FILL UP THE BLANKS

1. Carbohydrates are ____ or _____, derivatives of polyhydric alcohols.
2. _____ are those carbohydrates that cannot be hydrolysed into simpler carbohydrates.
3. Disaccharides are condensation products of two _____ units
4. _____ test is employed to distinguish carbohydrate from other substances
5. Addition of Molisch reagent and sulphuric acid with carbohydrate solution will give _____ colour at the junction of two liquid
6. Benedict's test is used to distinguish _____ and _____
7. _____ test is used to distinguish monosaccharaides from disaccharides
8. _____ test is used to distinguish aldo sugar from keto sugar
9. _____ test is employed to distinguish reducing monosaccharide and reducing disaccharide
10. Resorcinol test with fructose will give ____ colour precipitate
11. Deep blue colour is formed when fructose is treated with sulphuric acid and _____
12. Cobalt nitrate test with fructose will give _____ colour
13. ___ and _____ tests are used to confirm maltose sugar
14. ____ and ____ tests are used to confirm lactose sugar
15. Sucrose on hydrolysis with HCl is converted to ____and _____
16. A solution of reducing sugar when heated with phenyl hydrazine, characteristic yellow crystalline compounds called _____ are formed.
17. Action of Fehling's solution with monosaccharides gives _____ colour precipitate
18. Process of treating sucrose with hydrochloride is called as _____
19. _____ test is employed for identification of polysaccharides
20. Starch will give _____ colour with iodine
21. _____ polysaccharide will give reddish brown with iodine
22. _____ test is employed to distinguish mono and disaccharides with polysaccharides
23. Needle shaped crystals formed in osazone test confirms _____ monosaccharide
24. Sugars that contain _____ group will act as reducing agent
25. The estimation of glucose was developed by German Chemist _____ in 1849
26. The end point in the estimation of glucose is _____
27. The indicator used in the estimation of glucose is _____
28. Methylene blue is _____ indicator
29. Sucrose is a _____ sugar
30. The word "sucrose" was coined in 1857 by the English chemist _____
31. Non-reducing sugars are characterized by the absence of an _____ structure
32. Sugar solution on hydrolysis with acid becomes _____ sugar
33. Sucrose on hydrolysis form equimolar of _____ and _____
34. The factor used for converting glucose to sucrose is ___
35. 10 ml of Fehling's solution is reduced by _____ gram of glucose
36. _____ is stored in roots, tubers, stems, fruits and cereals
37. _____ method is advocated to estimate starch content in a sample
38. Starch is made up of _____ and _____
39. The factor to convert glucose to starch is _____
40. Starch on hydrolysis give _____ colour on treating with anthrone
41. The red precipitate formed when glucose is heated with "Benedict's reagent" is ___

42. Fructose and Glucose can be distinguished by _____
43. The reagent used for distinguishing a reducing monosaccharide from a reducing disaccharide is _____
44. _____ will answer Molisch test
45. In carbohydrates,_____ and _____ are functional groups
46. Fructosan is obtained in _____ test
47. Estimation of amino acid in a solution was proposed by____
48. An example of essential proteins is _____
49. Amino acids is called as _____
50. The end point in the estimation of amino acid is _____
51. The indicator used in the estimation of amino acid is _____
52. _____ are the building blocks of proteins
53. Amino acids are compounds containing an____ and a ____ group
54. Amino acid exist as Zwitter ions, to make it acidic, _____ added to amino acid solution
55. All proteins are constructed from the same ubiquitous set of ____ amino acids.
56. Proteins are dehydration polymers of amino acids, with each amino acid residue joined to its neighbour by a specific type of ____
57. Protein on heating becomes _____
58. The _____ is a chemical test used for detecting the presence of peptide bonds.
59. Formation of _____ in biuret test indicates the presentation of proteins.
60. Xanthoproteic acid reaction is done to identify _____
61. Reaction of protein with heat or acid or alkali will cause _____
62. Xanthoproteic acid reaction with protein will give orange colour due to the nitration of _____
63. Denaturation of protein results in formation of _____ protein
64. Million test will give _____colour on treatment with proteins
65. When protein is boiled with a dilute solution of Ninhydrin, a _____ is produced
66. A violet colour is produced on treating protein with _____
67. _____ colour is obtained when lead acetate solution is added to protein solution
68. Protein solution when added to glyoxylic acid and sulphuric acid gives _____ colour
69. _____Test will give violet colour when glyoxylic acid and sulphuric acid is added to egg albumin
70. Amino acid reacts with formalin to form _____
71. Acid value of oil is defined as the percentage of free fatty acids expressed as __ ,,_____&_____
72. Lipids are organic compounds formed mainly from ____ and _____
73. Lipids are organic compounds formed mainly from alcohol and fatty acids combined together by ____ linkage
74. The mineral salt of fatty acid is called a ____.
75. _____defined as the number of milligrams of potassium hydroxide required to neutralize the free fatty acids present in one gram of fat
76. Acid value measures _____ of oil
77. The free fatty acid content is known as _____ or _____
78. Acid number indicates the degree of _____ of fat

