

PART 09 — CHEMISTRY, CHEMICAL ENGINEERING AND CERAMIC TECHNOLOGY

(Answer ALL questions)

76. How much work is done by 1 mol of a gas during a reversible non-flow isothermal expansion from an initial volume V_1 to a final volume V_2 when the equation of state is $P(V-b) = RT$, where b is a positive constant?
- $W = RT \ln \frac{V_2}{V_1}$
 - $W = RT \ln(V_2 - V_1)$
 - $W = RT \ln \frac{V_1 - b}{V_2 - b}$
 - $W = RT \ln \frac{V_2 - b}{V_1 - b}$
77. Clausius–Clapeyron equation is applicable in
- melting processes only
 - vaporization processes only
 - sublimation processes only
 - all of the above
78. Mollier chart is a
- pressure Vs enthalpy chart
 - pressure Vs volume chart
 - enthalpy Vs entropy chart
 - temperature Vs entropy chart
79. Which of the following factors control the deactivation of a porous catalyst pellet?
- decay reactions
 - pore diffusion
 - form of surface attack by poison
 - all of the above
80. Which of the following is an autocatalytic reaction?
- Photochemical reactions
 - Microbial fermentation reaction
 - Enzyme fermentation reaction
 - Ammonia synthesis reaction
81. Viscous heat sensitive liquids are concentrated in
- open pan evaporators
 - long tube vertical evaporators
 - agitated film evaporators
 - none of the above
82. In a boiling curve, the peak heat flux is called _____ point
- the melting
 - Leiden frost
 - the boiling
 - burn out
83. The binary diffusivity in gases and liquids vary respectively as
- $T^{3/2}$ and T
 - T and $T^{3/2}$
 - \sqrt{T} and $T^{3/2}$
 - $T^{3/2}$ and \sqrt{T}
84. In McCabe-Thiele method, at infinite reflux ratio
- the overhead product is minimum
 - both the operating lines coincide with diagonal
 - both (1) and (2)
 - neither (1) nor (2)
85. Peclet number (N_{Pe}) for mass transfer is defined as
- N_{Re}/N_{SC}
 - $N_{Re} \cdot N_{SC}$
 - N_{SC}/N_{Re}
 - $N_{Sh} \cdot N_{SC}$

86. Dynamic similarity is the similarity of
1. shapes
 2. streamline pattern
 3. forces influencing the fluid motion
 4. discharge
87. The pressure drop in laminar flow through pipe is equal to
1. $\frac{8\mu\bar{V}L}{g_c D^2}$
 2. $\frac{g_c D}{32\mu\bar{V}L}$
 3. $\frac{32\mu\bar{V}L}{\rho g_c D^2}$
 4. $\frac{32\mu\bar{V}L}{g_c D^2}$
88. The discharge through a sharp-crested rectangular weir is proportional to
1. H
 2. $H^{5/2}$
 3. $H^{3/2}$
 4. $H^{1/2}$
89. Turbulent flow generally occurs for cases involving
1. highly viscous fluid
 2. very narrow passages
 3. very slow motion
 4. none of the above
90. The continuity equation
1. represents the conservation of energy
 2. represents the conservation of mass
 3. represents the conservation of momentum
 4. none of the above
91. Which of the following impurities in feed water for high pressure boiler is most detrimental?
1. Silica
 2. Dissolved oxygen
 3. Suspended salt
 4. Dissolved salt
92. Catalytic oxidation of naphthalene produces
1. Styrene
 2. Phenol
 3. Phthalic anhydride
 4. None of the above
93. In a fuel cell
1. electrical energy is converted into chemical energy
 2. chemical energy is converted into electrical energy
 3. electrical energy is converted into mechanical energy
 4. mechanical energy is converted into electrical energy
94. Yeast cannot be used in the manufacture of
1. loaf of bread in bakeries
 2. penicillin
 3. wine
 4. all of the above
95. In Kraft process of paper manufacture, white cooking liquor consists of caustic soda
1. Sodium sulphide, Sodium carbonate
 2. Sodium sulphite, Sodium carbonate
 3. Sodium sulphite, Sodium sulphide
 4. None of the above
96. The optical component in IR is made up of
1. Nernst Glower
 2. Copper Chloride
 3. Sodium Chloride
 4. Pyro electric cell
97. Which one among the following compounds is IR active?
1. N_2
 2. O,
 3. CO,
 4. H_2

