

***Process/Technical evaluation/tests for employees
in hiring, training, downsizing & restructuring***

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(A) General Questions: Answer T for true and F for false

1. Both dextran and invert sugar content in sugar cane will increase as the cane is waiting to mill in the cane yard. ____
2. Higher dextran content in cane juice would decrease the efficiency clarification. ____
3. High invert content in cane juice will not affect the sugar yield (sugar recovery). ____
4. Ideally sugar cane should be milled/crushed within 16 hours after harvest. ____
5. Sugar juice at pH 9 is more acidic than at pH 4. ____
6. Mixed juice pH is generally below 6. ____
7. It is ok to lime the mixed juice pH to over 6 to minimize the inversion of sucrose. ____
8. The pol of bagasse should be below 3. ____
9. The water content of bagasse should be below 50%. ____
10. For every 1% increase in bagasse moisture, you would loss about one ton of steam per 100 tons of bagasse. ____
11. The keys to clarifier operation is to have precise and consistent control of all operating parameter such as temperature, pH, flocculent preparation and addition, and juice flow rate. ____
12. The pH of a sugar solution is lower when measured at higher temperature (such as at operating temperature. as compared to that at room temperature. Therefore, the pH meter need to be calibrated at operating temperature. ____
13. One of the most important operating parameter for effective performance of a settling clarifier (in a sugar mill) is to maintain consistency in temperature control of over 100 °C, preferably 103 to 105 °C, to drive off all the air in sugar juice for suspended matter to sink/settle well. ____
14. If and when all the operating parameters are well controlled within the specified limits, the clarifier retention time can be as low as 30 minutes. ____
15. Clarifier effluent should be “free” of turbidity in order to minimize evaporator scaling and increase evaporation rate. ____
16. One of the important function of clarification is to remove heavy metal, such as lead and arsenic, from sugar juice. ____

17. Three effect evaporator has higher energy efficiency than that of four effect evaporator. ____
18. A 60 brix sugar syrup consist of 60 % solid and 40 % water. ____
19. Evaporator scaling is one of the most difficult and most urgent problem to solve. ____
20. Optimal and consistency in Flocculent addition is one the key parameters to minimize % clarifier underflow. ____

(A) General Questions: Answer T for true and F for false

1. Both dextran and invert sugar content in sugar cane will increase as the cane is waiting to mill in the cane yard. **True**
2. Higher dextran content in cane juice would decrease the efficiency clarification. **True**
3. High invert content in cane juice will not affect the sugar yield (sugar recovery). **True**
4. Ideally sugar cane should be milled/crushed within 16 hours after harvest. **False**
5. Sugar juice at pH 9 is more acidic than at pH 4. **False**
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18. A 60 brix sugar syrup consist of 60 % solid and 40 % water. True

19. Evaporator scaling is one of the most difficult and most urgent problem to solve. True

20. Optimal and consistency in Flocculent addition is one the key parameters to minimize % clarifier underflow. True

(B) Process Improvement: Answer T for true and F for false

1. The need for employees training increases as the organization is down-sized. ____
2. Introduction of value added products will improve company's profit margin potential. ____
3. Automation will help to maintain consistency in product quality. ____
4. Refinery energy usage could be reduced by 35% through process improvement and re-engineering, particularly in face of soaring energy cost as incentive. ____
5. Increase the plant capacity is one major step in reducing operating cost. ____
6. For many refineries, maintenance cost is the second major operating cost after energy. ____
7. Acidic destruction of sucrose creates hydrogen methyl furfural (HMF), a color precursor which eventually forms color. ____
8. Two of the major operating cost of a sugar conditioning silo are use of compressed air and increased inventory. ____
9. Reducing sucrose physical loss will also help to control environmental cost.
10. A major bottle-neck for refinery capacity increase is the need for recovery house operation. ____
11. The net decolorization efficiency of a refinery can be assessed by the color of the final molasses. ____
12. The amount of sucrose carried to the final molasses has no relationship to syrup purity. ____
13. Reduction in percent sugar recycle backed to the refining process will reduce plant capacity, increase sucrose and energy cost, and reduce overall decolorization efficiency. ____
14. Sugar drying and conditioning is another bottle- neck for plant capacity increase. ____
15. Comparing to cane syrup, beet syrup has much higher polysaccharide content. ____
16. Reduce impurities input to a refinery will significantly increase plant capacity. ____
17. In beet sugar boiling: A feed liquor of around 3000 ICU would generally produce sugar with color of less than 30 ICU. ____
18. Plant capacity generally can be increased by 25% without major capital investment.

