**KNOWLEDGE COMPONENT:**

**KNOWLEDGE COMPONENT: LEARNER WORKBOOK 3: SUGAR PROCESSING FACTORY CONTROL CALCULATIONS**

**Occupational Certificate: Sugar Processing Controller**

**KNOWLEDGE COMPONENT: LEARNER WORKBOOK 3:**

**SUGAR PROCESSING FACTORY CONTROL CALCULATIONS**

**LEARNER WORKBOOK 3:**

**SUGAR PROCESSING FACTORY CONTROL CALCULATIONS**

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**OCCUPATIONAL CERTIFICATE: SUGAR PROCESSING CONTROLLER**

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1. AN INTRODUCTION TO THIS LEARNER WORKBOOK

This Knowledge Component Learner Workbook 3: Sugar Processing Factory Control Calculations is intended to be used with the Knowledge Component Learning Resource: Book 3 (Textbook): Sugar Processing Factory Control Calculations of the Occupational Qualification: Sugar Processing Controller NQF 5.

Guidance on the use of this Work Book is provided in the Learning Guide.

1. LEARNER DETAILS

|  |  |
| --- | --- |
| First name |  |
| Surname |  |
| ID number |  |
| Mobile phone contact number |  |
| E-mail address |  |
| Postal address |  |
| Date on which you started this Knowledge Module |  |
| Date on which you completed this Knowledge Module |  |
| Declaration: | I hereby confirm that:* I received the assessment plan and schedule.
* I understand my rights in terms of special needs, re-assessment, feedback and appeals against assessment decisions.
* I completed this formative assessment independently without assistance from anyone else.
 |
| Total Marks for Knowledge Module 3 | 590 marks |
| Marks attained |  |
| Date: |  |
| Place: |  |
| Signature of Learner: |  |
| Signature of Assessor: |  |

1. FORMATIVE ASSESSMENT INSTRUCTIONS

**Instructions**

* Work individually to present the results of each Learning Activity in this Learner Workbook.
* Complete all the sections.
* Use a black pen and ensure that you complete the questions in your own handwriting.
* A recommended time to complete each activity is shown.
* The marks you will attain for each learning activity are shown in brackets.
* The total marks obtained for each Knowledge Module must be transferred from the back of each Learner Workbook to the Learner Qualification Summative Assessment Tool.
1. KNOWLEDGE MODULE 3: SUGAR PROCESSING FACTORY CONTROL CALCULATIONS

**NQF LEVEL: 5**

**CREDITS: 12**

**PURPOSE OF THE KNOWLEDGE MODULE: The main focus of the learning in this knowledge module is for the learner to gain a fundamental understanding of the analytical procedures and the calculations necessary to exercise supervisory and reporting control of a sugar processing factory.**

The learning will enable learners to demonstrate an understanding of:

* KM-03-KT01: Introduction to factory control concepts (40%)
* KM-03-KT02: Materials balance (25%)
* KM-03-KT03: Stock taking (10%)
* KM-03-KT03: Calculations (25%)

4.1 Knowledge Topic 1: Introduction to factory control concepts (40%)

Topic elements to be covered include:

* KT0101 Averaging
* KT0102 Factory figures
* KT0103 Cane payment
* KT0104 Calculations

Internal Assessment Criteria and Weight

* IAC0101 Understanding the meaning of factory performance indicators can be demonstrated
* (Weight 40%)

**Learning activity 1.1: Individual Learning activity: 2 hours (90 marks)**



**Learning Objective:** An understanding of the various factory performance indicators can be demonstrated.

**Task:** Read each question carefully and write your answer in the space provided.

1. State the four main purposes of the sugar mill laboratory. (4)

|  |
| --- |
|  |
|  |
|  |
|  |
|  |

2. Two quantities of molasses are mixed. The one has a mass of 10 tons and a pol of 38%. The other has a mass of 5 tons and a pol of 31%.

Calculate:

(a) The arithmetical average pol% of the mixture. (5)

|  |
| --- |
|  |
|  |
|  |
|  |

(b) The weighted average pol% of the mixture. (5)

|  |
| --- |
|  |
|  |
|  |
|  |

3. Complete the following factory control formulae. (76)

**Tonnages**

3.1. Tons water =

3.2. Tons brix in bagasse =

3.3. Tons moisture in bagasse =

3.4. Tons fibre in bagasse =

3.5. Tons pol in bagasse =

3.6. Tons pol in mixed juice =

3.7. Tons brix in mixed juice =

3.8. Tons suspended solids in mixed juice =

3.9. Tons corrected pol in mixed juice =

3.10. Tons corrected brix in mixed juice =

3.11. Tons pol in cane =

3.12. Tons brix in cane =

3.13. Tons DAC fibre in cane =

3.14. Tons DAC brix in cane =

3.15. Tons DAC in cane =

**Percentages**

3.16. Fibre & bagasse =

3.17. Pol % cane =

3.18. Fibre & cane =

3.19. Brix % cane =

3.20. Fibre % cane =

3.21. Imbibition % fibre =

3.22. Corrected brix% mixed juice =

3.23. Corrected pol %mixed juice =

3.24. Purity of mixed juice =

3.25. Mixed juice % cane =

3.26. Imbibition % cane =

3.27. Pol % by material balance =

3.28. Brix % by material balance =

3.29. Pol factor =

3.30. Brix factor =

3.31. Fibre factor =

3.32. Bagasse purity =

3.33. Material balance cane quality =

3.34. DAC purity =

3.35. Extraction =

3.36. CRE =

3.37. Boiling house recovery =

3.38. Overall recovery =

4.2 Knowledge Topic 2: Materials Balance (25%)

Topic elements to be covered include:

* KT0201 Data sources
* KT0202 Calculations

Internal Assessment Criteria and Weight

* IAC0201 Source of material to be balanced can be explained
* IAC0202 Calculations are correctly performed
* (Weight 25%)

**Learning activity 2.1: Individual Learning activity: 10 hours (250 marks)**



**Learning Objective:** Demonstrate an understanding of the source of materials and data and how to perform the calculations required in materials balance accurately.

**Task:** Use the data provided in each of the following Daily Materials Balance sheets (that make up 5 consecutive days in the factory) to complete each sheet. (50 marks each)

