

## CHEMICAL ENGINEERING PREVIOUS PAPERS

1. Dilute sulfuric acid is handled in vessels made of: (GATE-1989-9.i.a)

- (a) Stainless steel
- (b) Brass
- (c) Lead
- (d) Cast iron

Ans:c

2 ACSR (Aluminium Conductor Steel Reinforced) are used as

- (A) over head transmission lines.
- (B) superconductors.
- (C) fuse
- (D) underground cables.

Ans: A

2. At steady state, the temperature variation in a plane wall, made of two different solids

I and II is shown below:

Then, the thermal conductivity of material I

- (a) is smaller than that of II
- (b) is greater than that of II
- (c) is equal to that of II
- (d) can be greater than or smaller than that of II

Ans:A

3.Brass is an alloy of

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(A) copper and zinc.

(B) copper and iron.

(C) copper and Aluminum.

(D) copper and tin.

Ans: A

4. A gaseous reaction  $A \rightarrow 2B + C$  takes place isothermally in a constant pressure reactor. Starting with a gaseous mixture containing 50% A (rest inerts), the ratio of final to initial volume is found to be 1.6. The percentage conversion of A is (GATE-1992-2.c)

(a) 30

(b) 50

(c) 60

(d) 74

Ans:C

5. Property of material which allows it to be drawn out into wires is

(A) Ductility.

(B) Solder ability.

(C) Super conductivity.

(D) Malleability.

Ans: A

6. In n type semi conductor added impurity is

(A) pentavalent.

(B) divalent.

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(C) tetravalent.

(D) trivalent.

Ans: A

7. Air enters an adiabatic compressor at 300 K. The exit temperature for a compression ratio of 3, assuming air to be an ideal gas ( $\gamma = C_P / C_V = 7/5$ ) and the process to be reversible, is

(A)  $300(3^{2/7})$

(B)  $300(3^{3/5})$

(C)  $300(3^{3/7})$

(D)  $300(3^{5/7})$

Answer: (a) For reversible adiabatic process  $PV = \text{constant}$ .

8. Phenol and Formaldehyde are polymerised to a resultant product known as

(A) PVC.

(B) bakelite.

(C) polyester.

(D) teflon.

Ans: B

9. The percentage of carbon in mild steel is

(A) 0.08 to 0.3 %

(B) 0.5 to 1.4 %

(D) 2.35 %

(D) 0.5 %

Ans: A

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10. A rotameter, through which air at room temperature and atmospheric pressure is flowing, gives a certain reading for a flow rate of 100 cc/s. If helium (Molecular weight 4) is used and the rotameter shows the same reading, the flow rate is (GATE-1996-2.02)

- (A) 26 cc/s
- (B) 42 cc/s
- (C) 269 cc/s
- (D) 325 cc/s

Answer: (C)

11. Crystal size in a continuous crystalliser depends upon the

- A. rate of heat transfer.
- B. degree of turbulence.
- C. degree of supersaturation.
- D. all (a), (b) and (c).

Ans:D

12. When vaporisation takes place directly at the heating surface, it is called

- A. film boiling
- B. nucleate boiling
- C. vapour binding
- D. none of these

Ans:B

13. Fourier's law applies to the heat transfer by

- A. convection

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B. radiation

C. conduction

D. all (a), (b) & (c)

Ans:C

14. Convective heat transfer coefficient in case of fluid flowing in tubes is not affected by the tube length/diameter ratio, if the flow is in the \_\_\_\_\_ zone.

A. laminar

B. transition

C. both 'a' & 'b'

D. highly turbulent

Ans:D

15. In a solution containing 0.30 Kg mole of solute and 600 kg of solvent, the molality is

A. 0.50

B. 0.60

C. 2

D. 1

Ans:A

16. In batch distillation with constant reflux, overhead product composition \_\_\_\_\_ with time.

A. increases

B. decreases

C. does not vary

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D.may increase on decrease, depends on the system

Ans:B

17. Which of the following plays an important role in problems of simultaneous heat and mass transfer ?

A. Lewis number

B. Schmidt number

C. Prandtl number

D. Sherwood number

18. Which of the following process sequences is correct for melt blown process?

A) preparation, extrusion, quenching, attenuation, lay-down, winding.

B) preparation, extrusion, drawing, attenuation, lay-down, winding.

C) preparation, extrusion, quenching, lay-down, attenuation, winding.

D) preparation, quenching, extrusion, attenuation, lay-down, winding

19. Which of the following bonding methods is generally following in spunbond process?

A) Needle punching

B) Thermal calendar bonding

C) Chemical bonding

D) Hydroentanglement

20. Which of the following polymers is least likely to be optically transparent

A. Atactic polystyrene

B. Isotactic polystyrene

C. An ethylene/propylene random copolymer (50/50 composition)

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D. A styrene/butadiene random copolymer

21. Styrene is almost a unique monomer, in that it can be polymerized by practically all methods of chain polymerization.

A. Free radical

B. Anionic

C. Cationic

D. Co-ordination (i.e., with a catalyst)

22. What method would you use to synthesize a triblock copolymer?

A) Free radical polymerization

B) Anionic polymerization

C) Using a Ziegler Natta catalyst

D) By putting it into a bloody great pot and spitting on it to initiate polymerization

E) Condensation polymerization

23. In emulsion polymerization, the principal place where the monomer polymerizes is

A) Monomer droplets

B) Aqueous phase

C) Surfactant micelles

D) Surface of reactor

E) Air-liquid interface

24. Polypropylene produced commercially using a Ziegler-Natta catalyst is predominantly

A) Atactic

B) Isotactic

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C) Syndiotactic

25. Which pairs of monomers would you use to make an ethylene/propylene random copolymer?

26. The Tromsdorff effect is

- A. When the Swedish Bikini team drops from the sky with cases of Old Milwaukee beer.
- B. When the rate of initiation increases as the nature of the polymerization mass (i.e. all the stuff in the pot) changes from the initial conditions
- C. When the rate constant for propagation,  $k_p$ , increases due to an increase in viscosity of the reaction mass
- D. When the rate constant for termination decreases due to the same increase in viscosity.

27. The pressure of 20g of an ideal monatomic gas is tripled while the volume is halved. What happens to the internal energy?

- a) It stays the same
- b) Increases
- c) Decreases
- d) Indeterminate

28. Area on a p-v diagram has units associated with

- a) energy,
- b) momentum
- c) temperature
- d) change in temp

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29) The Pressure inside a commercial airliner is maintained at 1 atm( $10^5$  Pa). What is the net outward force exerted on a 1m x 2m cabin door if outside pressure is equal to .30 atm?

- a) 140,
- b) 1,400,
- c) 14,000
- d) 140,000

30. A system acted on by surroundings receives 50J of heat while doing 20J of work. What is the net change of internal energy?

- a) 70
- b) 30
- c) 0
- d) -30