19. Most of current suffixation plants would not meet USA food production standard with respect to product quality, health, safety and environmental issue. ____
20. Sugar colorants posses' considerable antioxidant function. ____
21. Increase the refinery capacity will significantly improve productivity. ____
22. Sucrose loss is defined as sucrose input into plant less sucrose to products, and less sucrose carried to B/S molasses. ____
23. Consistency in operating condition is a key step in increased productivities. ____
24. Poor vacuum control would increase chance of entrainment sucrose loss. ____
25. The invert in sucrose solution do not affect sucrose destruction. ____
26. Both acid and colorant are products of sucrose degradation. ____
27. Use of surface condenser for vacuum pan would significantly reduce energy cost. ____
28. Some polysaccharides and enzyme are by-products of microbial activities in sucrose solution. ____
29. One of the bottle neck in conversion of a conventional refinery to a VHP refinery is its sugar conditioning capacity. ____
30. Microbial growth is minimized at a temperature over 165 degree Fahrenheit. ____
31. Approximately 80% of raw sugar impurities are on the surface (coating) of crystal. ____
32. The % recycle of a refinery can be assessed by the color of the final molasses. ____
33. In a controlled pan boiling, the formation of false grain can be eliminated without use of water. ____
34. A major saving in refining cost of a VHP refinery is the avoidance of affinition step. ____
35. Color occlusion in beet sugar boiling is much less than that of cane sugar boiling. ____
36. The higher the brix of sugar syrup, the lower the microbial growth. ____

(B) Process Improvement: Answer T for true and F for false

1. The need for employees training increases as the organization is down-sized. **True**
2. Introduction of value added products will improve company's profit margin potential.
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35. Color occlusion in beet sugar boiling is much less than that of cane sugar boiling. **True**
36. The higher the brix of sugar syrup, the lower the microbial growth. **True**

(C) Sugar Boiling: multiple choice/ fill in answers

1. A Strike has a super-saturation of 1.15 SS at seeding, at the end of the Strike its Syrup Purity has Decrease and its Crystal Content has Increased will its Syrup SS at the end of the strike
 - a. Increased
 - b. Decreased
 - c. Remained the Same

2. If one Shock Seeds a Strike vs. a Full Pan Seeded Strike the Crystal Size Distribution [Crystal Size Range] of the Shocked Pan will be:
 - a. Smaller
 - b. Larger
 - c. The Same

3. List four [4] pieces of information one must have to determine a solution's super-saturation:
 - a. _____
 - b. _____
 - c. _____
 - d. _____

4. A Massecuite exposed to Under-Saturated condition will have a
 - a. Smaller
 - b. Larger Massecuite Purity to run Off Syrup Purity difference [drop]

5. What is the number One element making up the Sucrose Molecule:
 - a. Carbon
 - b. Hydrogen
 - c. Oxygen

6. Name one component of a final strike that after 24 hours of curing in a cooling crystallizer Does Change and One that Does Not Change
 - a. Does Change _____
 - b. Does Not Change _____

7. In a High Grade 4 Strike Boiling Scheme does each next strikes * Crystallized Sugar: Purity Remains Same, Its Color Increases * Its Syrup Purity: Increases and Its Color Increases
 - a. True
 - b. False

8. In low grade crystallization the larger the difference between the Masecuite Purity and its Centrifuged Run- off Syrup Purity the Lower its Crystal Solids to Syrup Solid will be:
- False
 - True
9. Boiling sugar under vacuum would minimize both color and invert formation:
- False
 - True
10. In a High Grade four (4) strike boiling what is the Ratio (Numbers. of First Strikes to its Fourth & Last Strike
- Two to One
 - Three to One
 - Four to One
 - Six to One
 - Eight to One
 - None of the Above
11. Spontaneous Crystallization [Fines] is a result
- Not enough crystal content
 - Boiling the pan Too Fast
 - Changing Vacuums too Fast
 - Too High of a SS during boiling
 - Some of the above
 - All of the above
 - None of the above
12. Circle Three Critical Steps in Crystallizing Quality Sugar:
- Vacuum Control
 - Steaming Out the Pan
 - Seeding the Pan at the Right SS
 - Control (Fluidity)
 - Minimum Feed Control
 - Boiling the Pan in a Specific Time
13. The Lower the Operating Vacuums used in Pans the more water they will use to condense their Vapors compared to Higher Vacuums.
- True
 - False