**DAILY MATERIALS BALANCE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **DAY** | **PREVIOUS**  | **WK TO DATE** |
| SUMMARY  | TONS CANE CRUSHED  | 7 691,656 |  |  |
| TONS MIXED JUICE  | 9 598,490 |  |  |
| TONS WATER  |  |  |  |
| TONS BAGASSE |  |  |  |
|  |  |  |  |  |
| BAGASSE | TONS Bx IN BAG (Bx % Bag = 2,68) |  |  |  |
| TONS MOIST IN BAG (Moist % Bag = 51,21) |  |  |  |
| TONS FIBRE IN BAG  |  |  |  |
| TONS POL IN BAG (POL % Bag = 1,53) |  |  |  |
| Fib % BAG |  |  |  |
|  |  |  |  |  |
| CANE  | TONS POL IN CANE  |  |  |  |
| TONS BRIX IN CANE  |  |  |  |
| TONS FIBRE IN CANE  |  |  |  |
| POL % CANE  |  |  |  |
| Fib % CANE  |  |  |  |
| Bx 5 CANE  |  |  |  |
| FIBRE IN BAG % CANE (UNCORR) |  |  |  |
| TONS D.A.C. BRIX IN CANE  |  |  |  |
| TONS D.A.C. pol in cane |  |  |  |
| IMBIBITION % FIBRE  |  |  |  |
| IMBIBITION % CANE  |  |  |  |
|  |  |  |  |  |
| EXTRACTION  |  |  |  |
| C.R.E. |  |  |  |
|  |  |  |  |
| M.J. | % SUSP. SOLIDS  | 0,640 |  |  |
| TONS SUSP. SOLIDS  |  |  |  |
| TONS CORR. BRIX IN M.J. | 1 122,418 |  |  |
| TONS CORR. POL IN M.J. | 972,842 |  |  |
| CORR. Bx.% M.J. |  |  |  |
| CORR. Pol% IN M.J. |  |  |  |
| PURITY M.J. |  |  |  |
| M.J. % CANE |  |  |  |
|  |  |  |  |  |
| HOURS AVAILABLE  | 30,00 |  |  |
| STOPS: MECHANICAL  | NIL |  |  |
| OPERATIONAL  | NIL |  |  |
| NO CANE  | Nil |  |  |
| SCHEDULED  | - |  |  |
| TOTAL STOPS  |  |  |  |
| HOURS CRUSHING  |  |  |  |
| TONS CANE PER HOUR  |  |  |  |
| TONS FIBRE PER HOUR  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **MATERIAL BALANCE** | **D.A.C.** |  | **DAY** | **PREVIOUS** | **WK- TO – DATE** |
|  | POL  | BRIX  | FIB  | POL  | BRIX  | TIB  | POL FACTOR  |  | - |  |
| DAY  |  |  |  | 12,95 | 15,21 | 15,93 | BRIX FACTOR  |  | - |  |
| PREVIOUS  | - | - | - | - | - | - | FIBRE FACTOR  |  | - |  |
| WK-TO-DATE  |  |  |  |  |  |  |  |  | - |  |

MONDAY DAY 1

**DAILY MATERIALS BALANCE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **DAY** | **PREVIOUS**  | **WK TO DATE** |
| SUMMARY  | TONS CANE CRUSHED  | 5859,004 |  |  |
| TONS MIXED JUICE  | 6979,775 |  |  |
| TONS WATER  |  |  |  |
| TONS BAGASSE |  |  |  |
|  |  |  |  |  |
| BAGASSE | TONS Bx IN BAG (Bx % Bag = 2,68) |  |  |  |
| TONS MOIST IN BAG (Moist % Bag = 51,21) |  |  |  |
| TONS FIBRE IN BAG  |  |  |  |
| TONS POL IN BAG (POL % Bag = 1,53) |  |  |  |
| Fib % BAG |  |  |  |
|  |  |  |  |  |
| CANE  | TONS POL IN CANE  |  |  |  |
| TONS BRIX IN CANE  |  |  |  |
| TONS FIBRE IN CANE  |  |  |  |
| POL % CANE  |  |  |  |
| Fib % CANE  |  |  |  |
| Bx 5 CANE  |  |  |  |
| FIBRE IN BAG % CANE (UNCORR) |  |  |  |
| TONS D.A.C. BRIX IN CANE  |  |  |  |
| TONS D.A.C. pol in cane |  |  |  |
| IMBIBITION % FIBRE  |  |  |  |
| IMBIBITION % CANE  |  |  |  |
|  |  |  |  |  |
| EXTRACTION  |  |  |  |
| C.R.E. |  |  |  |
|  |  |  |  |
| M.J. | % SUSP. SOLIDS  | 0,65 |  |  |
| TONS SUSP. SOLIDS  |  |  |  |
| TONS CORR. BRIX IN M.J. | 837,865 |  |  |
| TONS CORR. POL IN M.J. | 727,673 |  |  |
| CORR. Bx.% M.J. |  |  |  |
| CORR. Pol% IN M.J. |  |  |  |
| PURITY M.J. |  |  |  |
| M.J. % CANE |  |  |  |
|  |  |  |  |  |
| HOURS AVAILABLE  | 24,00 |  |  |
| STOPS: MECHANICAL  | 0,5 |  |  |
| OPERATIONAL  | 0,33 |  |  |
| NO CANE  | NIL |  |  |
| SCHEDULED  | - |  |  |
| TOTAL STOPS  |  |  |  |
| HOURS CRUSHING  |  |  |  |
| TONS CANE PER HOUR  |  |  |  |
| TONS FIBRE PER HOUR  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **MATERIAL BALANCE** | **D.A.C.** |  | **DAY**  | **PREVIOUS**  | **WK- TO – DATE** |
|  | POL  | BRIX  | FIB  | POL  | BRIX  | TIB  | POL FACTOR  |  |  |  |
| DAY  |  |  |  | 12,94 | 15,16 | 16,22 | BRIX FACTOR  |  |  |  |
| PREVIOUS  |  |  |  |  |  |  | FIBRE FACTOR  |  |  |  |
| WK-TO-DATE  |  |  |  |  |  |  |  |  |  |  |

TUESDAY DAY 2

**DAILY MATERIALS BALANCE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **DAY** | **PREVIOUS**  | **WK TO DATE** |
| SUMMARY  | TONS CANE CRUSHED  | 5302,932 |  |  |
| TONS MIXED JUICE  | 6500,115 |  |  |
| TONS WATER  |  |  |  |
| TONS BAGASSE |  |  |  |
|  |  |  |  |  |
| BAGASSE | TONS Bx IN BAG (Bx % Bag = 2,68) |  |  |  |
| TONS MOIST IN BAG (Moist % Bag = 51,21) |  |  |  |
| TONS FIBRE IN BAG  |  |  |  |
| TONS POL IN BAG (POL % Bag = 1,53) |  |  |  |
| Fib % BAG |  |  |  |
|  |  |  |  |  |
| CANE  | TONS POL IN CANE  |  |  |  |
| TONS BRIX IN CANE  |  |  |  |
| TONS FIBRE IN CANE  |  |  |  |
| POL % CANE  |  |  |  |
| Fib % CANE  |  |  |  |
| Bx 5 CANE  |  |  |  |
| FIBRE IN BAG % CANE (UNCORR) |  |  |  |
| TONS D.A.C. BRIX IN CANE  |  |  |  |
| TONS D.A.C. pol in cane |  |  |  |
| IMBIBITION % FIBRE  |  |  |  |
| IMBIBITION % CANE  |  |  |  |
|  |  |  |  |  |
| EXTRACTION  |  |  |  |
| C.R.E. |  |  |  |
|  |  |  |  |
| M.J. | % SUSP. SOLIDS  | 0,65 |  |  |
| TONS SUSP. SOLIDS  |  |  |  |
| TONS CORR. BRIX IN M.J. | 784,869 |  |  |
| TONS CORR. POL IN M.J. | 678,832 |  |  |
| CORR. Bx.% M.J. |  |  |  |
| CORR. Pol% IN M.J. |  |  |  |
| PURITY M.J. |  |  |  |
| M.J. % CANE |  |  |  |
|  |  |  |  |  |
| HOURS AVAILABLE  | 24,00 |  |  |
| STOPS: MECHANICAL  | 2,58 |  |  |
| OPERATIONAL  | 0,42 |  |  |
| NO CANE  | NIL |  |  |
| SCHEDULED  | - |  |  |
| TOTAL STOPS  |  |  |  |
| HOURS CRUSHING  |  |  |  |
| TONS CANE PER HOUR  |  |  |  |
| TONS FIBRE PER HOUR  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **MATERIAL BALANCE** | **D.A.C.** |  | **DAY** | **PREVIOUS** | **WK- TO – DATE** |
|  | POL  | BRIX  | FIB  | POL  | BRIX  | TIB  | POL FACTOR  |  |  |  |
| DAY  |  |  |  | 12,90 | 15,21 | 16,25 | BRIX FACTOR  |  |  |  |
| PREVIOUS  |  |  |  |  |  |  | FIBRE FACTOR  |  |  |  |
| WK-TO-DATE  |  |  |  |  |  |  |  |  |  |  |

