Chemical

1. Metal cutting by oxy-acetylene flame is accomplished by the _____ of the metal.
(A) Burning
(B) Intensive oxidation
(C) Evaporation
(D) None of these

2. The only suitable method for hardening the low carbon steel is case hardening. Which of the following is a case hardening process?
(A) Cyaniding
(B) Sherardizing
(C) Spheroidising
(D) None of these

3. Filler material used in welding should have _____ as compared to the parent metal to be welded.
(A) Lower melting temperature
(B) Same melting temperature
(C) Same composition
(D) Both 'b' & 'c'

4. The temperature at which the magnetic property of iron disappears (i.e., it becomes non-magnetic) and its electrical conductivity & specific heat also changes, is called the 'Curie point', which is _____ °C.
(A) 768
(B) 908
(C) 1400
(D) 1539

5. About _____ ton of coke is required in a cupola to produce one ton of casting.
(A) 0.03
(B) 0.3
(C) 0.8
(D) 1.5

6. Pick out the wrong statement.
(A) A closed system does not permit exchange of mass with its surroundings but may permit exchange of energy
(B) An open system permits exchange of both mass and energy with its surroundings
(C) The term microstate is used to characterise an individual, whereas macro-state is used to designate a group of micro-states with common characteristics
(D) None of the above

7. Which of the following is an undesirable characteristic of a refrigerant?
(A) It should be non-explosive
(B) It should have a sub-atmospheric vapor pressure at the temperature in refrigerator coils
(C) Its vapor pressure at the condenser temperature should be very high
(D) None of these

8. Work done may be calculated by the expression ∫ p dA for _____ processes.
(A) Non-flow reversible
(B) Adiabatic
(C) Both (a) and (b)
(D) Neither (a) nor (b)

9. Sound waves propagation in air exemplifies an _____ process.
(A) Adiabatic
(B) Isothermal
(C) Isometric
(D) None of these

10. In case of staged packed bed reactors carrying out exothermic reaction, use
(A) High recycle for pure gas
(B) Plug flow for dilute liquid requiring no large preheating of feed
(C) Cold shot operations for a dilute solution requiring large preheating to bring the stream upto the reaction temperature
(D) All (a), (b) and (c)

11. The performance equations for constant density systems are identical for
(A) P.F.R. and backmix reactor
(B) P.F.R. and batch reactor
(C) P.F.R. batch reactor and backmix reactor
(D) Batch reactor and backmix reactor

12. The equilibrium constant of chemical reaction _____ in the presence of catalyst.
(A) Increases
(B) Decreases
(C) Remain unaffected
(D) Can either increase or decrease (depends on the type of catalyst)

13. Study of chemical kinetics is the easiest in the case of _____ reactions.
(A) Irreversible
(B) Reversible
(C) Surface
(D) Side

14. With increase in temperature, the equilibrium conversion of a reversible exothermic reaction
(A) Decreases
(B) Increases
(C) Remain unaffected
(D) Decreases linearly with temperature

15. Sodium tri poly phosphate (STPP) is chemically represented as
(A) $Na_5P_3O_{10}$
(B) $Na_4P_3O_8$
(C) $Na_3P_4O_6$
(D) Na_2PO_4

16. Which of the following does not come under the category of 'micro-nutrient' for plant growth?
(A) Chlorine
(B) Iron
(C) Boron
(D) Carbon

17. Raw materials for nitric acid manufacture are
(A) Hydrogen peroxide, air and water
(B) Anhydrous ammonia and air
(C) Anhydrous ammonia, air and water
(D) Wet ammonia, air and water

18. $H_4P_2O_7$ is the chemical formula of _____ phosphoric acid.
(A) Pyro
(B) Ortho
(C) Meta
(D) None of these

19. Plant tranquillisers
(A) Hold back stem growth and halt plants at a desired height
(B) Cause early maturation of plants
(C) Accelerate ripening of food and grain
(D) Produce seedless fruit

20. Boiling of water containing temporary hardness produces
(A) CO_2
(B) $CaSO_4$
(C) $CaHCO_3$
(D) None of these

21. Fourdrinier machine is used in the manufacture of
(A) Nylon-6
(B) Paper
(C) Antibiotics
(D) Sugar

22. $Na_2CO_3.10H_2O$ is called
(A) Washing soda
(B) Soda ash
(C) Slaked lime
(D) Quicklime

23. Fire clay is _____ refractory material.
(A) A basic
(B) An acidic
(C) A neutral
(D) Not a

24. Bisphenol A is produced by the condensation of acetone with
(A) Formaldehyde
(B) Ethyl alcohol
(C) Diethyl ether
(D) Phenol

