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**Chemical Production
Machine Operator, NQF 2
SAQA ID: 117307
EISA Tools – Written Paper 1**



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EXTERNAL INTEGRATED SUMMATIVE ASSESSMENT

CHEMICAL PRODUCTION MACHINE OPERATOR

Theory Memorandum 1A

Candidate Full Names	
Identity Number	
EISA Registration Number	
Assessment Centre	
Accreditation Number	
Qualification	Chemical Production Machine Operator
SAQA ID	117307
NQF Level	2
Credits	134
Paper Number	1
Date of EISA dd/mm/yyyy	
Duration	2 HOURS
Total Marks	100
Pass Marks	60 %

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2. Students are only allowed to use a black pen for their answers.
3. Students to ensure that their name, surname and EISA registration number appears on the front of your EISA booklet.
4. This is a closed book examination; therefore, no other material or belongings are to be brought into the assessment centre. Should you bring any other material or belongings into the assessment centre, you will be required to leave such at the front of the assessment centre examination room. The assessment centre will not be held liable for any loss or damage to property brought into the assessment centre examination room.
5. All EISA booklets must be handed back to the invigilator intact. No pages may be torn off from the EISA booklet. The removal of EISA booklets from the examination room is prohibited.
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12. Students who are found to be disruptive and unruly in the assessment centre will be requested to leave the assessment centre by the invigilator.

I HEREBY CONFIRM THAT I HAVE READ THE ABOVE EISA RULES AND DECLARE THAT I UNDERSTAND AND ACCEPT THE RULES.

Student Signature..... Date Signed.....

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CANDIDATE INSTRUCTIONS

- Candidate must complete all questions in the EISA
- Candidates must ensure that they use only a black pen when completing this EISA.
- Candidate should ask the invigilator for additional paper should they need more space to write.
- Candidate must ensure that they indicate their Name, Surname and EISA registration number the top of the additional paper.

Also ensure that the question number is clearly marked on your additional paper.

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Question 1

1.1. Workplace scenario

A chemical production operator prepares to start a mixing process involving flammable solvents. The operator must follow the company's Safety Manual and SOP for Chemical Mixing to ensure safe operation. PPE is worn, equipment is checked, risks are reviewed, and incidents are reported as required.

1.1.1.A. Match column A with column B and write correct answer in the space provided. (5 marks)			
Column A	Column B	Answer Column	Mark obtained
I. Personal protective equipment (PPE) required before operating the machine.	A) Review Risk Assessment Register for hazards and control measures.	C	1
II. Procedure to check equipment before starting the mixing process.	B) Record any spills or near-misses using the Incident Reporting Template.	D	1
III. Step to follow when identifying high-risk chemical exposure.	C) Wear gloves, goggles, and respirator.	A	1
IV. Action to take if a minor chemical spill occurs.	D) Follow SOP for chemical mixing to check grounding and valve connections.	B	1
V. Method to ensure communication of safety incidents to supervisors.	E) Notify supervisor and complete incident report within 24 hours.	E	1

(5 Marks)

1.1.1.B. Choose the correct letter and write in the space provided		(5 marks)	
Question Statement		Answer	Marks
I. Which personal protective equipment (PPE) is required before operating the chemical mixing machine? A) Safety boots only B) Gloves, goggles, and respirator C) Earplugs and helmet only D) Lab coat only		B	1
II. What is the correct procedure to check the mixing equipment before starting? A) Turn it on immediately to see if it works B) Follow SOP to check grounding, valves, and connections C) Ask a colleague if it looks safe D) Skip the check if in a hurry		B	1
III. How should high-risk chemical exposure be managed? A) Ignore the risk if it seems minor B) Review the Risk Assessment Register for hazards and control measures C) Only wear gloves D) Report it after the work shift		B	1
IV. What action should be taken if a minor chemical spill occurs?		B	1

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A) Continue working and clean later B) Record the incident using the Incident Reporting Template C) Ignore it and hope no one notices D) Wait for the next supervisor to arrive		
V. How should safety incidents be communicated to supervisors? A) Verbally at the end of the month B) Only if serious injury occurs C) Notify the supervisor immediately and complete an incident report within 24 hours D) Send an email next week	C	1

(5 Marks)

1.1.2.A.	Match column A with column B and write correct answer in the space provided. (5 marks)		
Column A	Column B	Answer	Mark
I. Operator skips PPE while handling corrosive chemicals	A) Legal penalties and fines for violating environmental and safety regulations	B	1
II. Failure to follow proper chemical storage SOP	B) Exposure to toxic chemicals causing burns, respiratory problems, or poisoning	A	1
III. Not following spill containment procedures	C) Chemical leaks or spills causing soil, water, and air contamination	C	1
IV. Ignoring equipment maintenance SOP	D) Equipment failure, production delays, and potential accidents	D	1