WEDNESDAY DAY 3

**DAILY MATERIALS BALANCE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **DAY** | **PREVIOUS**  | **WK TO DATE** |
| SUMMARY  | TONS CANE CRUSHED  | 6193,614 |  |  |
| TONS MIXED JUICE  | 7166,950 |  |  |
| TONS WATER  |  |  |  |
| TONS BAGASSE |  |  |  |
|  |  |  |  |  |
| BAGASSE | TONS Bx IN BAG (Bx % Bag = 2,68) |  |  |  |
| TONS MOIST IN BAG (Moist % Bag = 51,21) |  |  |  |
| TONS FIBRE IN BAG  |  |  |  |
| TONS POL IN BAG (POL % Bag = 1,53) |  |  |  |
| Fib % BAG |  |  |  |
|  |  |  |  |  |
| CANE  | TONS POL IN CANE  |  |  |  |
| TONS BRIX IN CANE  |  |  |  |
| TONS FIBRE IN CANE  |  |  |  |
| POL % CANE  |  |  |  |
| Fib % CANE  |  |  |  |
| Bx 5 CANE  |  |  |  |
| FIBRE IN BAG % CANE (UNCORR) |  |  |  |
| TONS D.A.C. BRIX IN CANE  |  |  |  |
| TONS D.A.C. pol in cane |  |  |  |
| IMBIBITION % FIBRE  |  |  |  |
| IMBIBITION % CANE  |  |  |  |
|  |  |  |  |  |
| EXTRACTION  |  |  |  |
| C.R.E. |  |  |  |
|  |  |  |  |
| M.J. | % SUSP. SOLIDS  | 0,58 |  |  |
| TONS SUSP. SOLIDS  |  |  |  |
| TONS CORR. BRIX IN M.J. | 865,613 |  |  |
| TONS CORR. POL IN M.J. | 748,690 |  |  |
| CORR. Bx.% M.J. |  |  |  |
| CORR. Pol% IN M.J. |  |  |  |
| PURITY M.J. |  |  |  |
| M.J. % CANE |  |  |  |
|  |  |  |  |  |
| HOURS AVAILABLE  | 24,00 |  |  |
| STOPS: MECHANICAL  | 0,17 |  |  |
| OPERATIONAL  | 0,08 |  |  |
| NO CANE  | - |  |  |
| SCHEDULED  | - |  |  |
| TOTAL STOPS  |  |  |  |
| HOURS CRUSHING  |  |  |  |
| TONS CANE PER HOUR  |  |  |  |
| TONS FIBRE PER HOUR  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **MATERIAL BALANCE** | **D.A.C.** |  | **DAY** | **PREVIOUS** | **WK- TO – DATE** |
|  | POL  | BRIX  | FIB  | POL  | BRIX  | TIB  | POL FACTOR  |  |  |  |
| DAY  |  |  |  | 13,01 | 15,29 | 16,28 | BRIX FACTOR  |  |  |  |
| PREVIOUS  |  |  |  |  |  |  | FIBRE FACTOR  |  |  |  |
| WK-TO-DATE  |  |  |  |  |  |  |  |  |  |  |

THURSDAY DAY 4

**DAILY MATERIALS BALANCE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **DAY** | **PREVIOUS** | **WK TO DATE** |
| SUMMARY  | TONS CANE CRUSHED  | 5866,720 |  |  |
| TONS MIXED JUICE  | 6932,770 |  |  |
| TONS WATER  |  |  |  |
| TONS BAGASSE |  |  |  |
|  |  |  |  |  |
| BAGASSE | TONS Bx IN BAG (Bx % Bag = 2,68) |  |  |  |
| TONS MOIST IN BAG (Moist % Bag = 51,21) |  |  |  |
| TONS FIBRE IN BAG  |  |  |  |
| TONS POL IN BAG (POL % Bag = 1,53) |  |  |  |
| Fib % BAG |  |  |  |
|  |  |  |  |  |
| CANE  | TONS POL IN CANE  |  |  |  |
| TONS BRIX IN CANE  |  |  |  |
| TONS FIBRE IN CANE  |  |  |  |
| POL % CANE  |  |  |  |
| Fib % CANE  |  |  |  |
| Bx 5 CANE  |  |  |  |
| FIBRE IN BAG % CANE (UNCORR) |  |  |  |
| TONS D.A.C. BRIX IN CANE  |  |  |  |
| TONS D.A.C. pol in cane |  |  |  |
| IMBIBITION % FIBRE  |  |  |  |
| IMBIBITION % CANE  |  |  |  |
|  |  |  |  |  |
| EXTRACTION  |  |  |  |
| C.R.E. |  |  |  |
|  |  |  |  |
| M.J. | % SUSP. SOLIDS  | 0,58 |  |  |
| TONS SUSP. SOLIDS  |  |  |  |
| TONS CORR. BRIX IN M.J. | 842,34 |  |  |
| TONS CORR. POL IN M.J. | 726,955 |  |  |
| CORR. Bx.% M.J. |  |  |  |
| CORR. Pol% IN M.J. |  |  |  |
| PURITY M.J. |  |  |  |
| M.J. % CANE |  |  |  |
|  |  |  |  |  |
| HOURS AVAILABLE  | 24,00 |  |  |
| STOPS: MECHANICAL  | 1,00 |  |  |
| OPERATIONAL  | 0,50 |  |  |
| NO CANE  | - |  |  |
| SCHEDULED  | - |  |  |
| TOTAL STOPS  |  |  |  |
| HOURS CRUSHING  |  |  |  |
| TONS CANE PER HOUR  |  |  |  |
| TONS FIBRE PER HOUR  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **MATERIAL BALANCE** | **D.A.C.** |  | **DAY** | **PREVIOUS** | **WK- TO – DATE** |
|  | POL  | BRIX  | FIB  | POL  | BRIX  | TIB  | POL FACTOR  |  |  |  |
| DAY  |  |  |  | 12,88 | 15,17 | 16,30 | BRIX FACTOR  |  |  |  |
| PREVIOUS  |  |  |  |  |  |  | FIBRE FACTOR  |  |  |  |
| WK-TO-DATE  |  |  |  |  |  |  |  |  |  |  |

FRIDAY DAY 5

4.3 Knowledge Topic 3: Stock Taking (10%)

Topic elements to be covered include:

* KT0301 Purpose
* KT0302 Data collection
* KT0303 Sampling

Internal Assessment Criteria and Weight

* IAC0301 Knowledge of accurate stocking as a component of materials balance can be demonstrated
* (Weight 10%)

**Learning activity 3.1: Individual Learning activity: 6 hours (150 marks)**



**Learning Objective:** Demonstrate an understanding of stocktaking of factory products calculations.

**Task:** Read each question carefully and write your answers in the spaces provided.

1. Using the following stock figures, calculate the Estimated tons of Brix and Estimated tons of pol in stock. Then calculate the Estimated tons of sugar and the tons of molasses that will be produced from the stock. (50)

