Questions 1 Through 5

a- **Positive solubility - temperature relationship.**

b- **Negative solubility - temperature relationship.**

c- **Zero solubility - temperature relationship.**

Assign One of the above to each of the following:

1. Anhydrous sodium sulphate B
2. Calcium acetate dihydrate B
3. Potassium nitrate a
4. Ferrous sulphate tetrahydrate. a
5. Anhydrous disodium monohydrogen phosphate. b

Questions 6 Through 10 (T/F) True = a False = b. (This applies for all T/F type questions)

The following are Deliquescent materials:

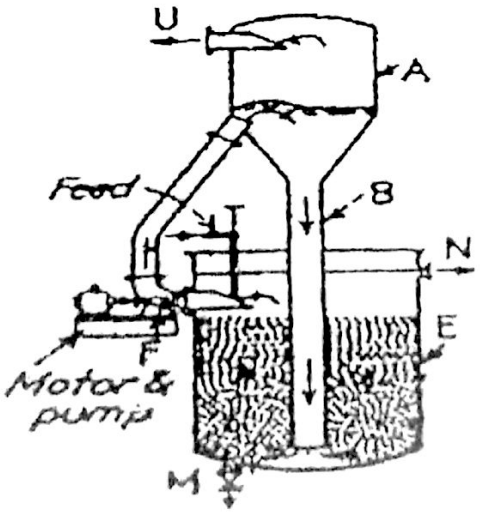
6. Borax b
7. Potassium hydroxide. a
8. Exsiccated sodium sulphate. b
9. Trichloroacetic acid. a
10. Glycerin. b

Questions 11 through 20 (Powder Mixing) (T/F) :

11. Powder mixing is Positive type of mixing. b
12. Scale of scrutiny decreases as the potency of the powder increases. a
13. The number of samples withdrawn to evaluate efficiency of powder mixing is dependent on sensitivity of method of analysis. a
14. Agitator mixers involve Diffusive and convective mechanisms. b
15. Sigma blade mixer is an example for tumbling mixers. b
16. Narrow range particle size is required to achieve optimum mixing of powders. a
17. The ideal shape for mixing of solid particles is the spherical shape. a
18. The ideal proportions for powder mixing of two materials is (50:50). a
19. Micronization of charged particles will decrease the efficiency of powder mixing. a
20. Over filling of mixing equipment for powders will inhibit mixing. a

Questions 21 through 25:

Look at the following sketch then answer the questions below:



21. This equipment is termed Oslo evaporative crystallizer. b
22. It acts by adiabatic evaporation and cooling. a
23. It acts as crystallizer and classifier in one process. a
24. It is used in common salt industry. b
25. It is suitable for crystallization of sodium thiosulphate. a

Questions 26 through 30 (T/F):

The following are isomorphous substances:

26. $Cu\ So_4 . 5\ H_2O$ and $Zn\ SO_4 . 5\ H_2O$ b
27. $Na_2\ HPO_4 . 12\ H_2O$ and $Na_2\ H\ ASO_4 . 12\ H_2O$. a
28. $Na_2\ H\ PO_4 . 12\ H_2O$ and $Na\ H_2\ PO_4 . 12\ H_2O$ b
29. Chloramphenical palmitate A and B. b
30. $Mg\ SO_4 . 7\ H_2O$ and $Zn\ SO_4 . 7\ H_2O$. a

Questions 31 through 35:

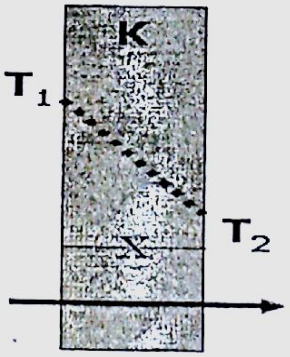
Oslo crystallizers are characterized by the following (T/F) :

31. The product is obtained from the bottom. a
32. The nucleation is created in one zone and released in another one. a
33. The crystal size of the product increases as the pump flow rate decreases. b
34. The production capacity increases as the feed concentration increases. a
35. They are batch type crystallizers. b

Questions 36 Through 40 (Liquid Mixing) (T/F) :

36. Turbine mixer is suitable for syrup mixing. a
37. Excessive tangential force will produce vortex. a
38. Excessive longitudinal force will result in stratification. a
39. Oscillating movement mixers are represented by shaker mixers. a
40. D/d ratio of 10 is required for high viscous liquids. b

Questions 41-45 can be answered using the following diagram which shows the process of heat transfer through plane wall.



