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Multiple choice Questions:

1. Which of the following dryer is used for pureed raw ingredients that are dried at relatively low temperatures over rotating?

- a) Fluidized bed dryer
- b) Drum dryer
- c) Cabinet tray dryer
- d) Pneumatic dryer

Answer: b

2. Which of the following dryer is used to produce powder from the solution?

- a) Spray dryer
- b) Cabinet tray dryer
- c) Pneumatic dryer
- d) Fluidized bed dryer

Answer: a

3. Who invented spray dryer?

- a) Samuel Percy
- b) Fritz Winkler
- c) John A
- d) Jacques-Arsened'Arsonva

Answer: a

4. What is the alternative name for batch-in-bin dryer?

- a. Flat bed dryer
- b. Cabinet tray dryer
- c. Pneumatic dryer
- d. Fluidized bed dryer

Answer: a

5. What is full form of LSU dryer?

- a) Louisiana State University dryer
- b) Low simple universal dryer
- c) Low and slow unit dryer
- d) Level steady unit dryer

Answer: a

6. What does Fritz Winkler invented?

- a) Fluidized bed dryer
- b) Drum dryer
- c) Spray dryer
- d) Freeze dryer

Answer: a

7. Which dryer is used to dry the material almost instantaneously in a turbulent stream of hot air?

- a) Fluidized bed dryer
- b) Drum dryer
- c) Cabinet tray dryer
- d) Pneumatic dryer

Answer: d

8. Which of the following dryer is the convectional drying equipment with enclosed insulated chambers?

- a) Fluidized bed dryer
- b) Drum dryer

- c) Cabinet tray dryer
- d) Pneumatic dryer

Answer: c

9. What type of dryer is used for the drying of substances which are hygroscopic?

- a) Fluidized bed dryer
- b) Drum dryer
- c) Cabinet tray dryer
- d) Vacuum dryer

Answer: d

10. Which one of the following dryers match this description – ‘The solid to be dried are fed on to endless, perforated, conveyor belt through which hot air is forced’?

- a) Drum drying
- b) Microwave Drying
- c) Screen Conveyor Dryer
- d) Rotary drying

Answer: c

11. Any kind of material possible such as coarse ones or granular or even powdery substance can be dried by circulating in a screen conveyor dryer without the requirement of any prior-treatment or loss in feed material.

- a) True
- b) False

Answer: a

12. If the drying operation is concerned as a setup, adiabatic dryers are _____ non-adiabatic dryers.

- a) Less expensive than
- b) More expensive
- c) More efficient

d) Almost similar in cost and efficiency

Answer: a

13. The thermal efficiency of a Screen Conveyor Dryer is usually _____

a) High at around 50-70%

b) 100%

c) 20%

d) Very Low < 20%

Answer: a

14. Which one of the following dryers matches this description – ‘A high-frequency generated waves is guided by a wave channel into an oven that is designed to remove the water from the feed to be dried’?

a) Drum drying

b) Microwave Drying

c) Furnace drying

d) Rotary drying

Answer: b

15. Microwave drying setup of heating uses low wavelength waves that carry the maximum amount of energy in them which can reach the deepest of the capillaries of the substance and heat it to be dried, which is a great advantage for the processing in _____ industries.

a) Cement

b) Pharmaceutical

c) Limestone

d) Petrochemical

Answer: b

16. Radiation dryers usually use _____ waves.

a) High frequency

b) Low frequency

c) Yellow light

d) Bright red visible frequency

Answer: a

17. Why is microwave drying so efficient? Select the most relevant answer.

a) High temperature

b) High heat transfer rate

c) Heat is generated deep within the material to be dried

d) Low temperature operation ability

Answer: c

18. The efficiency of microwave dryers is usually in the range of _____

a) > 70%

b) < 70%

c) > 90%

d) < 50%

Answer: a

19 _____ method allows the food product to be dehydrated without undergoing a phase change from liquid water to water vapour.

a) Superficial fluid Extraction

b) Supercritical Fluid Extraction

c) Superheated fluid Extraction

d) Sub-cooled fluid Extraction

Answer: b

21. Find the moisture to be evaporated per kg of dried product if initial and final moisture content per kg of dry solid is 85% and 15%.

a) 0.5

b) 0.6

c) 0.7

d) 0.8

Answer: c

Clarification: Moisture to dry = Initial moisture – final moisture content = 0.85 – 0.15 = 0.7 per kg of dry solid.