Use the wantage tables provided in Appendix A.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Brix** | **Purity** |
| Clarifier No.1 | 439.60 m3 | 12.00 | 84.90 |
| Clarifier No. 2 | 293.20 m3 | 12.00 | 84.90 |
| Syrup tank | 152 cm out | 68.40 | 85.30 |
| A-crystalliser No. 1 | 96 cm out | 93.00 | 84.40 |
| A-crystalliser No. 2 | 26 cm out | 93.00 | 84.40 |
| B-crystalliser No. 1 | 46 cm out | 93.40 | 68.70 |
| B-crystalliser No. 2 | 42 cm out | 93.40 | 68.70 |
| C-crystalliser No. 1 | 32 cm out | 96.30 | 52.90 |
| C-crystalliser No. 2 | 34 cm out | 96.30 | 52.90 |
| C-crystalliser No. 3 | 63 cm out | 96.30 | 52.90 |
| C-crystalliser No.4 | 32 cm out | 96.30 | 52.90 |
| A-molasses tank | 186 cm out | 70.80 | 68.90 |
| B-molasses tank | 366 cm out | 71.50 | 45.50 |
| Magma tank | 98 cm out | 91.00 | 68.90 |

Pol % Sugar 99.40

Moisture % Sugar 0.10

Pol % Molasses 26.98

Brix % Molasses 89.04

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Product** | Wantage (cm out) | Volume (m3) | Brix % | Purity % | Tons Bx/m3tons/m3 | Ton Brix | Ton pol |
| Clarifier No. 1 |  |  |  |  |  |  |  |
| Clarifier No. 2 |  |  |  |  |  |  |  |
| Syrup tank |  |  |  |  |  |  |  |
| A-crystalliser No. 1 |  |  |  |  |  |  |  |
| A-crystalliser No. 2 |  |  |  |  |  |  |  |
| B-crystalliser No. 1 |  |  |  |  |  |  |  |
| B-crystalliser No. 2 |  |  |  |  |  |  |  |
| C-crystalliser No. 1 |  |  |  |  |  |  |  |
| C-crystalliser No. 2 |  |  |  |  |  |  |  |
| C-crystalliser No.3 |  |  |  |  |  |  |  |
| C-crystalliser No. 4 |  |  |  |  |  |  |  |
| A-molasses tank |  |  |  |  |  |  |  |
| B-molasses tank |  |  |  |  |  |  |  |
| Magma tank |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Stock Purity = \_\_\_\_\_\_\_\_\_\_\_\_\_× 100

SJM Recovery = $\frac{S (J-M)}{J (S-M)}$ = $\frac{ ( - )}{ ( - )}$ × 100 = \_\_\_\_\_\_\_\_\_\_\_\_%

Tons of pol in Sugar = $\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}{100}$ × $\frac{\\_\\_\\_\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_tons

Tons of Sugar = $\frac{\\_\\_\\_\\_\\_\\_}{100}$ × $\frac{\\_\\_\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_ tons

Tons of Pol in Molasses = \_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_ tons

Tons of Molasses =\_\_\_\_\_100\_\_\_-$ \frac{\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_ tons

1. Using the following stock figures, calculate the Estimated tons of Brix and Estimated tons of Pol in stock. Then calculate the Estimated tons of sugar and the tons of molasses that will be produced from the stock. (50)

Use the wantages tables provided in Appendix A.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Brix** | **Purity** |
| Clarifier No.1 | 439.60 m3 | 13.00 | 83.60 |
| Clarifier No. 2 | 293.20 m3 | 13.00 | 83.60 |
| Syrup tank | 148 cm out | 70.40 | 84.60 |
| A-crystalliser No. 1 | 92 cm out | 92.50 | 84.20 |
| A-crystalliser No. 2 | 34 cm out | 92.50 | 84.20 |
| B-crystalliser No. 1 | 42 cm out | 93.20 | 68.30 |
| B-crystalliser No. 2 | 50 cm out | 93.20 | 68.30 |
| C-crystalliser No. 1 | 36 cm out | 96.50 | 51.90 |
| C-crystalliser No. 2 | 38 cm out | 96.50 | 51.90 |
| C-crystalliser No. 3 | 40 cm out | 96.50 | 51.90 |
| C-crystalliser No.4 | 38 cm out | 96.50 | 51.90 |
| A-molasses tank | 126 cm out | 70.40 | 69.10 |
| B-molasses tank | 332 cm out | 70.90 | 46.00 |
| Magma tank | 78 cm out | 90.00 | 68.20 |

Pol % Sugar 99.38

Moisture % Sugar 0.12

Pol % Molasses 27.04

Brix % Molasses 86.53

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Product** | Wantage (cm out) | Volume (m3) | Brix % | Purity % | Tons Bx/m3tons/m3 | Ton Brix | Ton pol |
| Clarifier No. 1 |  |  |  |  |  |  |  |
| Clarifier No. 2 |  |  |  |  |  |  |  |
| Syrup tank |  |  |  |  |  |  |  |
| A-crystalliser No. 1 |  |  |  |  |  |  |  |
| A-crystalliser No. 2 |  |  |  |  |  |  |  |
| B-crystalliser No. 1 |  |  |  |  |  |  |  |
| B-crystalliser No. 2 |  |  |  |  |  |  |  |
| C-crystalliser No. 1 |  |  |  |  |  |  |  |
| C-crystalliser No. 2 |  |  |  |  |  |  |  |
| C-crystalliser No.3 |  |  |  |  |  |  |  |
| C-crystalliser No. 4 |  |  |  |  |  |  |  |
| A-molasses tank |  |  |  |  |  |  |  |
| B-molasses tank |  |  |  |  |  |  |  |
| Magma tank |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Stock Purity \_\_\_\_\_\_\_\_\_\_\_\_\_× 100

SJM Recovery = $\frac{S (J-M)}{J (S-M)}$ = $\frac{ ( - )}{ ( - )}$ × 100 = \_\_\_\_\_\_\_\_\_\_\_\_%

Tons of pol in Sugar = $\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}{100}$ × $\frac{\\_\\_\\_\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_tons

Tons of Sugar = $\frac{100}{\\_\\_\\_}$ × $\frac{\\_\\_\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_ tons

Tons of Pol in Molasses = \_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_ tons

Tons of Molasses =$\frac{100}{\\_\\_\\_}$ × $\frac{\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_\_ tons

1. Using the following stock figures, calculate the Estimated tons of Brix and Estimated tons of pol in stock. Then calculate the Estimated tons of sugar and the tons of molasses that will be produced from the stock. (50)

Use the wantage tables provided in Appendix A.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Brix** | **Purity** |
| Clarifier No.1 | 439.60 m3 | 12.00 | 84.70 |
| Clarifier No. 2 | 293.20 m3 | 12.00 | 84.70 |
| Syrup tank | 152 cm out | 68.40 | 85.50 |
| A-crystalliser No. 1 | 96 cm out | 93.20 | 84.20 |
| A-crystalliser No. 2 | 26 cm out | 93.20 | 84.20 |
| B-crystalliser No. 1 | 46 cm out | 93.80 | 68.50 |
| B-crystalliser No. 2 | 42 cm out | 93.80 | 68.50 |
| C-crystalliser No. 1 | 32 cm out | 96.10 | 52.50 |
| C-crystalliser No. 2 | 34 cm out | 96.10 | 52.50 |
| C-crystalliser No. 3 | 63 cm out | 96.10 | 52.50 |
| C-crystalliser No.4 | 32 cm out | 96.10 | 52.50 |
| A-molasses tank | 186 cm out | 70.40 | 68.70 |
| B-molasses tank | 366 cm out | 71.70 | 45.70 |
| Magma tank | 98 cm out | 91.20 | 68.10 |