14. If one is to learn to boil sugar, it is better to start their training on
- High Grade
 - Low Grade
 - It Does Not Matter
15. During crystallization what is the most influential impact on the dynamic of that pans end result?
- Temperature of the pan
 - Brix of the Pan
 - Controlling Super Saturations levels during the pan boiling
 - Impurities in the feed material
16. A Massecuite contains 80 lbs. of solid per cubic foot, it's Purity is 50. How many lbs. of impurities are contained in a 2000 cu. ft. Strike? _____
17. An Ideal Target Purity Difference between Recovery Massecuite Purities and their Run-off Syrup Purities is _____points.
18. The major purpose of boiling sugar under vacuum is to increase evaporation rate to reduce boiling time.
- True
 - False
19. Under well designed sugar boiling profile, feeding a pan with 74/75 brix liquor will not necessarily form false grain.
- True
 - False
20. In general, lower the temperature of massecuite before discharging the pan will increase sugar extraction.
- True
 - False

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3. List four [4] pieces of information one must have to determine a solution's super-saturation:
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 - b. Temperature
 - c. Vacuum
 - d. Sucrose solubility
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5. What is the number One element making up the Sucrose Molecule:
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 - f. All of the above**
 - g. None of the above
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- d. Impurities in the feed material

16. A Massecuite contains 80 lbs. of solid per cubic foot, it's Purity is 50. How many lbs. of impurities are contained in a 2000 cu. ft. Strike? **80,000 lbs.**

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18. The major purpose of boiling sugar under vacuum is to increase evaporation rate to reduce boiling time.

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19. Under well designed sugar boiling profile, feeding a pan with 74/75 brix liquor will not necessarily form false grain.

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20. In general, lower the temperature of massecuite before discharging the pan will increase sugar extraction.

- a. True
- b. False

(D) Sugar Drying and Conditioning: Answer T for true and F for false

1. The % moisture of well-conditioned sugar should not exceed 0.025%. (ICUMSA oven moisture). ____
2. Fluctuation in Ambient temperature do not affect sugar caking. ____
3. The finer the sugar crystal, the more the number of sugar contact point resulting in higher tendency for sugar caking. ____
4. Bound moisture is most detrimental to sugar caking. ____
5. Migration of moisture in bulk storage of sugar also contribute to sugar caking. ____
6. Control of sugar caking starts at pan boiling of uniform sugar crystal. ____
7. High CV (coefficient of variation) of sugar indicate better uniformity of sugar crystals. ____
8. Based on Young & Laplace theory, water on sugar crystal surface could migrate to smaller capillary/contact point causing caking problem. ____
9. Moisture in bulk stored sugar can migrate to contact points via vapor phase transfer based on Kelvin theory. ____
10. Drying sugar too fast and at too high a temperature would create more amorphous sugar. ____
11. As compare to crystalline sugar, amorphous sugars retain high moisture. ____
12. Screening to remove both conglomerate and fine sugar is a practical way to minimize sugar caking. ____

13. Continued recycling of sugar during storage in silo, although would help conditioning of sugar, but is not advice because of creation of too much fire hazardous fine sugar. ____
14. To minimize sugar caking potential, displace humid air from rail car or shipping container before loading with bulk sugar. ____
15. Retention time of sugar in granulator is not affected by the inclination / pitch of the drum. ____
16. Too high a screen vibration frequency will reduce efficiency of screening. ____
17. Sugar shipped by truck has less tenancy to cake. ____
18. Washing of sugar at centrifugal to move syrup film would help sugar conditioning. ____
19. The temperature of sugar should not exceed 100 F during loading/packing. ____
20. Either or both improper processing technique and ambient conditions (temperature and humidity) could cause sugar caking problem. ____
21. High ambient humidity aggravate sugar caking problem. ____
22. Both number of contact point and the size/opening of contact point significantly affect the degree of sugar caking. ____
23. More bound moisture is produced when the rate of water evaporation from sugar crystal surface far exceed the rate of crystallization. ____
24. Sugar caking is caused by either improper processing technique (Efflorescent caking) or by exposure to fluctuation in ambient temperature and humidity (Deliquescent caking) or both. ____
25. Other things being equal, the larger the sugar crystal, the lesser the caking tendency. ____
26. Based on Kelvin Theory of capillary phenomenon, water evaporates from large opening/capillary and sugar crystal surface and then condenses into small opening/capillary caking problem. ____
27. Conglomerated sugar has no role in sugar caking. ____