79. The normal acid value for most samples lies within _____
80. Acid value is the measure of _____ rancidity
81. The high acid number will indicate that the oil is ____ and ___
82. Fatty acid + glycerol will give_____
83. The free fatty acid content is known as _____
84. 1 ml of 0.1 N KOH reacts with …….. g of oleic acid
85. 1 ml of 0.1 N KOH reacts with …….. g of Palmitic acid
86. 1 ml of 0.1 N KOH reacts with …….. g of Lauric acid
87. …….. is the indicator used in the estimation of acid value
88. Keeping quality of oil depends on …….. content
89. The end point in the estimation of acid value is_____
90. The iodine value is a measure of the degree of _____ in oil.
91. Iodine value is a useful parameter in studying …….. of oils
92. Oils contain …….. and …….. fatty acids
93. Iodine gets incorporated into the fatty acid whenever …….. bonds exists
94. …….. is the indicator used in the estimations of iodine value
95. …….. is the end point in the estimation of iodine value
96. One ml of 0.1 N $Na_2S_2O_3$ is equivalent to …….. g of I_2
97. _____ flask is used for estimation of iodine value in oil
98. Unsaturated fatty acids can be converted into saturated by the process of_____
99. If the iodine number is between 0-70, it will be a _____
100. If the value exceeds 70 it is an _____
101. _____value oils are prone to oxidation and polymerization
102. The _____ is the number of grams of iodine absorbed by 100g of the oil/fat
103. Number of double bonds in relation to the amount of lipid present is known by _____
104. Higher the iodine value, greater the degree of _____
105. Saponification literally means _____
106. Number of milligrams of KOH required to completely saponify 1 g oil is ……..
107. Process by which the fatty acids in the glycerides are hydrolysed by an alkali is referred to as _____
108. Saponification value is useful for comparative study …….. in oils
109. The indicator used in the estimation of saponification value is ……..
110. One ml of 0.5 N HCl …….. g of KOH
111. The saponification number is a measure of the average _____of the triacylglycerol's in a sample
112. Saponification value is ____ proportional to the mean molecular weight of fatty acids (or chain length).
113. Saponification value is inversely proportional to the _____ fatty acids
114. Fats (triglycerides) upon alkaline hydrolysis yield ____and ___
115. Rancidity of oil brought about by the action of air is …….
116. Rancidity of oil brought about by the action of microbes is …….
117. Peroxide value is a measure of ……. contained in oil
118. ……. is the indicator used in the estimation of peroxide of oil
119. Solvent mixture contains ……. and _____

120. _____ titration is involved in the estimation of peroxide value
121. _____ is one of the most widely used tests for oxidative rancidity
122. Peroxide value is the concentration of _____ groups in edible oils
123. High peroxide values are a definite indication of a _____ fat
124. Fresh oil has peroxide value below ____ meq/kg
125. Vitamin C is otherwise is called as _____
126. _____ is the richest source of ascorbic acid
127. The natural vitamin C exists in _____ form.
128. 2, 6-dichlorophenol indophenol dye, which is _____ in alkaline solution and ___ in acid solution
129. Ascorbic acid is a strong reducing agent and gets oxidized to _____ by 2, 6 dichlorophenol indophenol dye
130. The indicator used in ascorbic acid estimation is _____
131. The end point in the estimation of vitamin C in juice is _____
132. Ascorbic acid (Vitamin C) is a strong _____ agent
133. The Ninhydrin test is used to detect the presence of _____ and proteins that contain free _____.