41- The rate of heat transfer across the above wall can be increased by increasing its ....
a- surface area b- thermal conductivity coefficient c- thickness
(d) both a and b

42- If this wall is separating between hot liquid and cold liquid, the heat is transferred through the hot liquid by .....
a- radiation b- conduction (d) convection

43- Heat is transferred through the wall itself by .....
a- radiation (b) conduction d- convection

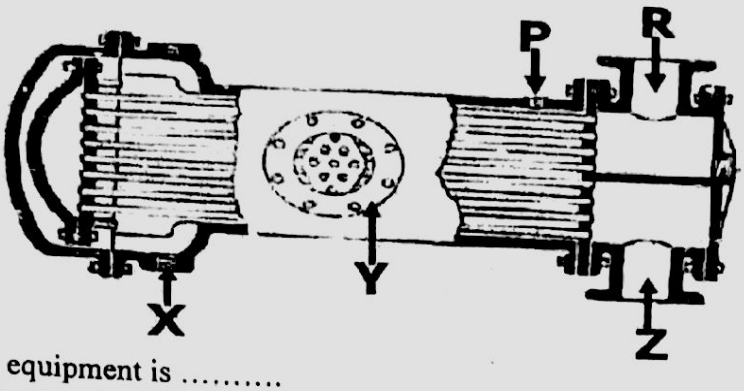
44- Heat is transferred from the surface of the wall to the adjacent cold liquid layers by:
a- radiation (b) conduction d- convection

45- If the above wall separates hot liquid from the atmosphere, an object which is placed away from the wall will receive heat from the wall by .....
(a) radiation b- conduction d- convection

46- Thermal insulation should be performed using a metal which suppress convection current and have good thermal conductivity.

a- true (b) false

Questions 47-52 can be answered using the following equipment:



47- The above equipment is .....

a- 1-2 heat exchanger b- 1-4 heater c- 2-1 heater (d) 1-2 heater

48- In the above equipment the heating medium is introduced through the opening .....

a- X b- Z (c) Y d- P

49- In the above equipment, the material to be heated is introduced at .....

a- X (b) Z c- Y d- P

50- In the above equipment, any non-condensed steam will escape from .....

a- X b- Z c- Y (d) P

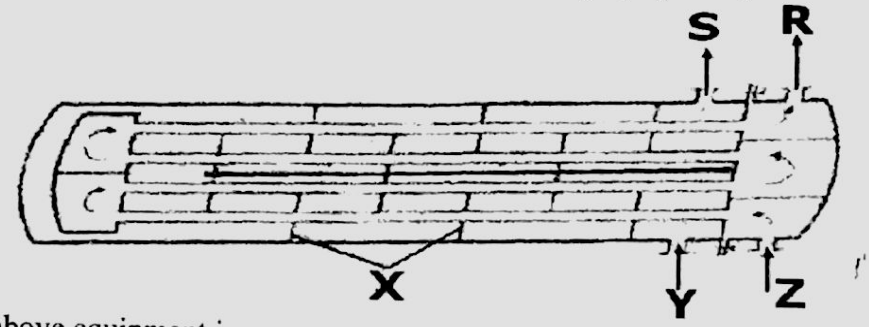
51- In the above equipment suffers from low film coefficient

a- true (b) false

52- In the above equipment, any condensed heating medium will be removed through ...

(a) X b- Z c- Y d- P

Questions 53-56 can be answered using the following equipment:



53- The above equipment is .....

a- 1-2 heat exchanger b- 2-4 heater (c) 2-4 heat exchanger d- 1-2 heater

54- The best heating medium for the above equipment is .....

a- steam b- hot gas (c) hot water d- both a and b

55- In the above equipment, removal of part X will .....

a- reduce of the film coefficient of the tube side b- reduce the surface area

c- reduce the flow rate of the liquid to be heated

(d) reduce of the film coefficient of the heating medium

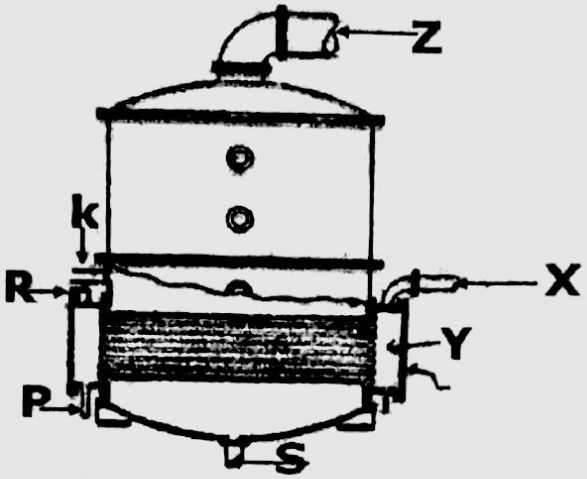
56- The above equipment suffers from buckling problem.

a- true (b) true

57- ..... is a source of energy, the pressure of which is less than that of saturated steam at the same temperature.

a- saturated steam b- superheated steam (c) dry steam

Questions 58-64 can be answered using the following equipment:



58- In the above equipment, the heating medium is introduced at port ....
a- K b- R c- X d- P

59- The heating medium of the above equipment circulates around the tubes.
a- true b- false

60- The material to be concentrated in the above equipment is introduced at .....
a- K b- Z c- X d- P

61- The problems of the above equipment include .....
a- poor liquor circulation b- low film coefficient c- both a and b
d- non of the and the answer is .....