V. Failing to report incidents as per SOP	E) Lack of data for risk analysis, delayed corrective actions, and repeated hazards	E	1
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1.1.2.B.	Indicate whether the following statement is True or False, circle the correct answer. (5 marks)			
	Statement(s)	Answer		Marks
I.	Failure to wear proper PPE when handling corrosive chemicals can lead to skin burns and toxic exposure.	True	False	1
II.	Ignoring SOPs for chemical storage has no impact on safety as long as the chemicals are kept indoors.	True	False	1
III.	Not following spill containment procedures can result in environmental pollution and health hazards.	True	False	1
IV.	Fire extinguishers should be inspected and maintained annually.	True	False	1
V.	Failing to report incidents as required in SOPs prevents the company from identifying recurring safety risks	True	False	1

(10 Marks)

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1.1.3. Refer to the pictures below to answer the following questions



1.1.3.	Match column A with column B and write correct answer in the space provided.		
	(5 marks)		
Column A	Column B	Answer Column	Mark obtained
I. Indicates safe exits, first aid points, or emergency equipment.	A) Blue	B	1
II. Warns of hazards such as flammable, toxic, or corrosive materials.	B) Green	C	1
III. Shows fire-fighting equipment or identifies prohibited actions.	C) Yellow	E	1
IV. Tells workers what actions must be taken, such as "Wear gloves" or "Wear helmet."	C) Yellow	A	1
V. Used for workplace guidance, pedestrian routes, or general information.	E) Red	D	1

(5 Marks)

1.1.4. Workplace scenario

The flammable solvents area has leaking drums and lacks appropriate “No Smoking” signage. Additionally, forklifts are operating in close proximity to this section.

Observed Conditions:

- Vapour smell in the area
- Leaking drums of solvent
- Workers smoking near the bay
- No visible fire extinguishers
- Heat from forklift engines

1.1.4.A.	Indicate whether the following statement is True or False, circle the correct answer.			
	Statement(s)	Answer		Marks
I.	The leaking drums of solvent represent a chemical hazard that could cause vapour inhalation and fire.	True	False	1
II.	The absence of “No Smoking” signage has no impact on the safety of the storage area.	True	False	1
III.	Operating forklifts near leaking solvent drums introduces a mechanical hazard that could ignite vapours.	True	False	1
IV.	Poor housekeeping in the storage area is unrelated to fire risk.	True	False	1
V.	Spilled solvents that enter drains or soil present an environmental hazard.	True	False	1

(5Marks)

1.1.4.B Categorise the hazards in the scenario as **mechanical, reactive, physical, chemical, or environmental**. (5 Marks)

Hazards	Category	Marks
I. Leaking drums of flammable solvent releasing vapours.	Chemical	1
II. Obstructed walkways and restricted access to emergency exits.	Physical	1
III. Sparks friction and heat from forklifts near flammable chemicals.	Mechanical	1
IV. Solvent spillage entering drains or soil.	Environmental	1
V. Chemical reactions may result in explosions or fires.	Reactive	1

(10 Marks)

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1.1.5. Refer to safety data to answer the questions to follow

Talc Material Safety Data Sheet (MSDS) – Table Format

Section	Details
Product Name	Talc
Recommended Use	Industrial applications, cosmetics, pharmaceuticals, etc.
Composition	Talc (hydrated magnesium silicate)
First Aid Measures	Move to fresh air if inhaled. Rinse eyes with water if irritated.
Accidental Release	Avoid dust formation. Sweep up and dispose of in accordance with regulations.
Handling & Storage	Store in a dry, well-ventilated area. Minimise dust generation.
Exposure Controls	Use local exhaust ventilation. Wear dust mask if necessary.
Physical Properties	White/grey powder, odourless, insoluble in water.
Toxicological Info	Low toxicity. Chronic inhalation may cause lung effects.
Disposal Considerations	Dispose of in accordance with local regulations.
Other Information	For industrial use only. Keep out of reach of children.

1.1.5.	Indicate whether the following statement is True or False, circle the correct answer.			
	Statement(s)	Answers		Marks
I.	Talc should be stored in a dry, well-ventilated area.	True	False	1
II.	If talc dust is inhaled, the affected person should be given milk to drink	True	False	1
III.	Talc should be disposed of according to local regulations	True	False	1
IV.	Talc dissolves easily in water	True	False	1

V.	Talc is intended for industrial use and should be kept out of reach of children.	True	False	1
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(5 Marks)

1.1.6.