- Inter and Intra molecular hydrogen bonding can be distinguished by
1. vapourising the sample and eluting through a chromatographic column
 2. diluting the sample and recording IR spectra
 3. using C, H, N, O, S analyzer
 4. applying Beer-Lambert's law
99. The NMR signal for ethanol would be
1. a triplet, a doublet, a singlet
 2. two triplet, one doublet
 3. two triplet, one singlet
 4. two singlet, one triplet
100. Using GC-mass spectrophotometer, we can do
1. Structural determination
 2. Separation of compounds from mixture and identification
 3. Quantitative determination
 4. (2) and (3)
101. The material with least hardness is
1. talc
 2. zircon
 3. diamond
 4. carbon
102. Whiskers are
1. Monocrystalline
 2. Polycrystalline
 3. Nono-crystalline
 4. Noncrystalline
103. Rice hulls are used to produce _____ whiskers
1. Carbon
 2. SiC
 3. Cellulose
 4. SiO₂
104. The material used as a dehumidifying and dehydrating agent is
1. Hydro gel
 2. Ionic gel
 3. Silica gel
 4. Alumina gel
105. Ceramic materials generally have an extremely low value of
1. elastic modulus
 2. hardness
 3. strength
 4. fracture toughness
106. The strength is highest for a
1. glass-ceramic
 2. annealed glass
 3. glass fiber
 4. tempered glass
107. Glass which is completely soluble in water is
1. Sodium Silicate
 2. Borosilicate
 3. Vitreous Silica
 4. None of the above
108. The prescribed cooling rate for a fiber of 0.065 cm diameter with 1000 g of suspended load as per ASTM is
1. 0.4° C/sec
 2. 4° C/sec
 3. 0.4° C/min
 4. 4.0° C/min
109. The operating temperature of rotary kiln for cement making is
1. 1700 – 1800° C
 2. 900 – 1000° C
 3. 1400 – 1500° C
 4. 700 – 800° C
110. Ring formation inside a rotary kiln occurs in
1. steaming zone
 2. transition zone
 3. sintering zone
 4. cooling zone

111. Which of the following characteristic is not represented by graphite refractories?
1. High resistance to corrosion action of slag and bases
 2. They do not allow the heat to pass through them
 3. Closure texture
 4. Excellent refractory material and can be used under neutral or reducing conditions
112. Periclase refractory contains mainly
1. CaO
 2. Al_2O_3
 3. MgO
 4. SiO_2
113. Heat conduction of a fired brick when compared to unfired brick is
1. high
 2. low
 3. similar
 4. none of the above
114. Point out the wrong statement in addition polymerisation
1. The presence of one or more double bonds in monomers and generally only one monomer is used
 2. Monomer units simply add to one another
 3. Small molecules such as H_2O , HCl , CO_2 are evolved during reaction
 4. Process is faster than condensation polymerisation
115. An injection molding machine may be a
1. plunger type
 2. piston type preplasticating
 3. reciprocating screw
 4. any one of above
116. The sequence of various steps involved in galvanising process is
1. preliminary treatment, pickling, zinc bath treatment and annealing respectively
 2. pickling, preliminary treatment, zinc bath treatment and annealing respectively
 3. preliminary treatment, pickling, annealing and zinc bath treatment
 4. annealing, pickling, preliminary treatment and zinc bath treatment respectively
117. Strong electrolytes are those which
1. dissolve readily in water
 2. dissolve readily in organic solvents
 3. completely dissociate into ions at all concentrations
 4. pass electricity
118. According to Debye-Bueche theory, the viscosity of a polymer solution or melts is proportional to
1. concentration
 2. molecular weight
 3. both (1) and (2)
 4. none of the above
119. Hydrogen bonding is maximum in
1. ethanol
 2. diethyl ether
 3. ethyl chloride
 4. trimethylamine
120. Which of the following compounds is oxidised to prepare methyl ethyl ketone?
1. Propanol-2
 2. Butanol-1
 3. 2-butanol
 4. t-butyl alcohol
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