28. Amorphous sugar eventually re crystalize and release water onto interspace of sugar crystals causing sugar caking. ____
29. Ideally, % moisture of sugar discharged from centrifugal should be around 0.5%. ____
30. Place sugar in holding/curing bins for 16 to 24 hours will help to alleviate sugar caking problem. ____
31. Counter currently granulator tend to produce “sparkling” sugar, as compare to co-current granulator. ____
32. Wet sugar tends to blind the sugar screen. ____
33. Increase the frequency of screener’s vibration disproportionally will decrease the efficiency of screening. ____
34. To ensure that sugar is dried, the counter current granulatoer should be at least 12 meter in length. ____
35. The % moisture of sugar coming out of the granulator should not exceed 0.1%. ____

(D) Sugar Drying and Conditioning: Answer T for true and F for false

1. The % moisture of well-conditioned sugar should not exceed 0.025%. (ICUMSA oven moisture). **True**
2. Fluctuation in Ambient temperature do not affect sugar caking. **False**
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4. Bound moisture is most detrimental to sugar caking. **False**
5. Migration of moisture in bulk storage of sugar also contribute to sugar caking. **True**
6. Control of sugar caking starts at pan boiling of uniform sugar crystal. **True**
7. High CV (coefficient of variation) of sugar indicate better uniformity of sugar crystals. **False**
8. Based on Young & Laplace theory, water on sugar crystal surface could migrate to smaller capillary/contact point causing caking problem. **True**
9. Moisture in bulk stored sugar can migrate to contact points via vapor phase transfer based on Kelvin theory. **True**
10. Drying sugar too fast and at too high a temperature would create more amorphous sugar. **True**
11. As compare to crystalline sugar, amorphous sugars retain high moisture. **True**
12. Screening to remove both conglomerate and fine sugar is a practical way to minimize sugar caking. **True**
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28. Amorphous sugar eventually re crystalize and release water onto interspace of sugar crystals causing sugar caking. **True**
29. Ideally, % moisture of sugar discharged from centrifugal should be around 0.5%. **True**
30. Place sugar in holding/curing bins for 16 to 24 hours will help to alleviate sugar caking problem.
31. Counter currently granulator tend to produce "sparkling" sugar, as compare to co-current granulator. **False**
32. Wet sugar tends to blind the sugar screen. **True**
33. Increase the frequency of screener's vibration disproportionally will decrease the efficiency of screening. **True**
34. To ensure that sugar is dried, the counter current granuloer should be at least 12 meter in length. **True**
35. The % moisture of sugar coming out of the granulator should not exceed 0.1%. **True**

(E) Quiz on Energy Conservation: Multiple choice

1. The boiler manufacturer has specified that their boiler must operate with no more than 3000 ppm (part per million) of solids in the drum water. If the solids content in the condensate feed to the boiler is 150 ppm, what is the minimum boiler blowdown necessary to meet the boiler manufacturer's specification?
 - a. 2%
 - b. 10%
 - c. 20%
 - d. None of the above.

2. A deaerator consumes exhaust steam and thus increases the fuel that must be burned in the boilers.
 - a. True.
 - b. False.

3. The three critical parameters for good combustion are time, temperature and turbulence.
 - a. True.
 - b. False.

4. A de aerator removes air and gases from the boiler feed water, improves boiler steam production by providing hotter boiler feed water, and can recover the heat in excess exhaust that might otherwise be lost.
 - a. True.
 - b. False.

5. If saturated live steam at 250 psig is throttled for use as make-up to the exhaust system, will the make-up exhaust be:
 - a. Saturated.
 - b. Superheated.
 - c. Contain condensate.