1.1.6.	Indicate whether the following statement is True or False, circle the correct answer. (5 Marks)			
Statement(s)		Answers		Marks
I.	Poor housekeeping can lead to blocked emergency exits and increase the severity of incidents.	True	False	1
II.	It is safe to troubleshoot electrical equipment without isolating power if the malfunction seems minor.	True	False	1
III.	Cleaning chemical spills immediately is part of good housekeeping practice.	True	False	1
IV.	Regular inspections of equipment for unusual noises, leaks, or vibrations are part of troubleshooting procedures.	True	False	1
V.	Housekeeping and equipment maintenance do not affect production efficiency.	True	False	1

(5 Marks)

(45 Marks)

Question 2

2.1. Workplace scenario

Nandi is a chemical plant operator responsible for transferring flammable solvents, corrosive liquids, and powdered chemicals from the storage area to the production mixing tanks. The plant produces specialty chemical blends for industrial use. Proper handling, measuring, and transfer of materials are critical to prevent contamination, ensure safety, and comply with regulations.

2.1.1.	Answer the following questions	(10 Marks)
	I. Explain two ways in which good housekeeping reduces contamination and accidents in the chemical plant” (2 Marks) Learner to list any two 1. It ensures that cleanliness is maintained which helps reduce contamination 2. It ensures that chemicals are properly stored which helps prevent contamination 3. It helps prevent mixing incompatible chemicals hence avoiding cross-contamination. 4. It helps improve hygiene ensuring elimination of microbial growth thus protecting personnel and product integrity 5. It ensures that work areas are clean, organised, and free from obstructions or chemical residues. 6. It helps prevent slips, trips and falls from obstructing materials 7. It helps reduce fire and explosion risks 8. It helps prevent objects from falling 9. It improves product visibility and access	

II. List three ways in which accurate chemical measurements ensure quality products and safety”.

(3 Marks)

Learner to list any three

1. it helps ensure correct product formulation
2. It helps ensure that consistency across batches produced
3. It helps protect consumers and workers
4. It helps detect defective products before they can be released
5. It helps protect against toxic exposure to harmful chemicals
6. It ensures that dangerous reactions are prevented
7. It guarantees consistent quality in the final product.
8. It helps avoid overfilling containers, prevents spills, and reduces the risk of unsafe conditions during transfers.
9. It promotes compliance with product specifications, safe operation and regulations

III. Discuss the benefits of minor repairs to chemical handling equipment and the ongoing flow of processes.

(1 Marks)

Learner to list any one

1. Minor repairs of chemical handling equipments helps prevent total equipment breakdowns, thus reduce safety risks to operators
2. It promotes equipment life span and its reliability which helps boost operational efficiency and the yield of quality products.
3. Carrying out minor repairs helps prevent leaks, spills, and contamination, thereby minimizing the risk of equipment failure. This practice supports uninterrupted production processes and fosters a safe working environment.

4. Minor repairs help with compliance to safety standards required for equipment integrity and safe equipment operations which demonstrate diligence and reduce liability.

IV. Explain why monitoring materials during transfer is important for preventing accidents.

(2 Marks)

Learner to list any one

1. Monitoring allows operators to detect leaks, abnormal flow rates, or blockages early.
2. By noticing deviations quickly, operators can take corrective action before spills occur, preventing contamination of the product and minimizing exposure risks for workers.

V. List two importances of using containment measures, such as drip trays or spill pans, during material transfer. (2 Marks)

Learner to list any two

1. It helps prevent chemical spills and leaks which could contaminate the workarea and the environment
2. It protects operators from hazardous chemicals which cause burns, respiratory illnesses and long-term health effects
3. It eliminate fire and explosion hazards which can be caused by flammable vapours ignited by spilled chemicals
4. Using containment measures ensures compliance with local regulations and helps avoid fines, shutdown and litigations.
5. Containment measures help minimize cleanup cost and downtime as material spills is localised which also helps reduce production interruptions and equipment damage.

(10 Marks)

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2.1.2.	Choose the correct letter and write in the space provided	(5 marks)
Question Statement	Answer	Marks
I. Which of the following is a correct safety measure during chemical transfer? A. Secure hoses and control flow rate B. Leave the transfer process unattended C. Mix chemicals before measuring D. Ignore spills if small	A	1
II. What is the purpose of placing spill trays or containment pans under transfer points? A. To store extra chemicals B. To prevent spills from contaminating the floor or other equipment C. To speed up chemical transfer D. To reduce the need for PPE	B	1
III. After transferring chemicals, what is the correct procedure? A. Leave the hose connected for future use B. Close valves, disconnect hoses safely, clean equipment, and record the transfer C. Store chemicals randomly in any area D. Skip documentation if the batch is small	B	1

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IV. Which of the following prevents contamination during measurement and transfer? A. Measuring chemicals quickly without attention B. Using clean and properly labelled containers and equipment C. Mixing chemicals without SOP guidance D. Ignoring spills	B	1
V. Neglecting safety measures during chemical transfer can result in: A. Contamination of the product B. Equipment damage C. Worker injury D. All of the above	D	1

(5 Marks)