PROBLEMS

1) Estimate the degree of unsaturation of given oil using the following data

Weight of oil taken for analysis = 1.0 g

Volume of 0.1 N $Na_2S_2O_3$ consumed in the blank titration = 30 ml

Volume of 0.1 N $Na_2S_2O_3$ consumed in the experimental titration = 5 ml

2) **Calculate the amount of sucrose present in the given sugar solution using the following data**

Volume of sugar solution taken for inversion = 20 ml

Total volume of inverted sugar solution prepared = 200 ml

Volume of inverted sugar solution consumed in the reduction = 12.3 ml

3) Calculate the amount of acid value of a given oil based on the following data

Weight of oil taken for analysis = 10 g

Volume of 0.1 N KOH consumed in the titration = 15.5 ml

4) Calculate the amount of ascorbic acid in given lime fruit

Weight of lime fruit taken for analysis = 30 g

Volume of the sample made up with = 250 ml

Volume of sample extract taken for dye titration = 25 ml

Volume of dye required (titre) = 15.7 ml

5) State the vegetable oil is rancid or not based on the following data

Weight of oil taken for analysis = Wg – 1 g

Volume of sodium thiosulfate consumed in sample titration = 77 ml

Volume of sodium thiosulfate consumed in blank titration = 4 ml

6) Find out the amount of free acid present in coconut oil based on the following data

Weight of oil taken for analysis = 1.65 g

Volume of 0.5 N HCl consumed in the blank titration = 27.4 ml

Volume of 0.5 N HCl consumed in the experimental titration = 11.2 ml

7) Determine the amount of amino acid in a given solution based on the following data

Volume of aliquot taken for analysis = 20 ml

Volume of 0.02 N NaOH consumed in sample titration = 54 ml

Volume of 0.02 NaOH consumed in blank titration = 2 ml

8) Determine the amount of aldo sugar in given solution using the following data

Volume of glucose solution consumed in the reduction = 13.5 ml

9) Calculate the amount of starch present in the given sample based on following data

Weight of starch material taken for nalysis = 0.5 g

Volume of starch extract sample made up to = 500 ml

Volume of aliquot taken for analysis = 0.5 ml

Volume of aliquot made up to = 5 ml

Concentration of glucose read from the graph = 65 ppm

SOLUTIONS

FILL UP THE BLANKS

Sl.No	Answer	Sl.No	Answer
1	Aldose and Ketose	35	0.05
2	Monosaccharides	36	Starch
3	Monosaccharides	37	Anthrone
4	Molisch	38	Amylose and Amylopectin
5	Reddish violet or purple	39	0.9
6	Reducing and Non-reducing sugar	40	Green Colour
7	Barfoed's test	41	Cuprous oxide
8	Seliwanoff's Test	42	Resorcinol test/ Seliwanoff's Test
9	Barfoed's test	43	Barfoed's test
10	Red colour precipitate	44	Carbohydrate
11	Ammonium Molybdate	45	Aldo and Keto
12	Violet colour	46	Osazone
13	Osazone and Potassium Ferricyanide	47	S. P. L. Sorensen
14	Osazone and Mucid test	48	Histidine
15	Glucose and Fructose	49	Zwitter ions
16	Osazone	50	Appearance of pink color
17	Red colour precipitate	51	Phenolphthalein
18	Inversion	52	Amino acids
19	Iodine	53	Amine and carboxyl
20	Blue	54	formaldehyde
21	Glycogen	55	Twenty
22	Molisch	56	Covalent bond(Peptide Bond)
23	Glucose and fructose	57	Denatured
24	Aldehyde	58	Biuret test
25	Hermann von Fehling	59	Purplish Violet Colour
26	Red colour precipitate	60	Nitration of benzene nucleus
27	Methylene blue	61	Denaturation/Coagulation
28	Redox indicator	62	Benzene rings
29	Non-reducing/ Disaccharide	63	Single strand proteins
30	William Miller	64	Brick red
31	Open structure	65	Blue colour
32	Invert sugar	66	Glyoxylic acid + H_2SO_4
33	Glucose and Fructose	67	Black colour
34	0.95	68	Violet colour