6. If a turbine, operating on 250 psig live steam, was designed to operate with 20 psig exhaust, but instead is operated with 15 psig exhaust. How would the actual water rate achieved compare to the design value?
- It would be higher.
 - It would be lower.
 - It would be unchanged
7. Generally, the more stages a turbine has, the higher will be the turbines water rate.
- True.
 - False.
8. The higher the live steam pressure to a turbine, the greater will be the turbine's thermodynamic efficiency.
- True.
 - False.
9. The thermodynamic efficiency of a simple turbine is about 80%
- True.
 - False. (about 50 to 60 %)
10. A steam turbine operates on superheated steam. Is it possible that the exhaust from this turbine could contain water?
- Yes.
 - No.
11. To produce saturated live steam at a pressure of 400 psig requires about twice the heat required to produce saturated live steam at 200 psig.
- True.
 - False. (about 1205 btu/lbs. vs 1200btu/lbs)
12. An unsaturated quadruple effect is used to concentrate 100 tons/hour of a 12 Brix sugar solution to 60 Brix syrup. How much vapor will the condenser on the fourth effect have to condense?
- 15 tons' steam/hour.
 - 20 tons' steam/hour. (water to be evaporated 80 tons, each effect, 20 ton/hr)
 - 25 tons' steam/hour.
 - 40 tons' steam/hour.
 - None of the above.

13. In question 12 above, what is the Brix of the juice leaving the second effect?
- 12.
 - 15.
 20. (brix= $12/60 \times 100 = 20$)
 - 30.
 - None of the above.
14. The calandrias of evaporators must be vented or the evaporators will eventually stop boiling.
- True
 - False.
15. The use of triple effect evaporator always requires more heating surface than a single effect evaporator.
- True
 - False.
16. Air compressor intakes should be installed in _____location possible.
- coolest (to reduce power requirement)
 - warmest
 - any available
17. Insulating steam lines can reduce heat loss by approximately
- 50%
 - 75%
 - 95%
18. The largest steam user in the plant is typically
- the white sugar pans.
 - the low grade pans.
 - the evaporators.
19. The quantity of heat required to raise the temperature of 1 lb. of water 1-degree F is called the latent heat of water.
- True
 - False. (Sensible heat in btu)

20. Vapor recompression can be economical up to a compression ration of around 2.
- a. True
 - b. False.
21. The purpose of a superheater is to raise the feedwater temperature to the proper temperature before pumping it into the boiler.
- a. True
 - b. False.
22. If an evaporator evaporates 1.8 lb. of water for every pound of steam that it uses, the evaporator is likely a _____ effect evaporator.
- a. single
 - b. double
 - c. triple
23. High efficiency electric motors are generally cost effective.
- a. True
 - b. False.
24. Raising the Brix of the liquor leaving a triple effect fine liquor evaporator from 65 to 72 Brix will yield substantial steam savings.
- a. True
 - b. False.

(E) Quiz on Energy Conservation: Multiple choice

1. The boiler manufacturer has specified that their boiler must operate with no more than 3000 ppm (part per million) of solids in the drum water. If the solids content in the condensate feed to the boiler is 150 ppm, what is the minimum boiler blowdown necessary to meet the boiler manufacturer's specification?
 - a. 2%
 - b. 10%
 - c. 20%
 - d. None of the above.
2. A deaerator consumes exhaust steam and thus increases the fuel that must be burned in the boilers.
 - a. True.
 - b. False.
3. The three critical parameters for good combustion are time, temperature and turbulence.
 - a. True.
 - b. False.
4. A de aerator removes air and gases from the boiler feed water, improves boiler steam production by providing hotter boiler feed water, and can recover the heat in excess exhaust that might otherwise be lost.
 - a. True.
 - b. False.
5. If saturated live steam at 250 psig is throttled for use as make-up to the exhaust system, will the make-up exhaust be:
 - a. Saturated.
 - b. Superheated.
 - c. Contain condensate.