22. Convert 80% of moisture in wet basis to dry basis (kg water/kg dry solid)

a) 4

b) 8

c) 12

d) 16

Answer: a

Clarification: $0.8/1-0.8 = 4$ kg water/kg dry solid.

23. If the equilibrium vapour pressure is lower than pure liquid pressure then the moisture content is

a) Bound moisture

b) Unbound moisture

c) Equilibrium moisture

d) None of the mentioned

Answer: a

24. The substance moisture exerts equilibrium vapour pressure equals to vapour pressure of liquid is

a) Bound moisture

b) Unbound moisture

c) Equilibrium moisture

d) None of the mentioned

Answer: b

25. The moisture which can be evaporated is bound moisture.

a) True

b) False

Answer: b

26. The method of drying by conduction through materials are done by _____

- a) Direct driers
- b) Indirect driers
- c) Tray driers
- d) None of the mentioned

Answer: b

27. The substance like food stuff, pharma products are dried by _____ drying.

- a) Direct
- b) Indirect
- c) Freeze
- d) None of the mentioned

Answer: c

28. The representation AB is known as

- a) Bound moisture
- b) Unbound moisture
- c) Equilibrium moisture
- d) None of the mentioned

Answer: b

29. The name of the curve between relative humidity and moisture content is equilibrium moisture curve.

- a) True
- b) False

Answer: a

30. Convert 5 kg of moisture /kg of dry solid to wet basis.

- a) 3/6
- b) 4/6
- c) 5/6
- d) 1

Answer: c

Clarification: In wet basis, $5/(5+1)$ (kg of moisture/kg of wet solid) = 5/6.

31. The capillary condensation theory plays a major role in _____ equation.

- a) Kelvin
- b) Harkins-Jura
- c) Chung-Pfost
- d) Henderson

Answer: a

32. Henderson equation is based on _____

- a) gibbs adsorption
- b) enthalpy
- c) latent heat
- d) entropy

Answer: a

33. The _____ is the average material moisture content at which the drying rate begins to decline.

- a) critical moisture content
- b) equilibrium moisture content
- c) free moisture content
- d) bound moisture content

Answer: a

34. What is hysteresis effect?

- a) Difference between desorption and adsorption curve
- b) Difference between desorption and absorption curve
- c) Difference between relative humidity and adsorption curve
- d) Difference between relative humidity and absorption curve

Answer: a

35. _____ was used to describe relationship between the water activity and equilibrium moisture content.

- a) Kelvin model
- b) Harkins-Jura model
- c) Chung-Pfost model
- d) GAB model

Answer: d

26. Which of the following statements about moisture sorption isotherms are correct?

Statement 1: It describes the relationship between moisture content and water activity in food.

Statement 2: Water activity always increases as moisture content increases.

- a) True, False
- b) True, True
- c) False, True
- d) False, False

Answer: b

27. _____ equation is based on potential field theory.

- a) Kelvin
- b) Harkins-Jura
- c) Chung-Pfost
- d) Henderson

Answer: c

28. Harkins-Jura equation does not predict satisfactory EMC values when relative humidity is

- _____
- a) more than 30%
 - b) more than 40%
 - c) more than 50%
 - d) more than 60%

Answer: a

39. The _____ helps to decide the stability of food at particular moisture content in the given environment.

- a) equilibrium moisture content
- b) psychometric charts
- c) equilibrium moisture content and psychometric charts
- d) chemical properties and psychometric charts

