is about:	5	11.7	2.3	0.005	○○●○
70. A household ammonia solution has $[OH^-] = 0.005$ M. Its pH is about:	11.7	0.005	2.3	9	●○○○
71. The pH of a 0.062 M NaOH solution is about:	12.8	7	0.062	1.2	●○○○
72. The pH of a solution containing 1.95 g of H_2SO_4 per dm^3 (molar mass 98 g/mol) is about:	12.6	1.4	0.4	2.0	○●○○
73. If the pH of a solution decreases by one unit, the $[H^+]$ becomes:	half	double	one-tenth	ten times	○○○●
74. A solution of pH 3 is ___ times more acidic than a solution of pH 5.	10	2	100	1000	○○●○
75. Titration is a method to find the volume of a:	liquid needed to boil	standard solution needed to react completely with another solution	gas needed to burn completely	solid needed to melt	○●○○
76. In acid–base titrations, the acid solution is generally placed in the:	beaker	test tube	burette	conical flask	○○●○
77. In acid–base titrations, a fixed volume of base is taken in a conical flask using a:	volumetric pipette	burette	beaker	measuring cylinder	●○○○
78. The point at which the indicator changes colour is called the:	end point	melting point	starting point	boiling point	●○○○
79. For the titration of a strong acid and a strong base, the best indicator is:	litmus	starch	methyl orange	phenolphthalein	○○○●
80. Phenolphthalein is pink in:	acidic solution	pure water	neutral solution	basic solution	○○○●
81. Phenolphthalein changes colour in the pH range of about:	8–10	4–6	1–3	11–14	●○○○
82. In the titration of HCl with Na_2CO_3 (strong acid with a weak base), the best indicator is:	methyl orange	phenolphthalein	bromine water	starch	●○○○

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Questions	A	B	C	D	A B C D
83. In the titration of a weak acid with a strong base (such as oxalic acid with NaOH), the best indicator is:	litmus	methyl orange	phenolphthalein	starch	○○●○
84. In the titration of a weak acid with a weak base:	phenolphthalein works	any indicator works	methyl orange works	no indicator works satisfactorily	○○○●
85. 25 cm^3 of 0.12 M NaOH neutralises 30 cm^3 of HCl. The molarity of the HCl is:	0.2 M	0.144 M	0.1 M	0.12 M	○○●○
86. The strength of HCl solution of molarity 0.1 M (molar mass 36.5 g/mol) is:	0.365 g dm^{-3}	0.1 g dm^{-3}	36.5 g dm^{-3}	3.65 g dm^{-3}	○○○●
87. The strength of a solution is equal to:	molarity + molar mass	molarity − molar mass	molarity × molar mass	molarity ÷ molar mass	○○●○
88. The ionisation constant of an acid is represented by:	K_a	K_b	K_w	K_{sp}	●○○○
89. The greater the value of K_a, the ___ the acid.	stronger	more basic	more neutral	weaker	●○○○
90. K_a depends on:	temperature	catalyst only	volume	concentration of acid	●○○○
91. The value of pK_a is defined as:	log K_a	−log K_a	1 / K_a	K_a^2	○●○○
92. The smaller the value of pK_a, the ___ the acid.	weaker	more basic	more neutral	stronger	○○○●
93. K_a of acetic acid at 25 °C is about:	1.8×10^5	1.8×10^{-5}	1.8×10^{-14}	1.8	○●○○
94. Which acid is stronger: HCl or HF?	Both equal	HCl	HF	Neither is an acid	○●○○
95. Which of these acids has the largest K_a?	HF	$HClO_4$	HCOOH	CH_3COOH	○●○○
96. Which of the following acids is the weakest?	Hydrofluoric acid	Hydrochloric acid	Acetic acid	Formic acid	○○●○
97. The ability of a base to accept a proton from a solvent is called the:	concentration of the base	strength of the base	dilution of the base	hydrolysis of the base	○●○○
98. The base ionisation constant is represented by:	K_b	K_w	K_{sp}	K_a	●○○○
99. A larger K_b value indicates a:	stronger base	neutral substance	stronger acid	weaker base	●○○○