Sl.No	Answer	Sl.No	Answer
69	Hopkin- Cole’s Test	103	Iodine value
70	Methylene amino acid	104	Unsaturation
71	Oleic , Palmitic and Lauric acids	105	Soap making
72	Glycerol and fatty acid	106	Saponification
73	Ester	107	Saponification
74	Soap	108	Chain length
75	Acid value	109	Phenolphthalein
76	Rancidity	110	28.05
77	Acid number or acid value	111	Molecular weight
78	Purity	112	Inversely
79	0.5	113	Molecular
80	Hydrolytic	114	Fatty acid and glycerol
81	Old and Rancid	115	oxidative
82	Triglycerides or fat	116	Ketonic
83	Acid number/acid value	117	Rancidity
84	0.0282 g	118	Starch
85	0.0256 g	119	Acetic acid + chloroform
86	0.02 g	120	Iodometric
87	Phenolphthalein	121	Peroxide value
88	Free fatty acid	122	(-O-O-)
89	Appearance of faint pink color	123	Rancid
90	Unsaturation	124	10
91	Rancidity	125	Ascorbic acid
92	Saturated and Unsaturated	126	Orange
93	Double bonds	127	L ascorbic acid
94	Starch	128	Blue and Red
95	Disappearance of blue colour	129	dehydro ascorbic acid
96	0.0127 g	130	Self-indicator
97	Iodine	131	Appearance of pink colour
98	Hydrogenation.	132	Reducing agent
99	Fat	133	Amino acid , Amino
100	Oil		
101	Higher iodine		
102	Iodine value		

PROBLEM

1. **Estimate the degree of unsaturation of given oil using the following data**

Weight of oil taken for analysis = 1.0 g

Volume of 0.1 N $Na_2S_2O_3$ consumed in the blank titration = 30 ml

Volume of 0.1 N $Na_2S_2O_3$ consumed in the experimental titration = 5 ml

Actual volume of 0.1 N $Na_2S_2O_3$ solution utilized by the oil = (30 -5) = 25 ml

1 ml of 0.1 N $Na_2S_2O_3$ solution (F) = 0.0127 g of iodine

25 ml of 0.1 N $Na_2S_2O_3$ solution = 0.0127 x 25 g of Iodine

1 g of oil absorbed = 0.0127 x 25 g of iodine

$$\% \text{ of iodine absorbed by the oil} = \frac{0.0127 \times 25 \times 100}{1} = 31.75$$

Result

Iodine value of fat = **31.75 g/100g**

2. Calculate the amount of sucrose present in the given sugar solution using the following data

Volume of sugar solution taken for inversion = 20 ml

Total volume of inverted sugar solution prepared = 200 ml

Volume of inverted sugar solution consumed in the reduction = 12.3 ml

10 ml of Fehling's solution is reduced by = 0.05 g (F) of glucose

12.3 ml of inverted sugar solution contains = 0.05 g of glucose

$$\text{200 ml of inverted sugar solution contains} = \frac{0.05}{12.3} \text{ g of glucose}$$

$$\text{20 ml of sugar solution contains} = \frac{0.05 \times 200}{12.3} \text{ g of glucose}$$

$$\text{Percentage of glucose in the sugar solution} = \frac{0.05 \times 200 \times 100}{12.3 \times 20} \text{ of glucose.}$$

Percentage of sucrose present in the sugar solution = % 4.06 x 0.95 = 3.86

Result

Percentage of sucrose present in the sugar solution = 3.86

3. Calculate the amount of acid value of a given oil based on the following data

Weight of oil taken for analysis = 10 g

Volume of 0.1 N KOH consumed in the titration = 15.5 ml

1 ml of 0.1 KOH reacts with (F1) = 0.0282 g of Oleic acid

1 ml of 0.1 N KOH reacts with (F2) = 0.0256 g of Palmitic acid

1 ml of 0.1 NKOH reacts with (F3) = 0.02 g of Lauric acid

15.5. ml of 0.1 N KOH reacts with 0.0282 x 15.5 g of oleic acid

15.5 ml of 0.1 N KOH reacts with 0.0256 x 15.5 g Palmitic acid

15.5 ml of 0.1 N KOH reacts with 0.02 x 15.5 g of Lauric acid

$$\textbf{Acid values as \% of oleic acid} = \frac{0.0282 \times 15.5 \times 100}{10} = 4.371$$

$$\textbf{Acid value as \% Palmitic acid} = \frac{0.0256 \times 15.5 \times 100}{10} = 3.968$$