Pol % Sugar 99.45

Moisture % Sugar 0.08

Pol % Molasses 26.08

Brix % Molasses 86.32

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Product** | Wantage (cm out) | Volume (m3) | Brix % | Purity % | Tons Bx/m3tons/m3 | Ton Brix | Ton pol |
| Clarifier No. 1 |  |  |  |  |  |  |  |
| Clarifier No. 2 |  |  |  |  |  |  |  |
| Syrup tank |  |  |  |  |  |  |  |
| A-crystalliser No. 1 |  |  |  |  |  |  |  |
| A-crystalliser No. 2 |  |  |  |  |  |  |  |
| B-crystalliser No. 1 |  |  |  |  |  |  |  |
| B-crystalliser No. 2 |  |  |  |  |  |  |  |
| C-crystalliser No. 1 |  |  |  |  |  |  |  |
| C-crystalliser No. 2 |  |  |  |  |  |  |  |
| C-crystalliser No.3 |  |  |  |  |  |  |  |
| C-crystalliser No. 4 |  |  |  |  |  |  |  |
| A-molasses tank |  |  |  |  |  |  |  |
| B-molasses tank |  |  |  |  |  |  |  |
| Magma tank |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

Stock Purity \_\_\_\_\_\_\_\_\_\_\_\_\_× 100

SJM Recovery = $\frac{S (J-M)}{J (S-M)}$ = $\frac{ ( - )}{ ( - )}$ × 100 = \_\_\_\_\_\_\_\_\_\_\_\_%

Tons of pol in Sugar = $\frac{\\_\\_\\_\\_\\_\\_\\_\\_\\_\\_}{100}$ × $\frac{\\_\\_\\_\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_\_\_\_tons

Tons of Sugar = $\frac{100}{\\_\\_\\_}$ × $\frac{\\_\\_\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_ tons

Tons of Pol in Molasses = \_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_ tons

Tons of Molasses =$\frac{100}{\\_\\_\\_}$ × $\frac{\\_\\_\\_}{1}$ = \_\_\_\_\_\_\_\_\_\_\_ tons

4.4 Knowledge Topic 4: Calculations (25%)

Topic elements to be covered include:

* KT0401 Factory Performance Calculations
* KT0402 Products in process
* KT0403 Calculations

Internal Assessment Criteria and Weight

* IAC0401 Knowledge of formulas and accurate application can be demonstrated.
* (Weight 25%)

**Learning activity 4.1: Individual Learning activity: 4 hours (100 marks)**



**Learning Objective:** Demonstrate an understanding and knowledge of formulas and the accurate application thereof.

**Task:** Complete the factory performance calculations for the “POLSASA” worksheet provided below. Extra space is provided for your calculations – Please show your workings in the space provided.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **WEEK NUMBER** | **1** | **2** | **3** | **4** | **5** | **35** |
|  |
| **WEEK SUGAR & FINAL MOLASSES ANALYSES** |
| 1 | POL & SUGAR | 99.52 | 99.48 | 99.31 | 99.37 | 99.28 | 99.25 |
| 2 | MOISTURE % SUGAR | 0.08 | 0.09 | 0.12 | 0.11 | 0.13 | 0.15 |
| 3 | PURITY SUGAR |  |  |  |  |  |  |
| 4 | POL % FINAL MOLASSES | 29.98 | 31.58 | 32.85 | 33.05 | 32.46 | 24.79 |
| 5 | BRIX % FINAL MOLASSES | 82.50 | 83.56 | 83.98 | 84.41 | 84.02 | 85.28 |
| 6 | PURITY FINAL MOLASSES |  |  |  |  |  | 40.80 |
| **STOCK SUGAR & FINAL MOLASSES ESTIMATED** |
| 7 | TONS SUGAR IN BINS | 2.819 | 0.850 | 0.000 | 1.223 | 2.789 | 0 |
| 8 | TONS POL IN STOCK | 7.770 | 6.623 | 7.585 | 8.003 | 8.413 | 0 |
| 9 | TONS BRIX IN STOCK | 11.227 | 9.461 | 11.154 | 11.599 | 11.525 | 0 |
| 10 | STOCK PURITY |  |  |  |  |  | 0 |
| 11 | SJM RECOVERY |  |  |  |  |  | 0 |
| 12 | TONS POL IN SUGAR EST |  |  |  |  |  | 0 |
| 13 | TONS SUGAR EST |  |  |  |  |  | 0 |
| 14 | TONS POL IN FIN. MOL EST. |  |  |  |  |  | 0 |
| 15 | TONS FIN. MOL. EST. |  |  |  |  |  | 0 |
| **V.H.P. SUGAR** |
| 16 | TONS MADE WEEK | 9.838 | 10.372 | 18.753 | 22.300 | 20.369 | 14.179 |
| 17 | TONS MADE PREVIOUS | 0.000 |  |  |  |  | 952.566 |
| 18 | TONS MADE TO-DATE |  |  |  |  |  |  |
| 19 | TONS EST IN STOCK & BINS |  |  |  |  |  | 0.000 |
| 20 | TONS M & E TO-DATE |  |  |  |  |  |  |
| 21 | TONS M & E PREVIOUS | 0.000 |  |  |  |  | 953.657 |
| 22 | TONS M & E WEEK |  |  |  |  |  |  |
| 23 | TONS POL M & E WEEK |  |  |  |  |  |  |
| 24 | TONS POL M & E PREVIOUS | 0.000 |  |  |  |  | 948.535 |
| 25 | TONS POL M & E TO-DATE |  |  |  |  |  |  |
| **FINAL MOLASSES** |
| 26 | TONS MADE WEEK | 8.311 | 1.778 | 6.252 | 9.355 | 8.102 | 17.375 |
| 27 | TONS MADE PREVIOUS | 0.000 |  |  |  |  | 273.802 |
| 28 | TONS MADE TO-DATE |  |  |  |  |  |  |
| 29 | TONS EST. IN STOCK |  |  |  |  |  | 0.000 |
| 30 | TONS M & E TO-DATE |  |  |  |  |  |  |
| 31 | TONS M & E PREVIOUS | 0.000 |  |  |  |  | 286.601 |
| 32 | TONS M & E WEEK |  |  |  |  |  |  |
| 33 | TONS POL M & E WEEK |  |  |  |  |  |  |
| 34 | TONS POL M & E PREVIOUS | 0.000 |  |  |  |  | 83.004 |
| 35 | TONS POL M & E TO-DATE |  |  |  |  |  |  |

