TNPSC
Jr Analyst

Previous Year Paper
(Chemical Technology)
18 Feb, 2018

Sl. No. : [redacted]

JCCTP/18

Register Number | | | | | | | | | |

2018

CHEMICAL TECHNOLOGY
(PG Degree Standard)

Time Allowed : 3 Hours] **[Maximum Marks : 300**

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. The applicant will be supplied with Question Booklet 15 minutes before commencement of the examination.
2. This Question Booklet contains **200** questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there in series and ensure there are no blank pages in the question booklet. **In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.**
3. Answer **all** questions. **All** questions carry equal marks.
4. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
5. An answer sheet will be supplied to you, separately by the Room Invigilator to mark the answers.
6. You will also encode your Question Booklet Number with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, action will be taken as per commission's notification.
7. Each question comprises *four* responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. In the Answer Sheet there are **four** circles Ⓐ, Ⓑ, Ⓒ and Ⓓ against each question. To answer the questions you are to mark with Blue or Black ink Ball point pen ONLY ONE circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. *e.g.* If for any item, Ⓑ is the correct answer, you have to mark as follows :

   Ⓐ ● Ⓒ Ⓓ

9. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the time of examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
10. The sheet before the last page of the Question Booklet can be used for Rough Work.
11. Do not tick-mark or mark the answers in the Question Booklet.
12. Applicants have to write and shade the total number of answer fields left blank on the boxes provided at side 2 of OMR Answer Sheet. An extra time of 5 minutes will be given to specify the number of answer fields left blank.
13. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SEAL

SPACE FOR ROUGH WORK

1. pH of a solution is defined as

(A) $\log \frac{1}{[H^+]}$ (B) $\log[H^+]$

(C) $\frac{1}{\log[H^+]}$ (D) $-\frac{1}{\log[H^+]}$

2. Linde gas liquefaction process employs cooling

(A) by throttling (B) by expansion in an engine

(C) at constant pressure (D) at constant volume

3. One ton of refrigeration capacity is equivalent to heat removal rate of

(A) 12600 Btu/hr (B) 126 J/hr

(C) 12600 kJ/hr (D) 12600 kw

4. In an ideal solution, the activity of a component equals to its

(A) Mole fraction

(B) Fugacity at the same temperature and pressure

(C) Partial pressure

(D) Chemical potential

5. If a vapour behaves as an ideal gas, its fugacity coefficient ϕ_i^s

(A) equals to zero (B) equals to unity

(C) is always infinity (D) is negative

6. The expression for chemical potential is

(A) $\mu_i = \left(\frac{\partial U^t}{\partial n_i}\right)_{s,v,n_j \neq i}$ (B) $\mu_i' = \left(\frac{\partial V^t}{\partial n_i}\right)_{s,v,n_j \neq i}$

(C) $\mu_i = \left(\frac{\partial P}{\partial n_i}\right)_{s,v,n_j \neq i}$ (D) $\mu_i = \left(\frac{\partial T}{\partial n_i}\right)_{s,v,n_j \neq i}$

7. A limiting reactant is the one which decides the ———— is chemical reaction.

(A) equilibrium constant (B) rate constant

(C) conversion (D) order

8. Average molecular weight of air is

(A) 21 (B) 29

(C) 23 (D) 26

9. 1 torr is equivalent to

(A) 1 mm Hg (B) 1 Pascal

(C) 1 atm (D) 1 mm water column

10. The fugacity coefficient at 1 bar for a gas that follows the equation of state $P_V = RT(1-0.00513)P$, where P is pressure in bar is

(A) 0.975 (B) 0.995

(C) 0.950 (D) 0.8

11. Continuity equation for an incompressible fluid is

(A) $A_1V_1 = A_2V_2$ (B) $\rho_1A_1V_1 = \rho_2A_2V_2$

(C) $(A_1V_1)/\rho_1 = (A_2V_2)/\rho_2$ (D) $(\rho_1A_1)/V_1 = (\rho_2A_2)/V_2$

where V = velocity, ρ = density, A = area.

12. The fluid forces considered in the Navier-Stokes equation are

(A) gravity, velocity and viscous

(B) gravity, pressure and turbulent

(C) pressure, viscous and turbulent

(D) pressure, viscous and gravity

13. Which is not a reciprocating pump?

(A) Piston pump
(B) Plunger pump
(C) Diaphragm pump
(D) Centrifugal pump

14. Flow is called subsonic if Mach number is

(A) less than unity
(B) at or near unity
(C) less than 2100
(D) 4000 and above

15. The flow is proportional to the pressure drop and inversely proportional to the fluid viscosity. This statement is known as

(A) Henry's law
(B) Darcy's law
(C) Fick's law
(D) Kirchoff's law

16. The velocity of a very small compression-rare faction wave moving adiabatically and frictionlessly through the medium is

(A) Average velocity
(B) Absolute velocity
(C) Relative velocity
(D) Acoustical velocity

17. For a centrifugal pump, the net positive suction head is defined as

(A) $h_{vs} + h_{ps}$
(B) $h_{vd} + h_{pd}$
(C) $h_{vs} + h_{ps} - p_s$
(D) $h_{vd} + h_{pd} - p_d$

where, h_{vs} – velocity head at suction, h_{vd} – velocity head at discharge, h_{ps} – pressure head at suction, h_{pd} – pressure head at discharge, p_s – vapor pressure of liquid at suction temperature, p_d – vapor pressure of liquid at discharge temperature.