62- In the above equipment, uncondensed heating medium will escape through .....
a- Z b- X c- P d- R

63- In the above equipment, the steam exiting through port Z is of .... type.
a- dry b- saturated c- superheated

64- In the above equipment, heat is mainly transferred through the liquor to be concentrated by:
a- forced convection b- conduction c- radiation
d- natural convection

65- ..... is suitable for concentration of crystal depositing materials despite of heat transfer by natural convection.
a- standard vertical tube evaporator b- basket evaporator
c- forced circulation evaporators d- both a and b

66- Radiation plays a role in heat transfer in case of .....
a- turbo shelf dryer b- basket tube evaporator c- steam dryer
d- forced circulation evaporator with external heating element

67- Its action depends on high speed of steam and its ability to change direction:
a- horizontal tube evaporator b- steam dryer
c- evaporating still d- non of the above

68- The major advantage of basket evaporator over standard vertical tube evaporator is:
a- being suitable for concentration of crystal depositing liquids
b- employing forced convection c- ease of cleaning d- non of them

69- ..... has a mean of economic utilization of energy.
a- forced circulation evaporator with internal heating element
b- horizontal tube evaporator c- evaporating pan d- non of them

70- In forced circulation evaporator with external heating element, the heating element is in the form of ..... tubular heater.
a- single pass b- double pass c- finned

71- The equipment in question 70 is heated by .....
(a) steam b- hot water c- hot air d- non of them

72- The efficacy of film evaporator depends on .....
a-type of liquid b- temperature (c) rate of feed

73- film evaporators are heated by .....
(a) steam b- hot water c- hot air d- non of them

Questions 74-80 can be answered by selecting one of the following equipment:

a- shelf dryer b- vacuum tray dryer
c- tumbling dryer d- turbo shelf dryer

74- heated by steam or liquid passing inside tubes:
75- suitable for drying sticky materials.
76- not suitable for drying dusty materials.
77- employs finned tube in its construction.
78- suffers from temperature variation from one space to another.
79- performs dynamic drying process.
80- capable of performing continuous operation.

Questions 81-86 can be answered by selecting one of the following equipment:

a- fluidized bed dryer b- freeze dryer
c- spray dryer d- pneumatic dryer

81- starts with wet pulverized solids.
82- produces rapidly dissolving hollow spherical particles.
83- produces dry fine particles free from aggregation.
84- produces microporous matrix.
85- can produce a dosage form starting from solution.
86- can be modified to perform mixing, granulation and drying.

87- In freeze drying, having the temperature of the condenser higher than that of the drying chamber will lead to .....
a- slow drying b- rapid drying c- damage of pump

88- At the end of freeze drying process, the operator discovered that the product was in the form of wet solids. Knowing that the vacuum pump was working properly, this problem can be due to .....
a- faulty condenser b- faulty heater c- low vacuum

89- Fluidized bed dryer can perform the mixing operation properly without modification.
a- true b- false

90- starts from solution to produce dry product of high bulk density.
a- spray dryer b- freeze dryer c- flash dryer d- all of them

91. Regarding factors affecting solid storage all the following except:
a- chemical, physical b- Toxicity and flammability
c- First out first in storage d- Flow prosperities and material handling

92. Footing is essential for storage of:
a- In-door storage b- Covered in-door storage c- Out-door storage
d- All of them

93. Lobe pump is an example of:
a- Rotary pump b- Centrifugal pump
c- Reciprocating pump d- Non of them

94. Stuffing box is characterized by:
a- A packing gland to maintain a tight seal
b- Operate at speed of 1200- 3600 rpm c- Has different blade shapes
d- All of them

95. Self priming is characteristic for:
a- Centrifugal pump b- Rotary pump c- Reciprocating pump
d- All of them

96. Pump priming can be overcome by:
a- Put the pump below the liquid level b- Change the impeller
c- Store liquid in a tank located below the pump for priming
d- Non of them

97. Intra-plant piping requires the following safety devices:
a- Pop – on valve b- Check trap c- Safety diaphragm
d- All of them

98. Regarding pipe color code:
a- Green dangerous materials b- Yellow for extra valuable materials
c- Blue for protective materials d- Purple for safe materials

99. Valve seat is:
a- Part of the valve that closes flow b- Means of operating the valve – hand
c- Packing gland d- Closure seals against the valve housing

100. Regarding Liquid piston compressors all the following are true except:
a- Compresses gases up to 5-150 psi b- Require liquid return traps
c- Gas was washed by the liquid d- Used for moving liquids

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