25. A centrifugal pump designed for handling water (μ = 1 cp) will deliver _____ when pumping a thicker oil (μ = 30 cp).
(A) Less head & less capacity
(B) More head
(C) More capacity
(D) Less head & more capacity

26. Delivery of insufficient quantity of liquid by a pump may be caused by
(A) Air leak in the inlet
(B) Low rpm
(C) Too high a lift
(D) All (a), (b) and (c)

27. Two fluids are flowing through two similar pipes of the same diameter. The Reynold's number is same. For the same flow rate if the viscosity of a fluid is reduced to half the value of the first fluid, the pressure drop will
(A) Increase

(B) Decrease
(C) Remain unchanged
(D) Data insufficient to predict relative pressure drop

28. In case of unsteady fluid flow, conditions & flow pattern change with the passage of time at a position in a flow situation. Which of the following is an example of unsteady flow?
(A) Discharge of water by a centrifugal pump being run at a constant rpm
(B) Water flow in the suction and discharge pipe of a reciprocating pump
(C) Water discharge from a vertical vessel in which constant level is maintained
(D) Low velocity flow of a highly viscous liquid through a hydraulically smooth pipe

29. Stoke's equation is valid in the Reynolds number range
(A) 0.01 to 0.1
(B) 0.1 to 2
(C) 2 to 10
(D) 10 to 100

30. Pick out the wrong statement.
(A) The value of hydrostatic head increases with increase in vacuum in the effect in a multiple effect evaporator system
(B) Entering velocity of the liquid in the tubes of natural circulation evaporators is in the range of 0.3 to 0.9 metre/second
(C) Duhring's plot is used for calculating the concentration of solution
(D) In a multiple effect evaporation system, the number of effects is limited by the total boiling point rise

31. In a shell and tube heat exchanger,
(A) The temperature drops in the two fluids and the wall are proportional to individual resistances
(B) The temperature drop is inversely proportional to the resistance across which the drop occurs
(C) There is no relationship between temperature drop and resistance
(D) The relationship is not generalised

32. ($NGr \times NPr$) is called the _____ number.
(A) Graetz
(B) Rayleigh
(C) Nusselt
(D) Stanton

33. Which of the following has maximum thermal conductivity at the same temperature?
(A) Steel

(B) Petrol
(C) Air
(D) All have the same conductivity

34. A concentric double pipe heat exchanger as compared to the shell and tube heat exchanger for the same heat load requires
(A) Less heating surface
(B) More space
(C) Lower maintenance cost
(D) None of these

35. Which of the following psychrometric processes is followed by water vapour laden unsaturated air, when it is passed through solid or liquid adsorbent?
(A) Cooling and dehumidification
(B) Heating and dehumidification at almost constant wet bulb temperature
(C) Dehumidification with dry bulb temperature remaining constant
(D) None of these

36. Heat sensitive materials like certain pharmaceuticals and food stuffs can be dried in a/an _____ dryer.
(A) Indirect tray
(B) Spray
(C) Freeze
(D) None of these

37. According to the Fenske equation, what will be the minimum number of plates required in a distillation column to separate an equimolar binary mixture of components A and B into an overhead fraction containing 99 mol% A and a bottom fraction containing 98 mol% B ? Assume that relative volatility ($\alpha AB = 2$) does not change appreciably in the column.
(A) 5
(B) 9
(C) 12
(D) 28

38. With increase in the mass velocity of the gas, the rate of drying during the constant rate period _____, if the conduction and radiation through the solid are negligible.
(A) Increases
(B) Decreases
(C) Remain same
(D) Increases linearly

39. During the constant rate period of drying of a solid,

(A) Increased air humidity decreases the rate of drying

(B) Increasing the air temperature decreases the drying rate

(C) Surface evaporation of unbound moisture occurs

(D) None of these

40. What is the major constituents of waste/polluted water discharged from textile, pulp & paper, tanning, distillery, dairy and meat packing industries?

(A) Radioactive substances

(B) Natural organic products

(C) Inorganic pollutants

(D) None of these

41. Coal mines drainage waste water (acidic in nature) results from the earth's water percolating through the voids created in coal bed during mining. This polluted water which either drains out naturally to water courses or are removed before starting the mining is

(A) Neutralized by alkali treatment

(B) Left as such without any treatment

(C) Diluted with fresh water to reduce its acidity

(D) None of these

42. If carbon monoxide content in atmospheric air exceeds _____ ppm, death is bound to occur.

(A) 50

(B) 500

(C) 1000

(D) 3000 (i.e. 0.3%)

43. Ringelmann chart is used for the measurement of the

(A) Combustibles present in automobile exhaust

(B) Smoke density from a chimney

(C) Exhaust gas density

(D) Flue gas temperature

44. The permissible color for domestic water supply is _____ ppm.

(A) 1

(B) 20

(C) 100

(D) 1000