6. If a turbine, operating on 250 psig live steam, was designed to operate with 20 psig exhaust, but instead is operated with 15 psig exhaust. How would the actual water rate achieved compare to the design value?
- a. It would be higher.
 - b. It would be lower.**
 - c. It would be unchanged
7. Generally, the more stages a turbine has, the higher will be the turbines water rate.
- a. True.
 - b. False.**
8. The higher the live steam pressure to a turbine, the greater will be the turbine's thermodynamic efficiency.
- a. True.
 - b. False.**
9. The thermodynamic efficiency of a simple turbine is about 80%
- a. True.
 - b. False. (about 50 to 60 %)**
10. A steam turbine operates on superheated steam. Is it possible that the exhaust from this turbine could contain water?
- a. Yes.**
 - b. No.
11. To produce saturated live steam at a pressure of 400 psig requires about twice the heat required to produce saturated live steam at 200 psig.
- a. True.
 - b. False. (about 1205 btu/lbs. vs 1200btu/lbs)**
12. An unsaturated quadruple effect is used to concentrate 100 tons/hour of a 12 Brix sugar solution to 60 Brix syrup. How much vapor will the condenser on the fourth effect have to condense?
- a. 15 tons' steam/hour.
 - b. 20 tons' steam/hour. (water to be evaporated 80 tons, each effect, 20 ton/hr)**
 - c. 25 tons' steam/hour.
 - d. 40 tons' steam/hour.
 - e. None of the above.

13. In question 12 above, what is the Brix of the juice leaving the second effect?

- a. 12.
- b. 15.
- c. 20. (brix= $12/60 \times 100 = 20$)
- d. 30.
- e. None of the above.

14. The calandrias of evaporators must be vented or the evaporators will eventually stop boiling.

- a. True
- b. False.

15. The use of triple effect evaporator always requires more heating surface than a single effect evaporator.

- a. True
- b. False.

16. Air compressor intakes should be installed in _____ location possible.

- a. coolest (to reduce power requirement)
- b. warmest
- c. any available

17. Insulating steam lines can reduce heat loss by approximately

- a. 50%
- b. 75%
- c. 95%

18. The largest steam user in the plant is typically

- a. the white sugar pans.
- b. the low grade pans.
- c. the evaporators.

19. The quantity of heat required to raise the temperature of 1 lb. of water 1-degree F is called the latent heat of water.

- a. True
- b. False. (Sensible heat in btu)

20. Vapor recompression can be economical up to a compression ration of around 2.

- a. True
- b. False.

21. The purpose of a superheater is to raise the feedwater temperature to the proper temperature before pumping it into the boiler.

- a. True
- b. False.

22. If an evaporator evaporates 1.8 lb. of water for every pound of steam that it uses, the evaporator is likely a _____effect evaporator.

- a. single
- b. double
- c. triple

23. High efficiency electric motors are generally cost effective.

- a. True
- b. False.

24. Raising the Brix of the liquor leaving a triple effect fine liquor evaporator from 65 to 72 Brix will yield substantial steam savings.

- a. True
- b. False.

(F) Quiz on Quality Assurance: Multiple choice

1. A polarimeter is used to measure:
 - a. color
 - b. pH
 - c. specific gravity
 - d. optical rotation

2. A refractometer measures solids on the basis of:
 - a. color
 - b. angle of refraction
 - c. purity
 - d. temperature

3. Which of the following instruments would be used to measure the color of a sugar solution?
 - a. refractometer
 - b. pH meter
 - c. spectrophotometer
 - d. polarimeter

4. What value does a Certificate of Analysis provide to a customer
 - a. it tells the customer what tests to run on the product
 - b. it assures the customer that the product has been tested and that it meets the specification
 - c. it tells the customer where the sugar was grown
 - d. none of the above

5. The basic premise of a spectrophotometer is to:
 - a. measures the angle of refraction
 - b. measures the density of a sugar solution
 - c. measures the angular rotation of polarized light
 - e. measure absorption of light at certain wavelengths

6. Measuring the true sucrose in blackstrap (final. molasses by polarimeter is difficult because)
 - a. the density is high
 - b. the viscosity is high
 - c. many optically-active sugars are present
 - d. the ash is high

7. The method of choice for measuring moisture in granulated sugar is:

- a. vacuum oven (70°C, 28" vacuum, 16 hours)
- b. forced air oven (105°C, 3 hours)
- c. Spindle brix
- a. refractometer

8. What is purity?

- a. % solids
- b. % sucrose, wet basis
- c. 100 – ash
- d. % sucrose, dry basis

9. Histograms are valuable statistical tools that tell us:

- a. the average results
- b. dispersion around the average
- c. normal/non-normal distribution
- d. all of the above

10. A Capability Index (CpK) tells us:

- a. if our process can reliably produce a product within a set of specifications
- b. if the process distribution is non-normal
- c. the average results of a process
- d. if the test results are outside the specification limits