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| **FILTER CAKE** |
| 36 | TONS MADE WEEK | 7.825 | 8.502 | 8.998 | 9.033 | 8.473 | 4.080 |
| 37 | TONS PREVIOUS | 0.000 |  |  |  |  | 367.915 |
| 38 | TONS TO-DATE |  |  |  |  |  |  |
| 39 | TONS POL WEEK | 0.257 | 0.303 | 0.324 | 0.35 | 0.333 | 0.090 |
| 40 | TONS POL PREVIOUS | 0.000 |  |  |  |  | 10.609 |
| 41 | TONS POL TO-DATE |  |  |  |  |  |  |
| **BAGASSE** |
| 42 | TONS MADE WEEK | 58.516 | 60.603 | 55.752 | 58.369 | 57.456 | 30.613 |
| 43 | TONS PREVIOUS | 0.000 |  |  |  |  | 2799.290 |
| 44 | TONS TO-DATE |  |  |  |  |  |  |
| 45 | TONS POL WEEK | 0.738 | 0.748 | 0.653 | 0.728 | 0.698 | 0.614 |
| 46 | TONS POL PREVIOUS | 0.000 |  |  |  |  |  |
| 47 | TONS POL TO-DATE |  |  |  |  |  |  |
| **MIXED JUICE** |
| 48 | TONS MADE WEEK | 238.293 | 240.357 | 230.246 | 243.842 | 238.159 | 155.313 |
| 49 | TONS PREVIOUS | 0.000 |  |  |  |  |  |
| 50 | TONS TO-DATE |  |  |  |  |  |  |
| 51 | TONS CORRECTED POL WEEK | 24.699 | 25.123 | 22.752 | 26.021 | 24.996 | 15.143 |
| 52 | TONS CORR. POL PREVIOUS | 0.000 |  |  |  |  | 1039.000 |
| 53 | TONS CORR. POL TO-DATE |  |  |  |  |  |  |
| **CANE** |
| 54 | TONS CRUSHED WEEK | 205.968 | 208.751 | 202.421 | 210.635 | 205.562 | 129.684 |
| 55 | TONS CRUSHED PREVIOUS | 0.000 |  |  |  |  | 8482.120 |
| 56 | TONS CRUSHED TO-DATE |  |  |  |  |  |  |
| 57 | TONS POL WEEK |  |  |  |  |  |  |
| 58 | TONS POL PREVIOUS | 0.000 |  |  |  |  | 1065.154 |
| 59 | TONS POL TO-DATE |  |  |  |  |  |  |
| **POL UNDETERMINED ON POL IN MIXED JUICE** |
| 60 | TONS LOST WEEK |  |  |  |  |  |  |
| 61 | TONS PREVIOUS | 0.000 |  |  |  |  |  |
| 62 | TONS TO-DATE |  |  |  |  |  |  |
| **POL BALANCE % POL IN CANE** |
| 63 | POL IN BAGASSE WEEK |  |  |  |  |  |  |
| 64 | POL IN BAGASSE TO-DATE |  |  |  |  |  |  |
| 65 | POL IN F. CAKE WEEK |  |  |  |  |  |  |
| 66 | POL IN F.CAKE TO-DATE |  |  |  |  |  |  |
| 67 | POL F. MOL. M & E WEEK |  |  |  |  |  |  |
| 68 | POL F. MOL M & E TO-DATE |  |  |  |  |  |  |
| 69 | POL UNDETERMINED WEEK |  |  |  |  |  |  |
| 70 | POL UNDETERMINEDTO-DATE |  |  |  |  |  |  |
| 71 | TONS POL IN SUGAR M & E WK |  |  |  |  |  |  |
| 72 | TONS POL IN SUGAR M & E TD |  |  |  |  |  |  |
| 73 | EXTRACTION FOR WEEK |  |  |  |  |  |  |
| 74 | EXTRACTION TO-DATE |  |  |  |  |  |  |
| 75 | B.H.R. WEEK |  |  |  |  |  |  |
| 76 | B.H.R. PREVIOUS |  |  |  |  |  |  |
| 77 | OVERALL REC. WEEK |  |  |  |  |  |  |
| 78 | OVERALL REC. TO-DATE |  |  |  |  |  |  |

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| **QUALITY CONTROL** |
| 79 | POL % CANE WEEK |  |  |  |  |  |  |
| 80 | POL % CANE TO-DATE |  |  |  |  |  |  |
| 81 | POL % SUGAR M & E WEEK |  |  |  |  |  |  |
| 82 | POL % SUGAR M & E TO-DATE |  |  |  |  |  |  |
| 83 | POL % MOL. M & E WEEK |  |  |  |  |  |  |
| 84 | POL % MOL. M & E TO-DATE |  |  |  |  |  |  |
| 85 | POL % BAGASSE WEEK |  |  |  |  |  |  |
| 86 | POL % BAGASSE TO-DATE |  |  |  |  |  |  |
| 87 | POL FILTER CAKE WEEK |  |  |  |  |  |  |
| 88 | POL FILTER CAKE TO-DATE |  |  |  |  |  |  |
| 89 | CANE TO SUGAR RATIO WEEK |  |  |  |  |  |  |
| 90 | CANE TO SUGAR RATIO TD |  |  |  |  |  |  |

**SPACE FOR CALCULATIONS**

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1. CONCLUSION OF KNOWLEDGE MODULE 3: SUGAR PROCESSING FACTORY CONTROL CALCULATIONS

Throughout this knowledge module you have been provided opportunities to complete formative learning activities. You have captured your results in this Learner Workbook.

The total marks for this Knowledge Module are as follows:

|  |  |  |
| --- | --- | --- |
| **Knowledge Module** | **Total Marks** | **Marks attained** |
| KM-03-KT01: Introduction to factory control concepts (40%) | 90 |  |
| KM-03-KT02: Materials balance (25%) | 250 |  |
| KM-03-KT03: Stock taking (10%) | 150 |  |
| KM-03-KT04: Calculations (25%) | 100 |  |
| **Total Marks** | **590 marks** |  |



APPENDIX A: WANTAGE TABLES

w**antage Table 1: Syrup Tank**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 104.0 | 103.7 | 103.0 | 102.2 | 101.5 |
| 20 | 100.8 | 100.1 | 99.4 | 98.6 | 97.9 |
| 30 | 97.20 | 96.5 | 95.8 | 95.0 | 94.3 |
| 40 | 93.6 | 92.9 | 92.9 | 91.4 | 90.7 |
| 50 | 90.0 | 89.3 | 88.6 | 87.8 | 87.1 |
| 60 | 86.4 | 85.7 | 85.0 | 84.2 | 83.5 |
| 70 | 82.8 | 82.1 | 81.4 | 80.6 | 79.9 |
| 80 | 79.2 | 78.5 | 77.8 | 77.0 | 76.3 |
| 90 | 75.6 | 74.9 | 74.2 | 73.4 | 72.7 |
| 100 | 72.0 | 71.3 | 70.6 | 69.8 | 69.1 |
| 110 | 68.4 | 67.7 | 67.0 | 66.2 | 65.5 |
| 120 | 64.8 | 64.1 | 63.4 | 62.6 | 61.9 |
| 130 | 61.2 | 60.5 | 59.8 | 59.0 | 58.3 |
| 140 | 87.6 | 56.9 | 56.2 | 55.4 | 54.7 |
| 150 | 54.0 | 53.3 | 56.2 | 51.6 | 51.1 |
| 160 | 50.4 | 49.7 | 49.0 | 48.2 | 47.5 |
| 170 | 46.8 | 46.1 | 45.4 | 44.6 | 43.9 |
| 180 | 43.2 | 42.5 | 41.8 | 41.0 | 40.3 |
| 190 | 39.6 | 38.9 | 38.2 | 37.4 | 36.7 |
| 200 | 36.0 | 35.2 | 34.6 | 33.8 | 33.1 |
| 210 | 32.4 | 31.7 | 31.0 | 30.2 | 29.5 |
| 220 | 26.8 | 28.1 | 27.4 | 26.6 | 25.9 |
| 230 | 25.2 | 24.5 | 23.8 | 23.0 | 22.3 |
| 240 | 21.6 | 20.9 | 20.2 | 19.4 | 18.7 |
| 250 | 18.0 | 17.3 | 16.6 | 15.8 | 15.1 |
| 260 | 14.4 | 13.7 | 13.0 | 12.2 | 11.5 |
| 270 | 10.8 | 10.1 | 9.4 | 8.6 | 7.9 |
| 280 | 7.2 | 6.5 | 5.8 | 5.0 | 4.2 |
| 290 | 3.6 | 2.9 | 2.2 | 1.4 | 0.7 |
|  |  |  |  |  |  |