18. Filtration operation when carried out by continuous increase of the inlet pressure of slurry, is called

(A) constant rate filtration
(B) varying pressure filtration
(C) varying rate filtration
(D) constant pressure filtration

19. For flow through bed of solid particles at particle Reynolds numbers upto 1.0, the pressure drop per unit length of bed will be given by

(A) Hagen-Poisuille Equation
(B) Darcy's Equation
(C) Kozeny-Carman Equation
(D) Burke-Plummer Equation

20. The exit age distribution of fluid leaving a vessel is used to

(A) Study the reaction mechanism
(B) Study the extent of non-ideal flow in the vessel
(C) Determine the rate constant and order of reaction
(D) Determine the activation energy of the reaction

21. When the rate equation of a reaction corresponds to the Stoichiometry of the reaction, it is called as

(A) Stoichiometric reaction
(B) Elementary reaction
(C) Non elementary reaction
(D) Non Stoichiometric reaction

22. The heat equation for an adiabatic reaction, assuming complete conversion is

(A) $-\Delta H_{r_2} = C'_P \Delta T$
(B) $-\Delta H_{r_2} = C'_P / \Delta T$
(C) $-\Delta H_{r_1} - \Delta H_{r_2} = C'_P \ \Delta T$
(D) $-\Delta Hr_1 = \Delta Hr_2 + C'_P \Delta T$

Where

ΔH_{r_1} - heat of reaction of entering stream

ΔH_{r_2} - heat of reaction of leaving stream

C'_P - mean specific heat of unreacted feed stream

ΔT - temperature difference between entering and leaving streams

23. If $\frac{D}{uL} \to \infty$ in dispersion model, the flow tends to be

(A) Plug flow
(B) Mixed flow
(C) Both plug and mixed flow
(D) Stopped

24. Thermal conductivity is minimum for

(A) Water
(B) Air
(C) Petroleum coke
(D) Asphalt

25. Vaporizing a definite fraction of liquid in such a way that the evolved vapor is in equilibrium with the residual liquid, separating the vapor and condensing it is

(A) Evaporative distillation
(B) Flash distillation
(C) Rectification
(D) Recuperation

26. Capacity of an evaporator is defined as

(A) No. of kgs of solvent vaporised per kg of steam fed
(B) No. of kgs of solvent vaporised per hour
(C) No. of kg of steam consumed per hour
(D) No. of kg of steam consumed per kg of solvent

27. The ratio of momentum diffusivity to mass diffusivity is known as

(A) Schmidt number
(B) Sherwood number
(C) Prandtl number
(D) Mach number

28. Saturated gas is a gas in which

(A) Vapour is in equilibrium with liquid at the same gas temperature
(B) Vapour and liquid are at different temperatures
(C) Partial pressure of vapor is more than the vapor pressure of liquid
(D) Vapor pressure of liquid is more than partial pressure of vapor

29. Liquid A decomposes by first order Kinetics, and in a batch reactor 50% of A is converted in a 5 minute run. How much longer would it take to reach 75% conversion?

(A) 5 min
(B) 10 min
(C) 20 min
(D) 30 min

30. The E (t) for a pulse input of a Tracer to an ideal mixed flow reactor is ————. Where T is the mean residence time in the mixed flow reactor.

(A) $1-e^{-t/T}$
(B) $\frac{1}{T}e^{-t/T}$
(C) $e^{-t/T}$
(D) $Te^{-t/T}$

31. Mercury in glass thermometer is of

(A) Zero order
(B) First order
(C) Second order
(D) Third order

32. The final value of function $n(s)=\frac{1}{s(s^3+3s^2+3s+1)}$ is

(A) 0
(B) 1
(C) 2
(D) 3

33. The Laplace transform of a sine function is

$$f(t)=\begin{Bmatrix} 0 & t<0 \\ \sin kt & t>0 \end{Bmatrix} \text{is}$$

(A) $\frac{1}{s+a}$
(B) $\frac{1}{s^2}$
(C) $\frac{1}{s}$
(D) 1

34. 2ml urine sample was treated with reagent to generate a colour with phosphate, which was dilated to 100ml. To a second 2ml sample, 5ml of phosphate solution containing 0.0300 mg phosphate/ml was added, which was treated in same way. The observance of 1st was 0.428 and second was 0.538. Calculate the concentration is milligram of phosphate/mililiter of specima.

(A) 0.30 mg PO_4^{3-}/mL
(B) 0.292 mg PO_4^{3-}/mL
(C) 0.276 mg PO_4^{3-}/mL
(D) 0.254 mg PO_4^{3-}/mL

35. Express observance of .0510 in terms of transmittance.

(A) 87%
(B) 88.9%
(C) 86.9%
(D) 89.8%

36. Thermocouples is suitable for measuring

(A) Liquid temperatures only
(B) Very high temperature only
(C) Very low temperature only
(D) Both high and low temperatures

37. If molar absorptivity is 12,000 l/mol.cm, absorbance is .001 for 1 cm path length, the minimum molar concentration is ————.

