Laxminarayan Institute of Technology, Nagpur

Question Bank

Special Tech -IV (Pulp and Paper Technology)

1. The water content of the wood determines not only the mechanical properties but also the of impregnation prior to chemical pulping. The moisture content in wood, M_{Cd}, is defined as the water in wood expressed as_____.
   A. (Mwc – Mdc)/Mdc
   B. Mwc/Mdc
   C. (Mwc – Mdc)/(1-Mdc)
   D. (1- Mwc)/Mdc
2. Which of the following reaction does not proceed with carbohydrates under Kraft condition?
   A. Deacetylation at T<70oC
   B. Ionization of phenolic group
   C. Peeling and stopping reaction
   D. Dissolution of hemicellulose
3. Effective alkali (EA) can be calculated as_____.
   A. NaOH+Na2S
   B. NaOH+Na2O
   C. 0.5 Na2S + NaOH
   D. 0.5 NaOH +Na2S
4. What is the degree of penetration and the density prior (300 °K) impregnation (373 °K) of aspen chips with 55% dry solids content (DS) and 0.37 t/ m3 dry density (qdc)?Impregnation takes place at 373 °K and increases the moisture content, MCw, to 0.65. The densities of water at 300 °K are 0.997 t/m3 and 0.959 t/m3, respectively.
   A. 54.3
   B. 45.61
   C. 39.9
   D. 29.42
5. Which of the following assumption is not true for the impregnation model for kraft pulping process?
   A. Chemical impregation follows Fick's first law of diffucion
   B. NaOH concentration in the impregnation solution remains constant
   C. The temperature is uniform throughout the sample
   D. No chemical reactions occur between the matrix and diffusing chemicals
6. The flow of liquid and associated chemicals into the air filled voids of the wood chips under the influence of hydrostatic pressure is called as_____.
   A. Penetration
   B. Diffusion
   C. Steam-filled cavities
   D. Capillary rise
7. Total pulping liquor mass/dry wood mass value gives _____.
   A. Liquor to wood ratio
   B. Wood to pulp ratio
   C. Delignification selectivity
   D. Defiberating

8. Chemical pulping method uses acid for the process.
   a) True
   b) False
9. To calculate the actual effect of hydroxy ions concentration on the delignification kinetics, the kinetic experiments are carried out by keeping the [HS–] concentration at a constant level, while evaluating the reaction kinetics at different levels of [OH–] concentrations. Following condition can be written as_____.
   A. k=k [OH–]
   B. k=k [OH–][H+]
   C. H=k [OH–]
   D. H=k [OH–][H+]
10. In peeling reaction take place in Kraft process, in this reaction the carbohydrates are degraded to form _____.
   A. Hydroxy carbonic acid
   B. Xyloisosaccharinic acid
   C. Glucoisosaccharinic acid
   D. Hexanuronic acid
11. The formation of stable carbon–carbon bonds between lignin units is normally referred to as_____.
   a. Condensation
   b. Nucleation
   c. Fragmentation
   d. Elimination
12. The delignification rate of the subsequent cooking phases increased, however, in the order soda < soda-AQ < kraft.
   a. True
   b. False
13. Which of the following statement is not correct in order to achieve the best cooking selectivity?
   A. The concentration of EA should be low initially and kept relatively uniform throughout the cook.
   B. The concentration of HS– should be as high as possible, especially during the initial delignification and the first part of the bulk delignification.
   C. The content of dissolved lignin and sodium ions in the pulping liquor should be kept high as much as possible during the course of the final bulk and residual delignification phases.
   D. The rate of polysaccharide depolymerization increases faster with rising temperature than the rate of delignification
14. The pulping yield for Kraft process can be calculated by_____.