**Wantage Table 2: A molasses Tank**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 62.4 | 62.1 | 61.8 | 61.4 | 61.1 |
| 20 | 60.8 | 60.5 | 60.2 | 59.8 | 59.5 |
| 30 | 59.2 | 58.9 | 58.6 | 58.2 | 57.9 |
| 40 | 57.6 | 57.3 | 57.0 | 56.6 | 56.3 |
| 50 | 56.0 | 55.7 | 55.4 | 55.0 | 54.7 |
| 60 | 54.4 | 54.1 | 53.8 | 53.4 | 53.1 |
| 70 | 52.8 | 52.5 | 52.2 | 51.8 | 51.5 |
| 80 | 51.2 | 50.9 | 50.6 | 50.2 | 49.9 |
| 90 | 49.6 | 49.3 | 49.0 | 48.6 | 48.3 |
| 100 | 48.0 | 47.7 | 47.4 | 47.0 | 46.7 |
| 110 | 46.4 | 46.1 | 45.8 | 45.4 | 45.1 |
| 120 | 44.8 | 44.5 | 44.2 | 43.8 | 43.5 |
| 130 | 43.2 | 42.9 | 42.6 | 42.2 | 41.9 |
| 140 | 41.6 | 41.3 | 41.0 | 40.6 | 40.3 |
| 150 | 40.0 | 39.7 | 39.4 | 39.0 | 38.7 |
| 160 | 38.4 | 38.1 | 37.8 | 37.4 | 37.1 |
| 170 | 36.8 | 36.5 | 36.2 | 35.8 | 35.5 |
| 180 | 35.2 | 34.9 | 34.6 | 34.2 | 33.9 |
| 190 | 33.6 | 33.3 | 33.0 | 32.6 | 32.3 |
| 200 | 32.0 | 31.7 | 31.4 | 31.0 | 30.7 |
| 210 | 30.4 | 30.1 | 29.8 | 29.4 | 29.1 |
| 220 | 28.8 | 28.5 | 28.2 | 27.8 | 27.5 |
| 230 | 27.2 | 26.9 | 26.6 | 26.2 | 25.9 |
| 240 | 25.6 | 25.3 | 25.0 | 24.6 | 24.3 |
| 250 | 24.0 | 23.7 | 23.4 | 23.0 | 22.7 |
| 260 | 22.4 | 22.1 | 21.8 | 21.4 | 21.1 |
| 270 | 20.8 | 20.5 | 20.2 | 19.8 | 19.5 |
| 280 | 19.2 | 18.9 | 18.6 | 18.2 | 17.9 |
| 290 | 17.6 | 17.3 | 17.0 | 16.6 | 16.3 |
| 300 | 16.0 | 15.7 | 15.4 | 15.0 | 14.7 |
| 310 | 14.4 | 14.1 | 13.8 | 13.4 | 13.1 |
| 320 | 12.8 | 12.5 | 12.2 | 11.8 | 11.5 |
| 330 | 11.2 | 10.9 | 10.6 | 10.2 | 9.9 |
| 340 | 9.6 | 9.3 | 9.0 | 8.6 | 8.3 |
| 350 | 8.0 | 7.7 | 7.4 | 7.0 | 6.7 |
| 360 | 6.4 | 6.1 | 5.8 | 5.4 | 5.1 |
| 370 | 4.8 | 4.5 | 4.2 | 3.8 | 3.5 |
| 380 | 3.2 | 2.9 | 2.6 | 2.2 | 1.9 |
| 390 | 1.6 | 1.3 | 1.0 | 0.6 | 0.3 |

**Wantage Table 3: B Molasses: 6 × 4 × 5m**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 117.6 | 117.1 | 116.6 | 116.2 | 115.7 |
| 20 | 115.2 | 114.7 | 114.2 | 113.8 | 113.3 |
| 30 | 112.8 | 112.3 | 111.8 | 111.4 | 110.9 |
| 40 | 110.4 | 109.9 | 109.4 | 109.0 | 108.5 |
| 50 | 108.0 | 107.5 | 107.0 | 106.6 | 106.1 |
| 60 | 105.6 | 105.1 | 104.6 | 104.2 | 103.7 |
| 70 | 103.2 | 102.7 | 102.2 | 101.8 | 101.3 |
| 80 | 100.0 | 100.3 | 99.8 | 99.4 | 98.9 |
| 90 | 98.4 | 97.9 | 97.4 | 97.0 | 96.5 |
| 100 | 96.0 | 97.9 | 97.4 | 97.0 | 69.5 |
| 110 | 93.6 | 93.1 | 92.6 | 92.2 | 91.7 |
| 120 | 91.2 | 90.7 | 90.2 | 89.8 | 89.3 |
| 130 | 88.8 | 88.3 | 87.8 | 87.4 | 86.9 |
| 140 | 86.4 | 85.9 | 85.4 | 85.0 | 84.5 |
| 150 | 84.0 | 83.5 | 83.0 | 82.6 | 82.1 |
| 160 | 81.6 | 81.1 | 80.6 | 80.2 | 79.7 |
| 170 | 79.2 | 78.7 | 78.2 | 77.8 | 77.3 |
| 180 | 76.8 | 76.3 | 75.8 | 75.4 | 74.9 |
| 190 | 74.4 | 73.9 | 73.4 | 73.0 | 72.5 |
| 200 | 72.0 | 71.5 | 71.0 | 70.6 | 70.1 |
| 210 | 69.6 | 69.1 | 68.6 | 68.2 | 67.7 |
| 220 | 67.2 | 66.7 | 66.2 | 65.8 | 65.3 |
| 230 | 64.8 | 64.3 | 63.8 | 63.4 | 62.9 |
| 240 | 62.4 | 61.9 | 61.4 | 61.0 | 60.5 |
| 250 | 60.0 | 59.5 | 59.0 | 58.6 | 58.1 |
| 260 | 57.6 | 57.1 | 56.6 | 56.2 | 55.7 |
| 270 | 55.2 | 54.7 | 54.2 | 53.8 | 53.3 |
| 280 | 52.8 | 52.3 | 51.8 | 51.4 | 50.9 |
| 290 | 50.4 | 49.9 | 49.4 | 49.0 | 48.5 |
| 300 | 48.0 | 47.5 | 47.0 | 46.6 | 46.1 |
| 310 | 45.6 | 45.1 | 44.6 | 44.2 | 43.7 |
| 320 | 43.2 | 42.7 | 42.2 | 41.8 | 41.3 |
| 330 | 40.8 | 40.3 | 39.8 | 39.4 | 38.9 |
| 340 | 38.4 | 37.9 | 37.4 | 37.0 | 36.5 |
| 350 | 36.0 | 35.5 | 35.0 | 34.6 | 34.1 |
| 360 | 33.6 | 33.1 | 32.6 | 32.2 | 31.7 |
| 370 | 31.2 | 30.7 | 30.2 | 29.8 | 29.3 |
| 380 | 28.8 | 28.3 | 27.8 | 27.4 | 26.9 |
| 390 | 26.4 | 25.9 | 25.4 | 25.0 | 24.5 |
| 400 | 24.0 | 23.5 | 23.0 | 22.6 | 22.1 |
| 410 | 21.6 | 21.1 | 20.6 | 20.2 | 19.7 |
| 420 | 19.2 | 18.7 | 18.2 | 17.8 | 17.3 |
| 430 | 16.8 | 16.3 | 15.8 | 15.4 | 14.9 |
| 440 | 14.4 | 13.9 | 13.4 | 13.0 | 12.5 |
| 450 | 12.0 | 11.5 | 11.0 | 10.6 | 10.1 |
| 460 | 9.6 | 9.1 | 8.6 | 8.2 | 7.7 |
| 470 | 7.2 | 6.7 | 6.2 | 5.8 | 5.3 |
| 480 | 4.8 | 4.3 | 3.8 | 3.4 | 2.9 |
| 490 | 2.4 | 1.9 | 1.4 | 1.0 | 0.5 |