(A) $1.10 \times 10^{-7} M$
(B) $1.20 \times 10^{-7} M$
(C) $1.20 \times 10^{-6} M$
(D) $1.20 \times 10^{-8} M$

38. The molecular weight of a given substance can be found using

(A) UV-Spectrometer
(B) Mass-Spectrometer
(C) X-ray Diffraction
(D) Nuclear Magnetic resonance spectroscopy

39. A digital computer programmed to perform the function of a process controller is a

(A) pneumatic control

(B) electronic control

(C) mixed control

(D) micro processor – based control

40. A zero $G(S)$ is any value of 'S' for which $G(S)$ equals

(A) zero

(B) one

(C) infinite

(D) finite

41. The catalyst used in the manufacture of sulphuric acid by contact process is

(A) Iron

(B) Aluminium oxide

(C) Nickel

(D) Vanadium pentoxide

42. Yellow glycerine is made into white, using

(A) activated carbon

(B) diatomaceous earth

(C) bauxite

(D) bentonite

43. Activity coefficient (γ_i) of a component 'i' in an ideal solution is ————————.

(A) 0

(B) 0.5

(C) 1

(D) ∞

44. What compound must be excluded from entry into absorber in the manufacture of nitric acid?

(A) bromides

(B) chlorides

(C) iodides

(D) nicotine

45. Oils and fats are converted to soap in a process called

(A) hydrogenation
(B) esterification
(C) saponification
(D) condensation

46. Mercury electrolytic cell produces

(A) 10 – 12% NaOH solution
(B) 50 – 70% NaOH solution
(C) 97 – 98.5% NaOH solution
(D) 20 – 25% NaOH solution

47. It is recommended as a mouthwash because of its oxidizing and cleansing effects

(A) sodium peroxide
(B) sodium perborate
(C) sodium amide
(D) sodium cyanide

48. It is employed for the diazotization of amines in making azo dyes

(A) Sodium amide
(B) Sodium sulfide
(C) Sodium nitrite
(D) Sodium silicates

49. Vat dyes were reduced into soluble form by using thin in particularly

(A) sodium peroxide
(B) sodium hydrosulfite
(C) sodium silicate
(D) sodium chloride

50. It is used in treating gold ore, in electroplating in the preparation of hydrocyanic acid and in making adiponitrile

(A) sodium peroxide
(B) sodium perborate
(C) sodium amide
(D) sodium cyanide

51. Bone Phosphate of Lime (BPL) is

(A) $POCl_3$ (B) PCl_3

(C) H_3PO_4 (D) $Ca_3(PO_4)_2$

52. Nitro phosphates are

(A) mixtures of Ammonium nitrate and various phosphates

(B) mixtures of Ammonium sulphate and various phosphates

(C) mixtures of super phosphate and urea

(D) mixtures of Ammonium sulphate and KCl

53. The P_2O_5 content of triple super phosphate is

(A) 16 – 20% P_2O_5 (B) 25 – 35% P_2O_5

(C) 42 – 50% P_2O_5 (D) 55 – 70% P_2O_5

54. What is nitro Lime?

(A) Ammonium sulfate nitrate

(B) Potassium sulphate

(C) Calcium Ammonium nitrate

(D) Ammonium phosphate

55. The principal source of cellulose for making paper is

(A) Wood

(B) Corn stalk

(C) Bhabbar grass

(D) Rough waste from textile industry

56. The characteristics of pulp by sulphate process is

(A) dull white colour

(B) easy to bleach

(C) less resistant to mechanical refining

(D) strong fibres

57. ———— pulp in a high – grade type of pulp and senes in the manufacture of some of the finest papers, including bond.

(A) Sulfite (B) Kraft

(C) NSSC (D) Lignin

58. Which one is not a thermosetting resin?

(A) Bakelite (B) Epoxy Resins

(C) Epon (D) Polyesters

59. This is not a sodium phosphate classification of structure

(A) Meta phosphate

(B) Ortho phosphate

(C) Penta chloro phosphate

(D) Poly phosphate

60. Which one is not a yield stimulators?

(A) Dinoseb

(B) Ethepon

(C) Glyphosine

(D) 2,4-dichlorophenoxy acetic acid

61. High temperature yields higher polychlorinated benzenes at

(A) higher chlorinated levels

(B) lower chlorinated levels

(C) any chlorinated level

(D) medium chlorinated level

62. Cellulose acetate are esters of

(A) Cellulose

(B) Regenerated cellulose

(C) Vinyl family

(D) Both (B) and (C)

63. SBR is widely used because of its

(A) low load bearing capacity

(B) low abrasion resistance

(C) high abrasion resistance

(D) poor susceptibility to oxidation

64. Nylon is

(A) a natural fibre

(B) a synthetic thermoplastic fibre

(C) a polymer fibre

(D) an addition copolymer fibre

65. Which of the following is a product of condensation polymerisation?

(A) polyolefins

(B) polyester resins

(C) vinyl resins

(D) vinyl alcohol resins

66. Carbon-chain polymers with only single bonds along the backbone are known as

(A) polyethylenes

(B) polyalkenylenes

(C) polyalkynylenes

(D) polyalkylenes

67. Insulin has upto ———— amino acid unit.

(A) 56
(B) 51
(C) 50
(D) 48

68. ———— is useful in Choriocarcinoma and Hodgkin's disease

(A) Ampicillin
(B) Velban
(C) Aldomet
(D) Prednisone

69. Hexylresorcinol is prepared by using resorcinol and

(A) Phenol
(B) Caproic acid
(C) Acetic acid
(D) Benzyl Chloride

70. ———— are organic compounds added to plastics to improve workability during fabrication.