Answer: a

40. What is the relationship between equilibrium moisture content (EMC) and free moisture content (FMC)?

- a) $FMC = \text{Total water content} - EMC$
- b) $FMC = \text{Total water content} + EMC$
- c) $FMC = \text{Total water content} \times EMC$
- d) $\text{Total water content} = EMC \times FMC$

Answer: a

41. What is psychometric chart?

- a) It is the graphical representation of thermodynamic properties
- b) It is the graphical representation of chemical properties
- c) It is the graphical representation of drying properties
- d) It is the graphical representation of mechanical properties

Answer: a

42. Who invented the psychometric chart?

- a) Dr Richard Seligman
- b) George Babcock
- c) George Brayton
- d) Willis H. Carrier

Answer: d

43. Which lines indicate wet bulb temperatures in the psychometric charts?

- a) Diagonals lines
- b) Vertical lines
- c) Horizontal lines
- d) Curves

Answer: a

44. Which lines indicate dry bulb temperatures in the psychometric chart?

- a) Diagonals lines
- b) Vertical lines
- c) Horizontal lines
- d) Curves

Answer: b

45. Which lines indicate relative humidity in the psychometric charts?

- a) Diagonals lines
- b) Vertical lines
- c) Horizontal lines
- d) Curves

Answer: d

46. What is another name for humidity ratio?

- a) Mixing ratio
- b) Water ratio
- c) Relative humidity ratio
- d) Bound water ratio

Answer: a

47. Who invented the sling psychrometer?

- a) Sir John Leslie
- b) Leonardo da Vinci
- c) George Babcock
- d) George Brayton

Answer: a

48. What is wet bulb depression?

- a) Difference between dry bulb temperature and wet bulb temperature at any point
- b) Difference between relative humidity and wet bulb temperature at any point
- c) Difference between dew point and wet bulb temperature at any point
- d) Difference between dry bulb temperature and dew point temperature at any point

Answer: a

49. What is dew point depression?

- a) Difference between dry bulb temperature and dew point temperature of air
- b) Difference between wet bulb temperature and dew point temperature of air
- c) Difference between relative humidity and dew point temperature of air
- d) Difference between wet bulb depression and dew point temperature of air

Answer: a

50. Is dew point same as wet bulb?

- a) True

b) False

Answer: b

51. Statement 1: Dried food items have more fats, proteins and carbohydrates compared to their fresh counterparts.

Statement 2: Vitamins deterioration takes place in dried up food items.

a) True, False

b) True, True

c) False, False

d) False, True

Answer: b

52. What does the extent of deterioration of vitamins in dried up food items depend upon?

a) Caution exercised during the preparation of food by dehydration

b) Dehydration process selected and the care in its execution

c) Conditions of the dried food

d) All of the mentioned

Answer: d

53. Statement 1: High temperatures may affect proteins to a large extent.

Statement 2: Carbohydrate loss is the maximum in _____ and may lead to browning or caramelization.

a) True, Fish

b) True, Fruits

c) False, Meat

d) False, Milk

Answer: b

54. Statement 1: Enzyme reaction decrease with the decrease in moisture levels.

Statement 2: Enzymes get inactivated near the boiling point of water.

a) True, False

- b) True, True
- c) False, False
- d) False, True

Answer: b

45. Statement 1: Enzyme reaction is dependent of concentration on enzyme only and not substrate.

Statement 2: Do enzymes catalase and peroxidase show residual enzyme activity?

- a) True, False
- b) True, True
- c) False, False
- d) False, True

Answer: d

46. The interaction of _____ and _____ occurs during conventional dehydration of food.

- a) Amino acids and proteins
- b) Amino acids and reducing sugars
- c) Carboxylic acids and alcohols
- d) Alcohols and minerals

Answer: b

47. Which of the following is NOT a method of controlling enzymatic browning?

- a) Sulphuring of fruits
- b) Vacuum dehydration
- c) In-package desiccation
- d) None of the mentioned

Answer: d

48. Statement 1: _____ undergoes considerable drying on trees itself.

Statement 2: Which of the following is not lye peeled.