**Wantage Table 4: A Crystallisers : 15 × 4 × 2m**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 114.0 | 112.8 | 111.6 | 110.4 | 109.2 |
| 20 | 108.0 | 106.8 | 105.6 | 104.4 | 103.2 |
| 30 | 102.0 | 100.8 | 99.6 | 98.4 | 97.2 |
| 40 | 96.0 | 94.8 | 93.6 | 92.4 | 91.2 |
| 50 | 90.0 | 88.8 | 87.6 | 86.4 | 85.2 |
| 60 | 84.0 | 82.8 | 81.6 | 80.4 | 79.2 |
| 70 | 78.0 | 76.8 | 75.6 | 74.4 | 73.2 |
| 80 | 72.0 | 70.8 | 69.6 | 68.4 | 67.2 |
| 90 | 66.0 | 64.8 | 63.6 | 62.4 | 61.2 |
| 100 | 60.0 | 58.8 | 57.6 | 56.4 | 55.2 |
| 110 | 54.0 | 52.8 | 51.6 | 50.4 | 49.2 |
| 120 | 48.0 | 46.8 | 45.6 | 44.4 | 43.2 |
| 130 | 42.0 | 40.8 | 39.6 | 38.4 | 37.2 |
| 140 | 36.0 | 34.8 | 33.6 | 32.4 | 31.2 |
| 150 | 30.0 | 28.8 | 27.6 | 26.4 | 25.2 |
| 160 | 24.0 | 22.8 | 21.6 | 20.4 | 19.2 |
| 170 | 18.0 | 16.8 | 15.6 | 14.4 | 13.2 |
| 180 | 12.0 | 10.8 | 9.6 | 8.4 | 7.2 |
| 190 | 6.0 | 4.8 | 3.6 | 2.4 | 1.2 |

**B Crystallisers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 136.8 | 135.4 | 133.9 | 132.5 | 131.0 |
| 20 | 129.6 | 128.2 | 126.7 | 125.3 | 123.8 |
| 30 | 122.4 | 121.0 | 119.5 | 118.1 | 116.6 |
| 40 | 115.2 | 113.8 | 112.3 | 110.9 | 109.4 |
| 50 | 108.0 | 106.6 | 105.1 | 103.7 | 102.2 |
| 60 | 100.8 | 99.4 | 97.9 | 96.5 | 95.0 |
| 70 | 93.6 | 32.2 | 90.7 | 89.3 | 87.7 |
| 80 | 86.4 | 85.0 | 83.5 | 82.1 | 80.6 |
| 90 | 79.2 | 77.8 | 76.3 | 74.9 | 73.6 |
| 100 | 72.0 | 70.6 | 69.1 | 67.7 | 66.2 |
| 110 | 64.8 | 63.4 | 61.9 | 60.5 | 59.0 |
| 120 | 57.6 | 56.2 | 54.7 | 53.3 | 51.8 |
| 130 | 50.4 | 49.0 | 47.5 | 46.1 | 44.6 |
| 140 | 43.2 | 41.8 | 40.3 | 38.9 | 37.4 |
| 150 | 36.0 | 34.6 | 33.1 | 31.7 | 30.2 |
| 160 | 28.8 | 27.4 | 25.9 | 24.5 | 23.0 |
| 170 | 21.6 | 20.2 | 18.7 | 17.3 | 15.8 |
| 180 | 14.4 | 13.0 | 11.5 | 10.1 | 8.6 |
| 190 | 7.2 | 5.8 | 4.3 | 2.9 | 1.4 |

**Wantage Table 4: C Crystallisers : 20 × 4 × 2m**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 152.0 | 150.4 | 148.8 | 147.2 | 145.6 |
| 20 | 144.0 | 142.4 | 140.8 | 139.2 | 137.6 |
| 30 | 136.0 | 134.4 | 132.6 | 131.2 | 129.6 |
| 40 | 128.0 | 126.4 | 124.8 | 123.2 | 121.6 |
| 50 | 120.0 | 118.4 | 116.8 | 115.2 | 113.6 |
| 60 | 112.0 | 110.4 | 108.8 | 107.2 | 105.6 |
| 70 | 104.0 | 102.4 | 100.8 | 99.2 | 97.6 |
| 80 | 96.0 | 94.4 | 92.8 | 91.2 | 89.6 |
| 90 | 88.0 | 86.4 | 84.8 | 83.2 | 81.6 |
| 100 | 80.0 | 78.4 | 76.8 | 75.2 | 73.6 |
| 110 | 72.0 | 70.4 | 68.8 | 67.2 | 65.6 |
| 120 | 64.0 | 62.4 | 60.8 | 59.2 | 57.6 |
| 130 | 56.0 | 54.4 | 52.8 | 51.2 | 49.6 |
| 140 | 48.0 | 46.4 | 44.8 | 43.2 | 41.6 |
| 150 | 40.0 | 38.4 | `36.8 | 35.2 | 33.6 |
| 160 | 32.0 | 30.4 | 28.8 | 27.2 | 25.6 |
| 170 | 24.0 | 22.4 | 20.8 | 19.2 | 17.6 |
| 180 | 16.0 | 14.4 | 12.8 | 11.2 | 9.6 |
| 190 | 8.0 | 6.4 | 4.8 | 3.2 | 1.6 |

**Magma Tank : 4 × 8 × 2**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| cm | 0 | 2 | 4 | 6 | 8 |
| 10 | 60.8 | 60.2 | 59.5 | 58.9 | 58.2 |
| 20 | 57.6 | 57.0 | 56.3 | 55.7 | 55.0 |
| 30 | 54.4 | 53.8 | 53.1 | 52.5 | 51.8 |
| 40 | 51.2 | 50.6 | 49.9 | 49.3 | 48.6 |
| 50 | 48.0 | 47.4 | 46.7 | 46.1 | 45.4 |
| 60 | 44.8 | 44.2 | 43.5 | 42.9 | 42.2 |
| 70 | 41.6 | 41.0 | 40.3 | 39.7 | 39.0 |
| 80 | 38.4 | 37.8 | 37.1 | 36.5 | 35.8 |
| 90 | 35.2 | 34.6 | 33.9 | 33.3 | 32.6 |
| 100 | 32.0 | 31.4 | 30.7 | 30.1 | 29.4 |
| 110 | 28.8 | 28.2 | 27.5 | 26.9 | 26.2 |
| 120 | 25.6 | 25.0 | 24.3 | 23.7 | 23.0 |
| 130 | 22.4 | 21.8 | 21.1 | 20.5 | 19.8 |
| 140 | 19.2 | 18.6 | 17.9 | 17.3 | 16.6 |
| 150 | 16.0 | 15.4 | 14.7 | 14.1 | 13.4 |
| 160 | 12.8 | 12.2 | 11.5 | 10.9 | 10.2 |
| 170 | 9.6 | 9.0 | 8.3 | 7.7 | 7.0 |
| 180 | 6.4 | 5.8 | 5.1 | 4.5 | 3.8 |
| 190 | 3.2 | 2.6 | 1.9 | 1.3 | 0.6 |