(A) Catalyst
(B) Stabilizers
(C) Plasticizer
(D) Fillers

71. Condensation polymerisation is also known as

(A) Addition polymerisation
(B) Chain polymerisation
(C) Step-wise polymerisation
(D) Chain initiation polymerisation

72. The copolymer of isobutylene with about 2% isoprene is known as

(A) Silicone rubber
(B) Neoprene
(C) Butyl rubber
(D) Thiokol

73. Raw material for the manufacture of carbon black by oil furnace process is

(A) Natural gas

(B) Liquid aromatic hydrocarbons

(C) Furnace oil

(D) Petroleum

74. Activated carbon is regenerated using the process called

(A) Vapourisation

(B) Electrolytic

(C) Atomised suspension

(D) Electrothermic

75. Boiling water reactor and pressurised water reactor are

(A) Nuclear reactor

(B) Solar reactor

(C) Biogas reactor

(D) CSTR

76. Isotopes that are not fissile but are convertible to fissile materials are called

(A) Chain reaction

(B) Cornel's hump

(C) Fertile materials

(D) Moderators

77. An example for slurry explosive is

(A) Mercury fulminate

(B) Lead azide

(C) Tetrazine

(D) Ammonium nitrate mixture

78. Which one of the following adsorbents is preferred for adsorbing components from aqueous solutions and moist gases because of its poor affinity towards water?

(A) Activated alumina

(B) Activated carbon

(C) Silica gel

(D) Zeolites

79. Natural graphites are widely used in

(A) ink making
(B) pencil making
(C) plastic making
(D) glass making

80. Which of the following is not used in the military for explosions?

(A) Nitrocellulose
(B) TNT
(C) Nitroglycerine
(D) RDX

81. Stoneware is glazed between

(A) 1150 and 1200°C
(B) 1250 and 1300°C
(C) 1350 and 1400°C
(D) 1000 and 1050°C

82. Formula for gypsum is

(A) $CaSO_4$
(B) $CaSO_4 \cdot H_2O$
(C) $CaSO_4 \cdot 2H_2O$
(D) $CaSO_4 \cdot 4H_2O$

83. Choose the correct function of compound C_3A in portland cement

(A) Causes set but needs retardation
(B) Early strength
(C) Final strength
(D) Lower clinkering temperature

84. Iron effects the color of most glass adversely. The iron content should not exceed for optical glass is

(A) 0.0015 %
(B) 0.015%
(C) 0.15%
(D) 0.10%

85. ———————— is not used as raw material in producing portland cement.

(A) Calcareous
(B) Igneous
(C) Argillaceous
(D) Siliceous

86. The calcination reaction is

(A) reversible reaction
(B) irreversible reaction
(C) first order reaction
(D) elementary reaction

87. Plaster of Paris is obtained by heating

(A) limestone to 120 - 150°C
(B) Soda ash to 120 - 150°C
(C) dolomite to 120 - 150°C
(D) Gypsum to 120 - 150°C

88. ———————— is the most common type of ferroelectric and ferromagnetic ceramics.

(A) Vitreous enamel
(B) Frit
(C) Enamel glass
(D) Barium titanate

89. NiO dissolved in sodium-lead glass yields a

(A) Blue colour
(B) Brown colour
(C) Yellow colour
(D) Orange colour

90. ———————— is produced by growing non metallic crystals from nucleated silver particles developed from an original clear glass containing silver.

(A) Safety glass
(B) Opal glass
(C) Tempered glass
(D) Coated glass

91. Muscle tissue contains 55-80% of

(A) Protein
(B) Water
(C) Carbohydrates
(D) Fat

92. ———————— contain anthocyanin pigments.

(A) Banana
(B) Beet-root
(C) Grapes
(D) Potato

93. ———————— is an important sweetener used in confectionary industry.

(A) High fructose corn syrup
(B) Saccharin
(C) Aspartame
(D) Monellin

94. (a) Glucose and fructose are digestible readily in human metabolism

(b) Melibase and mannose either remain undigested or poorly absorbed in human metabolism

(A) both (a) and (b) are false
(B) (a) is false and (b) is true
(C) (a) is true and (b) is false
(D) both (a) and (b) are true

95. Lignoceric acid is present in

(A) Coconut oil
(B) Cotton seed oil
(C) Corn oil
(D) Linseed oil

96. Amino acid which has a sulphur like flavour

(A) L-tyracine
(B) L-methionine
(C) Valine
(D) Leucine

97. For a constant volume process, where U is internal energy

(A) $d_U = C_V \cdot d_T$ (B) $d_H = C_V \cdot d_T$

(C) $d_H = d_Q$ (D) $d_W = Pd_V$

98. _____ law state that the net heat evolved or absorbed in a chemical reaction is same whether the reaction takes place in a single step or in a series of steps.