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Questions	A	B	C	D	A B C D
100. Sodium hydroxide and potassium hydroxide are strong bases because they:	ionise slightly in water	do not ionise in water	are insoluble	ionise completely in water	○○○●
101. According to the K_b values in the book, which of the following is the strongest base?	Diethylamine	Pyridine	Ammonia	Aniline	●○○○
102. Ammonia is a weaker base than:	pyridine	water	aniline	methylamine	○○○●
103. A buffer solution is a solution whose pH:	changes drastically with acid	is always 7	does not change significantly on adding a small amount of acid or base	is always 14	○○●○
104. An acidic buffer can be prepared by mixing a weak acid with:	its salt with a strong base	its salt with a weak base	a strong acid	a strong base in excess	●○○○
105. Which of the following is an acidic buffer?	$CH_3COOH + CH_3COONa$	HCl + NaCl	$NH_4OH + NH_4Cl$	NaOH + NaCl	●○○○
106. Which of the following is a basic buffer?	$CH_3COOH + CH_3COONa$	HCl + NaCl	$NH_4OH + NH_4Cl$	$H_2SO_4 + Na_2SO_4$	○○●○
107. An acidic buffer has a pH:	equal to 0	equal to 14	greater than 7	less than 7	○○○●
108. A basic buffer has a pH:	equal to 0	equal to 1	less than 7	greater than 7	○○○●
109. The Henderson-Hasselbalch equation for an acidic buffer is:	$pH = pK_a -$ log([salt]/[acid])	$pH = pK_a +$ log([salt]/[acid])	$pH = pK_a \times$ [salt]/[acid]	pH = log([acid]/[salt])	○●○○
110. The Henderson-Hasselbalch equation for a basic buffer is:	pOH = log([base]/[salt])	$pOH = pK_b +$ log([salt]/[base])	$pH = pK_b +$ log([salt]/[base])	$pOH = pK_b -$ log([salt]/[base])	○●○○
111. In a buffer where [acid] = [salt], the pH equals:	pK_a	$pK_a + 1$	7	$pK_a - 1$	●○○○
112. A buffer has 0.1 M CH_3COOH and 1.0 M CH_3COONa (pK_a = 4.74). Its pH is:	3.74	5.74	4.74	6.74	○●○○
113. The pH of a buffer with 0.11 M CH_3COONa and 0.09 M CH_3COOH ($K_a = 1.8 \times 10^{-5}$) is about:	4.83	5.74	3.74	4.65	●○○○
114. Aqueous solution of NH_4Cl turns blue litmus:	colourless	green	red	yellow	○○●○
115. Aqueous solution of K_2CO_3 turns red litmus:	yellow	green	colourless	blue	○○○●
116. Aqueous solution of NaCl:	has no action on litmus	bleaches litmus	turns red litmus blue	turns blue litmus red	●○○○

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Questions	A	B	C	D	A B C D
117. The chemical reaction of the cations and anions of salts with water is called:	dehydration	hydrolysis	hydration	neutralisation	○●○○
118. In hydrolysis, the ___ bond of water is broken.	C–C	C–H	H–OH	O–O	○○●○
119. Which of the following anions reacts with water to give a basic solution?	NO_3^-	Cl^-	SO_4^{2-}	CH_3COO^-	○○○●
120. Which of the following ions does NOT hydrolyse in water?	Al^{3+}	CN^-	Na^+	NH_4^+	○○●○
121. Which of the following cations hydrolyses to produce an acidic solution?	Mg^{2+}	Ca^{2+}	K^+	NH_4^+	○○○●
122. Anions of weak acids are ___ conjugate bases.	neutral	amphoteric	strong	weak	○○●○
123. The salt of a strong acid and a strong base gives a solution of pH:	14	greater than 7	less than 7	7	○○○●
124. The aqueous solution of CH_3COONa has a pH:	equal to 0	less than 7	equal to 7	greater than 7	○○○●
125. The aqueous solution of NH_4Cl has a pH:	less than 7	greater than 7	equal to 14	equal to 7	●○○○
126. The aqueous solution of $CuSO_4$ is:	neutral	acidic	basic	buffer	○●○○
127. Which salt solution is neutral?	NH_4Cl	$CuSO_4$	NaCN	KNO_3	○○○●
128. The solution of Na_2CO_3 is basic because of the hydrolysis of:	Na^+ ions	CO_3^{2-} ions	water only	H^+ ions	○●○○
129. Hydrolysis differs from hydration because in hydration:	the H–OH bond breaks	a salt is formed	an acid is neutralised	a water molecule adds without bond breakage	○○○●
130. The solubility product constant is represented by:	K_{sp}	K_b	K_w	K_a	●○○○
131. K_{sp} is the product of equilibrium concentrations of ions, each raised to a power equal to its:	charge only	coefficient in the balanced equation	atomic mass	molar mass	○●○○
132. K_{sp} for CaF_2 is:	$[CaF_2]$ / $[Ca^{2+}][F^-]^2$	$[Ca^{2+}]^2[F^-]$	$[Ca^{2+}][F^-]$	$[Ca^{2+}][F^-]^2$	○○○●
133. K_{sp} for AgBr is:	[AgBr]	$[Ag^+]^2[Br^-]$	$[Ag^+][Br^-]$	$[Ag^+]$ / $[Br^-]$	○○●○