- a) Apple, potatoes
- b) Orange, carrots
- c) Pomegranate, beets
- d) Figs, none of the mentioned

Answer: d

49. _____ treatment of potatoes for dehydration offers a means to control heat damage during damage and to control browning.

- a) Magnesium chloride
- b) Sodium chloride
- c) Calcium chloride
- d) All of the mentioned

Answer: c

50. The glucose content in which of the following products needs to be reduced before fermentation/ enzyme treatment.

- a) Chocolate
- b) Milk
- c) Eggs
- d) Idli batter

Answer: c

61. Moisture content of a substance which exerts as equilibrium vapour pressure less than of the pure liquid at the same temperature is referred to as _____

- a) Bound moisture
- b) Unbound moisture
- c) Moisture
- d) Total Moisture

Answer: a

62. Moisture content of the solid which exerts an equilibrium vapour pressure equal to that of pure liquid at the given temperature is the _____

- a) Bound moisture
- b) Unbound moisture
- c) Moisture
- d) Total Moisture

Answer: b

63. The moisture content of solid in excess of the equilibrium moisture content is referred as _____

- a) Bound moisture
- b) Free moisture
- c) Moisture
- d) Total Moisture

Answer: b

64. During drying, only _____ can be evaporated, which depends upon the vapour concentration in the gas.

- a) Bound moisture
- b) Fixed moisture
- c) Free moisture
- d) Total Moisture

Answer: c

65. The moisture contents of solid when it is in equilibrium with given partial pressure of vapour in gas phase is called as _____

- a) Equilibrium moisture content
- b) Fixed moisture
- c) Free moisture
- d) Total Moisture

Answer: a

66. Dryers heated by dielectric, radiant or microwave energy are _____

- a) Adiabatic
- b) Non-Adiabatic
- c) Isobaric
- d) Isothermal

Answer: c

67. Agitated vacuum dryers are a subcategory of/ can be referred to as _____

- a) Batch – Type Dryers
- b) Continuous Dryers
- c) Drum Dryers
- d) Plate – type dryers

Answer: a

68. Which one of the following is not a batch dryer?

- a) Agitated vacuum dryer
- b) Tray dryer
- c) Rotary dryer
- d) Pan dryer

Answer: c

69. _____ involves the sublimation of water from ice under high vacuum at temperatures well below 0°C.

- a) Freeze-drying
- b) Flash drying
- c) Furnace drying
- d) Ice drying

Answer: a

70. Which one of the following is best suited for heat sensitive feed?

- a) Freeze-drying
- b) Flash drying
- c) Furnace drying
- d) Ice drying

Answer: a

71. The pasteurization process was named after _____

- a) Louis Pasteur
- b) Charles Chamberland
- c) Nicolas Appert
- d) Clarence Birdseye

Answer: a

72. Which of the following is called as cold pasteurization?

- a) Freeze drying
- b) Heating under low pressure
- c) Irradiation
- d) Heating at low temperature

Answer: c

73. Pasteurization processes are fully effective in destroying _____

- a) campylobacter
- b) thermus
- c) bacillus
- d) thermoplasma

Answer: a

75. A pasteurization process operates to _____ reductions of the target organism.

- a) 12 log

- b) 9 log
- c) 6 log
- d) 3 log

Answer: d

77. Vat Pasteurization is also known as _____

- a) batch pasteurization
- b) HTST pasteurization
- c) UHT pasteurization
- d) cold pasteurization

Answer: a

78. One pasteurization unit is the microorganism death that occurs in a product held at _____ for 1 minute for beer.

- a) 60°C
- b) 70°C
- c) 80°C
- d) 50°C

Answer: a

79. What is the pasteurization temperature of egg?

- a) 140F for 2 minutes
- b) 145F for 2 minutes
- c) 145F for 3 minutes
- d) 140F for 3 minutes