(A) Kirchoff's law (B) Hess's law

(C) Kopp's rule (D) Lavaisier and laplace law

99. Which is the correct form of Maxwell's equation?

(A) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$ (B) $\left(\frac{\partial T}{\partial P}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$

(C) $\left(\frac{\partial T}{\partial V}\right)_S = \left(\frac{\partial S}{\partial V}\right)_T$ (D) $\left(\frac{\partial V}{\partial T}\right)_P = \left(\frac{\partial S}{\partial V}\right)_T$

100. Fugacity and pressure are numerically equal, when the gas is

(A) in ideal state (B) at high pressure

(C) at low temperature (D) in standard state

101. For a given mass of an ideal gas the product of pressure and volume is constant at constant temperature is given by

(A) Charles law (B) Boyle's law

(C) Amagat's law (D) Dalton's law

102. The ratio of quantity of a reactant present in the reactor feed of a recycling operation to the quantity of that same reactant entering the operation as fresh feed is known as

(A) Recycle ratio (B) Combined feed ratio

(C) By pass ratio (D) Purge ratio

103. The relation between equilibrium constant and standard free energy is

(A) $\Delta G^0 = -RT \ln k$ (B) $\Delta G^0 = RT \ln k$

(C) $\Delta G^0 = RP \ln k$ (D) $\Delta G^0 = -RV \ln k$

104. Pick out the Clausius-Clapeyron equation from the following

(A) $\frac{d \ln p^s}{dT} = \frac{\Delta H}{RT^2}$ (B) $\frac{d \ln p^s}{dT} = \frac{\Delta H}{RT}$

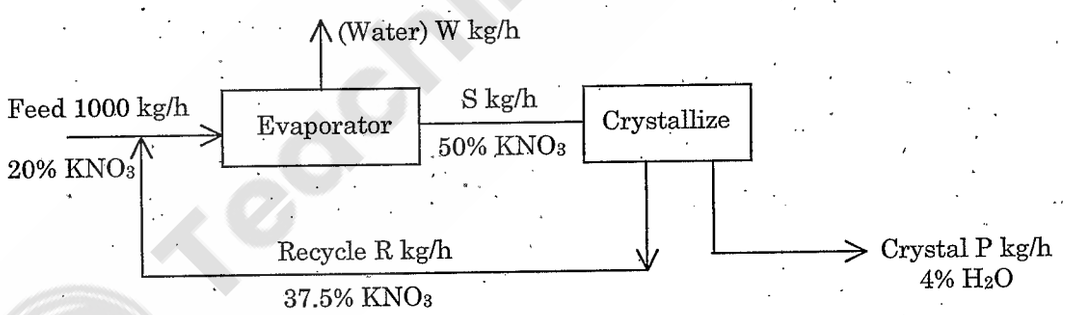
(C) $\frac{d \ln p^s}{dT} = \frac{\Delta S}{RT^2}$ (D) $\frac{d \ln p^s}{dT} = \frac{\Delta S}{RT}$

105. A gas mixture contain CO_2, CO, N_2, O_2 which partial pressures are 75, 50, 595, 26 mm Hg respectively. Calculate the composition of CO_2 in the mixture

(A) 0.101 (B) 0.067

(C) 0.797 (D) 0.035

106.



Calculate the value of R (Recycle).

(A) 766.6 kg (B) 730 kg

(C) 780 kg (D) 743 kg

107. Rich cow's milk (4536 kg/h) at 4.4°C is being heated in a heat exchanger to 54.4°C by hot water? The average heat capacity of cow's milk is 3.85 KJ/kg. K. How much heat is needed?

(A) 250.kw (B) 242.5 kw

(C) 248.5 kw (D) 251.5 kw

108. Critical speed of a ball mill is equal to

(A) $\frac{1}{4\pi}\cdot\sqrt{\frac{g}{R_1-R_2}}$

(B) $\frac{1}{2\pi}\cdot\sqrt{\frac{g}{R_1-R_2}}$

(C) $\frac{1}{\pi}\cdot\sqrt{\frac{g}{R_1-R_2}}$

(D) $\frac{1}{2\pi}\cdot\sqrt{\frac{R_1-R_2}{g}}$

R_1 – Radius of ball mill, R_2 – Radius of ball

109. For crushing of solids, the Rittinger's law states that the work required for crushing is proportional to

(A) the new surface created

(B) the size reduction ratio

(C) the change in volume due to crushing

(D) the compression ratio

110. Removal of solid particles from a fluid by passing the fluid through a septum on which the solids are deposited is known as

(A) Filtration

(B) Elutriation

(C) Thickening

(D) Clarification

111. $\frac{pV}{nRT}=1+\frac{B}{V/n}+\frac{C}{(V/n)^2}+\frac{D}{(V/n)^3}+\cdots$ is