11. How many tests must be run before a “true” answer is determined?

- a. it depends
- b. seven
- c. twelve
- d. one

12. A handy statistical tool used to classify product defects by frequency is a(n):

- a. Histogram
- b. range chart
- c. x-bar chart
- d. Pareto chart

13. The role of a laboratory in a sugar refinery is:

- a. to be an independent advisor to management
- b. to measure and report key performance indicators
- c. to be a technical resource to customers
- d. all of the above

14. From an environmental standpoint, sugar refineries are considered to be major sources of:

- a. particulate emissions
- b. volatile organic chemicals
- c. BOD (Biochemical Oxygen Demand)
- d. both a and b

15. Universal wastes are those wastes that:

- a. can be hazardous, but qualify for reduced handling and recordkeeping
- b. are ignitable
- c. are corrosive
- d. both b. and c.

16. If audited by an environmental agency, you may:

- a. be present during the inspection
- b. request copies of all recording (video, still pictures, samples, etc.)
- c. requires the inspector to comply with all company safety regulations
- d. all of the above

17. Is it possible for citizens to sue a company directly for non-compliance with provisions of environmental permits?

- a. yes
- b. no

18. Are citizens entitled to view your permits, and compliance history?

- a. yes, but they must be represented by an attorney
- b. yes, permits and reports are public records
- c. it depends

19. Does a company have the right to refuse access to an inspector?

- a. yes
- b. no

20. Who is responsible for the proper disposal of a hazardous waste?
- a. the company
 - b. the EPA
 - c. the contractor
 - d. the employees

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(G) Clarification/Decolonization

Clarification test 1

1. Decolorizing polymers are most effective when what occurs?
 - a. When they are fed after the clarification process
 - b. When they are fed selectively to very low color liquor streams
 - c. When they are fed proportionally to liquor flow

2. Clarification by Phosphatation and Carbonation are different in which area?
 - a. Use of filtering material
 - b. Importance of retention time
 - c. Use of Lime
 - e. Use of acids

3. To correct a high Carb Liquor pH, you would do what?
 - a. Increase the Milk of Lime dosage
 - b. Increase the (carb) gas flow
 - c. Increase the Milk of Lime concentration
 - d. Lower the Carb Liquor temperature

4. A poorly operating clarification process does not effect which other processes?
 - a. Raw Sugar Warehouse
 - b. White Sugar Crystallization
 - c. Affination Station
 - d. Low Grade Recovery
5. If you observed a reddish tint to the Carb Liquor, which action would you take?
 - a. Increase the pH of the Liquor
 - b. Do nothing, that is normal
 - c. Decrease the gas flow to the Liquor
 - d. Decrease the temperature of the Liquor

6. Which action is not proper for enzyme treatment of starch?
 - a. The enzyme must be heated to de-activate after clarification.
 - b. The correct enzyme for starch is identified
 - c. The enzyme must be heated to de-activate prior to feeding.
The starch must be heated sufficiently to denature
7. Measuring the invert created across the Carbonation process is an effective evaluation.

- a. True
- b. False

8. Which action would NOT improve clarification?

- a. Lower the liquor temperature
- b. Increase the liquor temperature
- c. Increase the mass of the particles being removed
- d. Lower the liquor Brix

9. Which example allows the greatest retention time per tank?

- a. Three 10,000 gallon tanks in series and a liquor flow of 1,000 gallons per minute
- b. Two 20,000 gallon tanks in parallel and a liquor flow of 2,000 gallons per minute
- c. Two 10,000 gallon tanks in series and a liquor flow of 1,000 gallons per minute
- d. Two 20,000 gallon tanks in series and a liquor flow of 2,000 gallons per minute

10. Which process requires the greatest capital costs?

- a. Carbonation
- b. Phosphitation
- c. Clarification test 2

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Clarification test 2

1. Decolorizing polymers are most effective when what occurs?
 - a. When they are fed proportionally to liquor flow
 - b. When they are fed after the clarification process
 - c. When they are fed selectively to very low color liquor streams
 - d. When they are greatly over fed

2. In order for a starch removing enzyme to work properly, what must occur?
 - a. The enzyme must be heated to boiling to activate
 - b. The correct species of starch must be identified
 - c. Starches are insignificant and removal is unnecessary
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