   A. (Dry product mass out) (Dry product mass out)^-2 x 100

   B. (Dry product mass out) (Dry product mass in)^-1 x 100

   C. (Dry product mass out)^-1 (Dry product mass out) x 100

   D. (Dry product mass out)^-2 (Dry product mass out) x 100

   15. H-factor can be defined as _____.

   A. It is a pulping variable that combines ignition temperature and time into a single variable

   B. It is a pulping variable that combines cooking temperature and time into a single variable

C. It is a pulping variable that combines sublimation temperature and time into a single variable

D. It is a pulping variable that combines vaporization temperature and time into a single variable

16. Which one of the following reason behind the removal of lignin in washing system?

A. To reduce bleaching chemical demand

B. To increase bleaching chemical demand

C. To maintain constant bleaching chemical demand

D. To freeze bleaching chemical demand

17. The lower dilution factor pulp can be _____ the energy requirment of the multiple effect evaporator.

A. Increases

B. Decreases

C. Constant

D. Not depend on the dilution factor

18. The sum of all of the bases present in the white liquor that could be titrated with strong acid, is called as_____.

A. Total titratable alkali

B. Active alkali

C. Total chemical

D. Total alkali

19. In hydrocyclone system, the speed at which frequency of rotation matches the natural frequency is called_____.

A. Final speed

B. Optimum speed

C. Critical speed

D. Operating speed

20. Consider the wood having two main component such as Lignin and corbohydrates. Assuming an average wood composition of 36 % (density=1280 kg/m3) and 64 % (density= 1600 kg/m3)of lignin and carbohydrates respectively. Calculate the average density of the solid fraction?

A. 1530 kg/m3

B. 1610 kg/m3

C. 1485 kg/m3

D. 1670 kg/m3

21. The following is one of the method of assigning a numerical value to washing efficiency?

A. Kappa number

B. H-factor

C. Nordon number

D. Permagnate number

22. In hydrocyclone process, particles of a suspended material consequently have two opposing forces actiong on suspended particles. Which of the following property of the both fluid is not dependent for the magnitude of these forces?

A. Particle size

B. Density of the particle

C. Viscosity of the fluid

D. Capillary action of the fluid

23. Pressurized diffusor is also one of the type of _____.

A. Vaccum filter washer

B. Dispalcement washer

C. Belt type brown stock washer

D. Fourdriner brown stock washer

24. _____is the phenomenon that makes soluble substances accumulate at the solid– liquid interface on the surface of pulp fibers.

A. Sorption

B. Diffusion

C. Dewatering

D. Washing

25. The specifications and results from the E factor example have been: Discharge consistency = 13%; Pulp production capacity =40 odt/h; Wash liquor flow rate= 345 t/h; Liquor flow rate in pulp discharge = 268 t/h. Calculate dilition factor for the given data?

A. 2.67

B. 1.92

C. 1.58

D. 2.05

26. The capacity of multiple effect evaporator when compared with a single effect evaporator both operating with significant boiling point rise at the same terminal temperatures and surface area in each effect equal to surface area of single effect evaporator is_____.

A. Increase

B. Decrease

C. Reamin same

D. Double

27. A multiple effect evaporator as compared to a single effect evaporator of the same capacity has_____.

A. Lower heat transfer area

B. Lower steam economy

C. Higher economy

D. Higher solute concentration in the product

28. Steam economy of a multiple effect evaporator system is defined as_____.

A. kilogram of steam used per hour

B. kilogram of steam consumed in all the effects for each kilogram of steam fed

C. kilogram of steam used in all the effects for each kilogram of water vaporized per hour

D. kilogram of water vaporized from all the effects for each kilogram of steam fed to the first effect

29. A dilute aqueous solution is to be concentrated in an evaporator system. High pressure steam is available. Multiple effect evaporator system is employed because_____.

A. Total heat transfer area of all the effects is less than that in a single effect evaporator system

B. Total amount of vapour produced per kg of feed steam in a multi-effect system is much higher than in single effect

C. Boiling point elevation in a single effect system is much higher than that in any effect in a multi-effect system

D. Heat transfer coefficient in a single effect is much lower than that in any effect in a multi-effect system

30. Single effect evaporator has capacity to process 4000 kg of solid black liquor per day when it is concentrating from 10% to 25% solids. Calculate the water evaporated in kg per day?