(A) Virial equation

(B) Van der Wall equation

(C) Kelvin equation

(D) Kremser equation

112. The gross energy requirement in kilowatt hours per ton (2000 lb) of the product pass a 100 μm screen is known as

(A) Crushing efficiency

(B) Work index

(C) Power index

(D) Kick's law

113. When granular solids are piled up on a flat surface, the sides of the pile are at a definite reproducible angle with the horizontal, this angle is known as

(A) Contact angle
(B) Angle of nip
(C) Angle of repose
(D) Critical angle

114. Specific cake resistance for incompressible filter cakes is proportional to

(A) ΔP
(B) $\sqrt{\Delta P}$
(C) $1/\Delta P$
(D) independent of ΔP

115. Total drag on a body is the sum of

(A) Pressure drag and velocity drag
(B) Friction drag and velocity drag
(C) Friction drag and pressure drag
(D) Pressure drag, velocity drag and friction drag

116. The formation of vene contracts is noticed in which the following flow measuring device?

(A) Venturimeter
(B) Orifice meter
(C) Pitot tube
(D) Rota meter

117. The Navier-Stokes' equation is completely equivalent to

(A) Newton's law of viscosity
(B) Newton's law of motion
(C) Euler's equation of motion
(D) Hagen-Poisuille's equation

118. Thickness of turbulent boundary layer at a distance 'x' from the leading edge over a flat plate after turbulence is fully developed varies as

(A) $x^{4/5}$
(B) $x^{5/4}$
(C) $x^{2/5}$
(D) $x^{5/3}$

119. In a double pipe heat exchanger, the equivalent diameter is equal to

(A) flow area / wetted perimeter

(B) 4 × flow area / wetted perimeter

(C) wetted perimeter / flow area

(D) 4 × wetted perimeter / flow area

120. Multiple effect evaporators are used to

(A) increase the steam economy and decrease capacity

(B) increase the capacity and decrease steam economy

(C) increase both steam economy and capacity

(D) decrease both steam economy and capacity

121. The law which states that the boiling point of a given solution is a linear function of the boiling point of pure water at the same pressure is

(A) Newton's law

(B) Duhring's law

(C) Shank's law

(D) Nusselt's law

122. The ratio of the energy absorbed to the total incident energy is called

(A) Reflectivity

(B) Absorptivity

(C) Transmissivity

(D) Conductivity

123. Rotary driers are generally used for

(A) Drying fruits

(B) Drying free - flowing granular materials

(C) Drying pastes and slurries

(D) Making milk powder

124. The key factor in Nucleation is the

(A) Effect of particle size on solubility

(B) Effect of cluster formations

(C) Temperature

(D) Saturation pressure

125. If the overall mass transfer co-efficient is very sensitive to temperature changes

(A) Mass transfer with chemical reaction occurs

(B) The mass transfer is accompanied by evolution of heat

(C) The resistance on the two sides of the interface are approximately equal

(D) The mass transfer is likely to be liquid phase controlled

126. Extraction utilizes differences in the

(A) Relative volatilities of their components

(B) Vapor pressures of their components

(C) Solubilities of their components

(D) Boiling points of their components

127. The rate constant of a reaction depends

(A) Time

(B) Concentration of substance

(C) Temperature

(D) Mole fraction of substance

128. The isothermal gas phase reaction $A \rightarrow 3R$ with 50% inerts, how many times the final volume will change if conversion is 100%

(A) 3

(B) 1.5

(C) 2

(D) 2.5

129. Phase angle (ϕ) of the Sinusoidal response of first order system is given by

(A) $\phi = Tan^{-1}(-w\tau)$ (B) $\phi = Tan^{-1}(w\tau)$

(C) $\phi = Tanh^{-1}(-w\tau)$ (D) $\phi = Tanh^{-1}(w\tau)$

130. Damped Vibrator is an example of

(A) Zero order system (B) First order system

(C) Second order system (D) Third order system

131. With a damping coefficient more than 1, the second order response will be

(A) Oscillatory (B) Non oscillatory

(C) Critically damped (D) Overshoot

132. For a Second order system as radian frequency (w) increases, the value of phase angle $|\phi|$ asympotically approaches to

(A) 90° (B) 45°

(C) 60° (D) 180°

133. A pneumatic value always has some

(A) Phase lag (B) Static lag

(C) Overshoot (D) Dynamic lag

134. Control which is suitable, if no-offset and no oscillations is tolerable, is.

(A) Proportional control

(B) Proportional Integral control

(C) Proportional derivative control

(D) Proportional integral derivative control

135. Pick the wrong statement for Mass spectrometry

(A) It is used to determine elemental composition of matter

(B) It does not provide the structure and compositions of Solid surfaces

(C) Evaluate isotopic ratios of atoms in sample

(D) Used for qualitative and quantitative compositions of complex mixtures.

136. ———— groups have chelating properties towards certain metallic ions.