Answer: d

80. Both pasteurization and sterilization destroys the spores of the bacteria.

- a) True
- b) False

Answer: b

81. Pasteurization is the process of heating milk

- a) above 121 0C
- b) above the boiling point
- c) below boiling point
- d) above 1500C

Answer: c

82. The process of preserving food by rapid freezing followed by dehydration under vacuum is called

- a) Lyophilisation
- b) Sterilization
- c) Cold Dehydration
- d) Cryopreservation

Answer: b

83. What is the purpose for blanching (immersing food in hot water) vegetables during canning?

- a) to soften products to ll better
- b) to denature enzymes that change colour, texture
- c) to reduce microbial population
- d) All of the above

Answer: d

84. What is cryodesiccation?

- a) Freeze drying
- b) Cold pasteurization
- c) Irradiation
- d) Dehydration

Answer: a

85. During the primary drying phase in freeze drying, What is necessary to calculate amount of heat required?

- a) By using latent heat of sublimation
- b) By using latent heat of vapourization
- c) By using enthaply
- d) By using specific heat

Answer: a

86. Which of the following governs the process in secondary drying in freeze drying?

- a) Latent heat of sublimation
- b) Latent heat of vapourization
- c) Enthaply
- d) Adsorption isotherms

Answer: d

87. At what point the ice crystal formation takes place?

- a) When the material is cooled below itstriple point
- b) When the material is cooled below its freezing point
- c) When the material is cooled below its dew point
- d) When the material is cooled above its triple point

Answer: a

88. What is the main advantage of annealing?

- a) It is done to achieve largeice crystals
- b) It is done to achieve smallice crystals
- c) It is done to achieve microscopice crystals
- d) It is done to achieve mixture of large and small ice crystals all

Answer: a

89. Which of the following is known to result in the highest quality of foods amongst all drying techniques?

- a) Freeze drying
- b) Cold pasteurization
- c) Osmotic dehydration
- d) Evaporation

Answer: a

90. How long does freeze drying take?

- a) 10 to 40 hours
- b) 20 to 40 hours
- c) 30 to 50 hours
- d) 5 to 20 hours

Answer: c

91. What foods cannot be freeze dried?

- a) Foods with high fiber content
- b) Foods with high Vitamin B12 content
- c) Foods with high protein content
- d) Foods with high fat content

Answer: d

92. Who discovered freeze drying?

- a) Jacques-Arsened'Arsonval
- b) Charles Chamberland
- c) Willis Carrier
- d) Clarence Birdseye

Answer: a

93. _____ is added to fruits prior to freezing commercially to protect their quality.

- a) Vitamin C
- b) Ascorbic acid
- c) Water
- d) None of the mentioned

Answer: b

94. Why direct heating by hot air cannot be done in some cases?

- a) The material can degrade
- b) High temperature not required
- c) Low temperature not required
- d) Conduction gives best results

Answer: a

95. When are drum dryers used?

- a) When the material is too thick for spray dryer and too thin for rotary dryer
- b) When the material is too thick for rotary dryer and too thin for spray dryer
- c) When the material is not biodegradable
- d) When large crystal size is to be obtained

Answer: a

96. How is heating achieved in drum dryers?

- a) By heating the drums
- b) By conduction
- c) By passing steam through hollow screws
- d) By passing steam through the conveyer belt

Answer: c

97 What is the drum dryer called if it is open to the atmosphere?

- a) Open dryer

- b) Box dryer
- c) Trough dryer
- d) Trench dryer

Answer: c

98. Which materials are not used in drying in a freeze dryer?

- a) Seafood
- b) Fruits
- c) Pharmaceuticals
- d) Dyes

Answer: d

99. How the liquid does gets separated in freeze dryer?

- a) Boiling
- b) Distillation
- c) Freezing and crystallization
- d) Evaporation

Answer: c

100. Heat sensitive or easily oxidizable materials are dried by:

- a) Flash dryer
- b) Drum dryer
- c) Fluidized bed dryer
- d) Rotary dryer

Answer: a