Acid value as % of Lauric acid = $\frac{0.02 \times 15.5 \times 100}{10}$ = 3.10

Result

1. Acid value as % of oleic acid = 4.371

2. Acid value as % of Palmitic acid = 3.968

3 Acid value as % of Lauric acid = 3.10

4. Calculate the amount of ascorbic acid in given lime fruit

Weight of lime fruit taken for analysis = 30 g

Volume of the sample made up with = 250 ml

Volume of sample extract taken for dye titration = 25 ml

Volume of dye required (titre) = 15.7 ml

Ascorbic acid in 25 ml of the sample extract = 0.1 x 15.7 mg

Therefore, ascorbic acid in 250 ml of the extract = $\frac{0.1 \times 15.7, \times 100}{250}$

Since 30g sample was made up to 250 ml, ascorbic acid content of the sample (mg per 100 g)

$$\frac{0.1 \times 15.7 \times 250 \times 100}{25 \times 30} = \textbf{52.33 mg /100g}$$

Result

Ascorbic acid content of the sample =.**52.33 mg per 100 g**

5. State the vegetable oil is rancid or not based on the following data

Weight of oil taken for analysis = Wg – 1 g

Volume of sodium thiosulfate consumed in sample titration = 35 ml

Volume of sodium thiosulfate consumed in blank titration = 4 ml

Actual volume of sodium thiosulfate consumed to absorb iodine = (35- 4) ml

The normality of sodium thiosulfate = N/500 or 0.002 N

Peroxide value (meq. /Kg sample) = $\frac{(35 - 4) \times 0.002 \times 1000}{1}$ = 62

Result

Peroxide value of vegetable oil = 62. Meq peroxide/kg of sample

Interpretation

Since the peroxide value of vegetable oil is 62 which is less than 75, it is not rancid

6. Find out the amount of free acid present in coconut oil based on the following data

Weight of oil taken for analysis = 1.65 g

Volume of 0.5 N HCl consumed in the blank titration = 27.4 ml

Volume of 0.5 N HCl consumed in the experimental titration = 11.2 ml

Actual volume of 0.5 N HCl utilized by the oil = (27.4- 11.2) ml

The amount of KOH utilized by 1.65 g of oil = 56.11 x 0.5 x (27.4 – 11.2) g of KOH

Saponification value = $\frac{56.11 \times 0.5 \times (27.4-11.2)}{1.65}$ = **275.44**

Result:
Saponification value of coconut oil = **275 44 mg/g**

7) Determine the amount of amino acid in a given solution based on the following data
Volume of aliquot taken for analysis = 20 ml
Volume of 0.02 N NaOH consumed in sample titration = 54 ml
Volume of 0.02 NaOH consumed in blank titration = 2 ml
Actual volume of 0.02 N NaOH required to neutralize the amino acid = (54- 2) ml
Strength of the amino acid (N) = $\frac{(54 - 2) \times 0.02}{20} = 0.05$
Concentration of amino acid = 0.05 x 75
= 3.9 (g/l)
(Equivalent weight of the simplest amino acid (glycine) is 75)
Result
1. **The strength of amino acid solution is 0.05**
2. Concentration of amino acid is 3.9 g/l

8) Determine the amount of aldo sugar in given solution using the following data
Volume of glucose solution consumed in the reduction = 13.5 ml
10 ml of Fehling's solution is reduced by = 0.05g (F) of glucose.
13.5 ml of glucose solution contains = 0.05 g of glucose.
Percentage of glucose present in the sample solution = 0.05/ 13.5 x 100 = 0.37
Result:
Percentage of glucose present in the given sample solution = **0.37**

9) Weight of starch material taken for nalysis = 0.5 g
Volume of starch extract sample made up to = 500 ml
Volume of aliquot taken for analysis = 0.5 ml
Volume of aliquot made up to = 5 ml
Concentration of glucose read from the graph = 65 ppm
500) ml of sample extract contains = $\frac{65 \times 5}{10^6 \times 0.5}$ g of glucose
0.5 g of sample contains = $\frac{65 \times 5 \times 100}{10^6 \times 0.5}$ g of glucose
100 g of sample will contain $= \frac{65 \times 5 \times 500 \times 100}{10^6 \times 0.5 \times 0.5}$ g of glucose
= 65
Percent starch in the given sample = 65 x 0.9 = 58.5
Result:
Percentage of starch present in the given sample = 58.5