(A) Sulfonate groups

(B) Aminodiacetate

(C) Quaternary amino

(D) Carboxylate

137. In chromatography, displacement types pump is also known as

(A) Syringe pump

(B) Reciprocating pump

(C) Pneumatic pump

(D) Rotary pump

138. The maximum efficiency of a heat engine operating between a heat source at 100°C and sink at 0°C is

(A) 100%

(B) 73.2%

(C) 50%

(D) 26.8%

139. McLeod gauge issued to measure

(A) vacuum pressure

(B) temperature

(C) level

(D) flow

140. Micro computer based control systems which have the capability of communicating with other controllers through a network is called

(A) feed forward control

(B) feed back control

(C) distributed control

(D) stand alone control

141. In Tennessee this type of phosphate rocks are not found

(A) brown
(B) blue
(C) white
(D) yellow

142. Alkyl Benzene sulphonate (ABS) is a

(A) plasticiser
(B) coating ingredient
(C) lubricant
(D) detergent

143. Hydrophilic group of a soap or detergent solution is

(A) water hating
(B) water loving
(C) soil hating
(D) soil loving

144. Fat splitting catalyst is

(A) $CaCO_3$
(B) ZnO
(C) Al_2O_3
(D) Fe

145. In a reaction $2SO_2 + O_2 \rightleftharpoons 2SO_3$, the reverse reaction becomes appreciable at and above the temperature of

(A) 400°C
(B) 450°C
(C) 550°C
(D) 650°C

146. The most recent process for the manufacture of Sulphuric acid is

(A) Lead chamber process
(B) Frasch process
(C) Finnish process
(D) Double Contact Double Absorption (DCDA)

147. This is extensively employed in the leather industry as a depilatory

(A) Sodium Cyanide
(B) Sodium Nitrite
(C) Sodium Silicate
(D) Sodium Sulfide

148. Which chemical is widely used in the dyeing of denim with indigo?

(A) Sodium silicate
(B) Sodium peroxide
(C) Sodium hydrosulfite
(D) Sodium amide

149. 50% of thin salt is consumed in the country for the manufacture of Kraft pulp, 38% goes into the compounding of house hold detergents and the remainder for glass, dyes textile and medicine

(A) Sodium chloride
(B) Sodium silicate
(C) Sodium hydrosulfite
(D) Sodium sulfate

150. Which process is virtually obsolete for the production of sulfuric acid?

(A) Contact process
(B) Chamber process
(C) Partial or stage – wise combustion
(D) Arc process

151. Which is known as sevin insecticides?

(A) Carbophos
(B) Dimethoate
(C) P – Dichlorobenzene
(D) Carbaryl

152. $NH_2 . CO . NH_2$ is

(A) Urea
(B) Ammonium Carbamate
(C) Biuret
(D) Ammonium nitrate

153. In fertilizer the major component required for the development of starches of potatoes and grains is

(A) Nitrogen
(B) Phosphorus
(C) Potassium
(D) Carbon

154. The presence of sodium sulphate in pulp

(A) poor strength properties of paper
(B) make the pulp bleachability poor
(C) increase its flexibility and opacity of paper
(D) makes the pulp bleachability easier

155. Bleaching can be done for bamboo pulp by

(A) Alkali extraction process
(B) Nitration process
(C) Chlorination process
(D) Sulphonation process

156. The purpose of Hollander beater is

(A) Dissolving of fibres
(B) Sizing of fibres
(C) Rag pulping
(D) Fibrillation of fibres

157. Major constituent in white liquor is

(A) Silica
(B) Sodium carbonate
(C) Caustic soda
(D) Sodium sulphate

158. In four driner machine the paper enters the rolls with a moisture content of 60 to 70% and leaves them ———— to ———— dry.

(A) 90 to 94%
(B) 80 to 83%
(C) 74 to 80%
(D) 95 to 97%

159. ———— is the commercially important amino resin.

(A) Epoxy resin
(B) Urea formaldehyde
(C) Monoglyceride
(D) Polycarbonate

160. Type of paper used in the manufacture of news print paper is

(A) tissue paper
(B) ground wood paper
(C) wrapping paper
(D) paper board

161. Butadiene is a co-product of the steam cracking of petroleum in

(A) Acetalene manufacture
(B) Propylene manufacture
(C) Ethylene manufacture
(D) Styrene manufacture

162. Which one of the following statement is wrong?

(A) Yeast and bacteria are unicellular
(B) Molds multiply by vegetative growth
(C) Molds are multicellular
(D) Yeasts multiply by fission, bacteria by budding

163. Solubility of NH_3 in organic solvents when compared with water is

(A) very low
(B) low
(C) high
(D) same

164. Talc is used in plastics processing as

(A) plasticizers
(B) emulsifier
(C) fillers and reinforcements
(D) stabilizer

165. The type of resin used in the decorative and structural panels is

(A) Furanes
(B) Acrylics
(C) Polypropylene
(D) Polybutylene

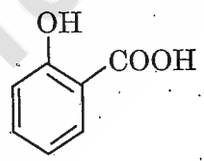
166. Propanolol is prepared from 1-naphthol and

(A) caproic acid
(B) epichlorohydrin
(C) resorcinol
(D) sodium phonalate

167. Riboflavin is also known as

(A) Vitamin B_1
(B) Vitamin B_2
(C) Vitamin B_6
(D) Vitamin B_{12}

168. Name the following structure



(A) salicyclic acid
(B) benzaic acid
(C) formic acid
(D) acetic acid

169. Insulin is isolated from ———— of beef or hogs.

(A) liver
(B) pancreas
(C) gall bladder
(D) kidney

170. ———— is used for grinding tungsten carbide tooling , glass and nonferrous metals

(A) Pyrolytic graphite
(B) Diamond
(C) Graphite
(D) Carbon fiber

171. ———— is produced by the thermal cracking of hydrocarbons such as, methane, propane and acetylene at reduced pressures.