A. 800

B. 24000

C. 48000

D. 60000

ANSWER: B

31. Pressurized diffusor is also one of the type of _____.

A. Vaccum filter washer

B. Dispalcement washer

C. Belt type brown stock washer

D. Fourdriner brown stock washer

32. It is possible to obtain very high energy efficiency with _____method by eliminating the latent heat losses.

A. Vapour compression evaporation

B. Flash-steam evaporation

C. Blow heat evaporation

D. Direct contact evaporation

33. In Kraft pulping process, prolonged coocking results in a gradual degradation of the carbohydrate chain which ultimetly results in _____.

A. Decraese in viscosity and in increase in yield

B. Decraese in viscosity and in decrease in yield

C. Increase in viscosity and in decrease in yield

D. Increase in viscosity and in increase in yield

34. The ratio of amount of solvent (water) vaporized per unit time is called as_____.

A. Capacity

B. Steam economy

C. Steam consumption

D. Vapor recompression

ANSWER: A

35. In Sulfite pulping process, _____as solution of sulfur dioxide in water and have two distinctive properties i.e. tendency to gas off and elusive acidity.

A. Thiosulfate

B. Acidum volatile

C. Sodium bisufite

D. Bound SO2

36. Acid sulfite process is carried out at_____pH.

A. 1.5 to 2

B. 2.5 to 4

C. 3 to 5

D. 11-12

37. Which compound or chemical is used as additives in pulping process to reduce the carbohydrate degradation?

A. Quadraquinone

B. Anthraquinone

C. Hydrogen peroxide

D. Chlorine dioxide

38. The Soda-AQ process, anthraquinone (AQ) might be utilized as a pulping additive to _____ the carbohydrate degradation.

A. Increase

B. Decrease

C. Maintain

D. Stop

39. The concentration of chemicals in sulfite pulping are noted on an SO2 basis.

a) True

b) False

40. Identify the decomposition reaction take place in calcium sulphite process.

A. 4CaSO3----> 3CaSO4+CaS

B. H2O+SO2----> SO2 aq

C. CaSO3---> CaO+SO2

D. Ca+2HSO3--->Ca (HSO3)2

41. The acid sulfite solution can be de-acidified by increasing _____.

A. Temperature

B. Pressure

C. Concentration of HSO3

D. Hydrogen ions

42. What is the main principle of green liquor clarifies?

A. Settling tank used to remove dregs by evaporation

B. Settling tank used to remove dregs by condensation

C. Settling tank used to remove dregs by metamorphism

D. Settling tank used to remove dregs by sedimentation

43. What is the full form of ESP in Recovery boiler?

a) Electrostatic precipitator

b) Electrostatic pressure

c) Emergency start procedure

d) Emergency shared procedure

44. What is cogeneration term used in recovery boiler?

a) Producing electricity from steam

b) Producing steam from electricity

c) Producing light from steam

d) Producing power from steam

45. Identify the correct statement: the net heating value of black liquor is negative when_____.

A. black liquor dry solids is below 20 %
B. Black liquor dry solid is highly concentrated
C. Increase in main steam temperature
D. Both A and B

46. At high concentration of green liquor the causticizing reaction is slightly_____.

A. Endothermic
B. Exothermic
C. Displacement
D. Double displacement

47. The temperature at which standard Gibbs free energy is zero for calcination reaction is called_____.

a) Absolute temperature
b) Negative temperature
c) Transition temperature
d) Thermal decomposition temperature

48. Black liquor heated at a temperature of 390 K and boiling point of water at a pressure in the vapor space is 373 K. Temperature of condensing steam is 423 K. Boiling point of elevation is 17 K. Calculate the driving force for heat transfer?

A. 5 K
B. 23 K
C. 17 K
D. 33 K

49. The vapours entering into the steam chest of respective effects ofa multiple effect evaporator are at their saturation temperature.

a) True
b) False

50. What is the molecular weight of Anthraquinone ?

A. 188
B. 208
C. 276
D. 302