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134. K_{sp} for $Ca_3(PO_4)_2$ is:	$[Ca^{2+}][PO_4^{3-}]$	$[Ca^{2+}]^3[PO_4^{3-}]^2$	$[Ca^{2+}]^2[PO_4^{3-}]^3$	$[Ca^{2+}]^3[PO_4^{3-}]^3$	○●○○
135. K_{sp} for $PbSO_4$ is:	$[Pb^{2+}][SO_4^{2-}]^2$	$[Pb^{2+}]^2[SO_4^{2-}]$	$[PbSO_4]$	$[Pb^{2+}][SO_4^{2-}]$	○○○●
136. The solubility of AgBr is 7.1×10^{-7} M. Its K_{sp} is about:	5.0×10^{-13}	1.4×10^{-6}	5.0×10^{-7}	7.1×10^{-7}	●○○○
137. The K_{sp} of $PbSO_4$ is 1.96×10^{-8}. Its solubility is:	3.9×10^{-8} M	1.4×10^{-8} M	1.96×10^{-8} M	1.4×10^{-4} M	○○○●
138. In a saturated solution of a sparingly soluble salt, there is a:	complete dissolution of solid	static state	no equilibrium	dynamic equilibrium between the solid and its ions	○○○●
139. An aqueous reaction in which two solutions are mixed and an insoluble solid forms is called a:	hydrolysis reaction	precipitation reaction	combustion reaction	neutralisation reaction	○●○○
140. The ion product (Q) is obtained by using ___ concentrations in the K_{sp} expression.	zero	equilibrium only	final only	initial	○○○●
141. If Q is greater than K_{sp}, then:	the solution is unsaturated	no precipitation occurs	the solution is neutral	precipitation occurs	○○○●
142. If Q is less than K_{sp}, then:	no precipitation occurs	the solution is supersaturated	precipitation occurs	crystals form	●○○○
143. In a river, Ca^{2+} and PO_4^{3-} concentrations are 1.0×10^{-9} M each. The ion product Q for $Ca_3(PO_4)_2$ is:	1.0×10^{-18}	1.0×10^{-9}	1.0×10^{-45}	1.0×10^{-27}	○○●○
144. The reduction in ionisation or solubility of an electrolyte by adding a soluble electrolyte with a common ion is called the:	Le Chatelier effect only	buffer effect	common ion effect	hydrolysis effect	○○●○
145. When NaF is added to a solution of HF, the dissociation of HF:	remains unchanged	decreases	becomes complete	increases	○●○○
146. When highly soluble KCl is added to a saturated solution of $KClO_4$, $KClO_4$:	precipitates out	remains unchanged	dissolves more	decomposes	●○○○
147. Passing HCl gas through a saturated solution of NaCl (brine) causes:	NaCl to dissolve more	no change	NaCl to precipitate	NaOH to form	○○●○
148. The purification of NaCl by passing HCl gas through its saturated solution is based on the:	hydration	buffer action	common ion effect	hydrolysis	○○●○
149. Adding NH_4Cl to a solution of NH_4OH ___ the ionisation of NH_4OH.	has no effect on	increases	completes	suppresses	○○○●
150. The pH of a 0.001 M NaOH solution is:	11	0.001	3	7	●○○○

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