(A) Artificial graphite
(B) Carbon black
(C) Pyrolytic graphite
(D) Carbon fibres

172. Monazite sand is a chief source of

(A) Uranium
(B) Thorium
(C) Radium
(D) Polonium

173. Destructive distillation of coal is the process of

(A) Heating coal in excess of air
(B) Heating coal with water
(C) Heating coal in absence of air
(D) Heating coal with carbondioxide

174. In low temperature Carbonisation, liquid products contain more

(A) Crude light oil
(B) Tar-acids, tar-bases
(C) Water
(D) Tar

175. ———— is root formed by the incomplete burning of carbonaceous solids or liquids

(A) Carbon fibre
(B) Lamp black
(C) Activated carbon
(D) Carbon black

176. An example of non-initiating high explosive

(A) Dynamite (B) Lead azide

(C) Mercury fulminate (D) Hydrazine

177. The end product of the distillation of coal tar is ————, usually more than 60% of the crude tar.

(A) Wash oil (B) Pitch

(C) Naphthalene oil (D) Right oil

178. ———— is the second most abundant material in coal tar

(A) Diphenyl (B) Pyrene

(C) Phenanthrene (D) Indole

179. ———— is an intimate mixture of KNO_3, sulphur and charcoal in the proportions of 75 : 15 : 10.

(A) Lampblack (B) Activated carbon

(C) Black powder (D) Dynamite

180. Low explosives are normally employed

(A) in mining (B) in demolition

(C) in military warheads (D) as propellants

181. Explosive power of an explosive is calculated by

(A) impact sensitivity test

(B) friction sensitivity test

(C) cylinder expansion test

(D) heat sensitivity test

182. The fluxes required to blend the particles of the refractories to maintain reduced vitrification are kept at

(A) Maximum
(B) Minimum
(C) Moderate
(D) No influence

183. The first reaction in the production of ceramic product is to drive off the water of hydrotion and this occurs at about

(A) 500 – 600°C
(B) 600 – 650°C
(C) 700 – 750°C
(D) 400 – 450°C

184. The chemical reactions which occur on heating clay is quite important. At about 1000°C, the alumina and silica combine to form

(A) γ - alumina
(B) β - alumina
(C) Mullite
(D) Cristobalite

185. Glost firing is the technical term for

(A) Crazing
(B) Glazing
(C) Firing of the glaze
(D) Vitrification

186. A fracturing or a flaking off, of a refractory brick, due to uneven heat stresses or compression caused by heat is known as

(A) Shivering
(B) Spalling
(C) Over glazing
(D) Crazing

187. ———————— dryers are used in drying of bricks.

(A) Spray
(B) Tunnel
(C) Rotary
(D) Vacuum

188. Sugar alcohols found in pears, apples and plums

(A) Sorbital
(B) Xylital
(C) Maetital
(D) Inositol

189. Most preferred starch for laundry purpose is

(A) Corn starch
(B) Wheat starch
(C) Cassava starch
(D) Rice starch

190. The usual range of over run in ice cream is from

(A) 50 to 60%
(B) 60 to 70%
(C) 70 to 100%
(D) 10 to 20%

191. Enzyme used in the preparation of cheese from milk is

(A) Aspertase
(B) Lactase
(C) Rennin
(D) Amylase

192. Betalains are

(A) Sugar
(B) Pigments
(C) Protein
(D) Fat

193. Anthocyanin pigments are not present in

(A) Grapes
(B) Berries
(C) Plums
(D) Banana

194. Humid volume is defined as the

(A) total volume of a unit mass of vapor-free gas and whatever vapor it may contain at 1 atm and the gas temperature

(B) total volume of water vapor in air

(C) total volume of moist gas present in air

(D) defined as humidity

195. Give an example of fluxing agent used in making ceramic products.

(A) Borax (B) Polyacrylonitrile

(C) Sodium hydrosulphite (D) Sodium sulphide

196. The sweetness index of B-D-fructose is

(A) 0.9 (B) 0.42

(C) 1 (D) 0.8

197. _____ is used as an emulsifier in confectionary.

(A) Margarine (B) Lecithin

(C) Casein (D) Butyric acid

198. _____ are used to stabilise fats and oil.

(A) Oxidants (B) Surface actino agent

(C) Stabilizers (D) Antioxidant

199. The important protein in whole milk is

(A) Lipovitellin (B) Globulins

(C) Casein (D) Prolamins

200. Over-ripening of fruits can be prevented by dipping in

(A) Ascorbic acid (B) Sodium sulphate

(C) Hydrogen peroxide (D) Sodium chloride

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