2.1.3.	Answer the following questions (10 Marks)
I. List four methods that loading/offloading operators can use to communicate chemical stock levels in the chemical industry. (4 Marks) Learner to list any four 1. Two Way Radio 2. Intercom 3. Telephone / Cell phone	

4. Face to Face
5. Email
6. Logbook / Shift Reports

II. Underline the correct phrase from the ones below which best describe communication principles. (1 Mark)

1. Relaying the message from the receiver via a medium to the transmitter
2. The medium is relayed via the messengers
3. The transmitter relays the message via a medium to the receiver, and the receiver responds to the transmitter.
4. The message is transmitted via the receiver to the messenger

III. Explain how effective team communication and coordination can ensure safety and efficiency in chemical measurement and transfer. (2 Marks)

1. Effective communication ensures all team members are aware of ongoing transfers, potential hazards, and equipment status.
2. Coordination prevents errors such as double-handling, accidental mixing, or unattended operations, improving safety and operational efficiency.

IV. List Three potential consequences of neglecting proper monitoring of stock level (3 Marks)

Learner to choose any 3

1. Running out of essential chemicals can delay manufacturing processes, leading to costly downtime and missed deadlines.
2. Insufficient stock of safety-related chemicals can increase the risk of accidents or make it harder to respond to spills and emergencies.

3. Inconsistent supply may result in improper mixing ratios or substitutions, affecting product quality and compliance with specifications.
4. Emergency purchases, expedited shipping, and lost production time can increase costs and reduce profitability.
5. Over-ordering due to poor monitoring may lead to excess stock, which can expire or become obsolete, resulting in waste and additional disposal costs.
6. Delays or quality issues can damage reputation and lead to loss of business.

(10 Marks)

2.2. Study the provided batch card below and answer the questions that follows

Workplace batch card

Field / Activity	Details / Checklist	Data / Records
Batch Number	Unique identifier for the material	CH-2025-015
Material Name	Chemical being handled	Sodium Sulphate Powder
Supplier	Source of material	ChemSupplies Ltd.
Delivery Date	Date material received	2025-10-28
Expiry / Manufacture Date	Confirm shelf life	2026-04-30
Storage Location	Assigned storage area	Dry Chemical Storage Zone A
Production Area / Destination	Where material will be used	Mixing Tank #3
Operator	Person responsible	Nandi M.
Receiving Inspection	Verify PO, check packaging, confirm identity, inspect quantity, note defects	Date: 2025-10-28; Quantity: 200 kg; Status: Pass; Notes: Packaging intact, labels match PO
Handling Measurement	Wear PPE, follow SOP, use calibrated equipment, avoid contamination	Date: 2025-10-29; Quantity Measured: 50 kg; PPE: Gloves, Goggles, Apron; Method: Calibrated Scale; Notes: Measured carefully
Stock Reconciliation	Compare physical vs recorded stock, note discrepancies	Date: 2025-10-29; Stock on Hand: 150 kg; Recorded Stock: 152 kg; Variance: -2 kg; Notes: Minor spillage

Field / Activity	Details / Checklist	Data / Records
Storage & Transfer	Store safely, segregate incompatible chemicals, use containment, follow SOP	Date: 2025-10-29; Quantity Transferred: 50 kg; From: Storage Zone A; To: Mixing Tank #3; Notes: Flow monitored, spill tray used
Data Tracking & Analysis	Record usage, monitor trends, highlight variance, corrective action	Month: Oct 2025; Received: 200 kg; Used: 50 kg; Remaining: 150 kg; Variance: -2 kg; Notes: Review SOP for handling powder
Approvals	Accountability and compliance	Prepared By: Nandi M.; Reviewed By: L. Dlamini; Approved By: T. Khumalo; Date: 2025-10-29

2.2.1.A.	Indicate whether the following statement is True or False, circle the correct answer. (5 Marks)			
	Statement(s)	Answer		Marks
I.	The inspection process only requires checking the quantity of the received material.	True	False	1
II.	Physical inspection of materials includes examining colour, texture, odour, and packaging	True	False	1
III.	It is not necessary to record the results of an inspection if the material looks fine.	True	False	1
IV.	It is not necessary to record the results of an inspection if the material looks fine.	True	False	1
V.	Non-conforming or defective materials should be used immediately to avoid production delays.	True	False	1

(5 Marks)

2.2.1.B.	Describe the following procedures associated with the inspection of incoming chemical materials. (5 Marks)	
Steps	Procedures	Marks
I. Verify Delivery Documents	Compare the purchase order, delivery note, and supplier invoice to confirm material type, quantity, and batch number	1
II. Physical Inspection	Check packaging for damage or leaks, verify labels and batch numbers, and examine the physical appearance (colour, texture, odour).	1
III. Sampling and Testing	Take a sample for quality tests like purity, moisture, pH or any other test according to the SOP	1
IV. Documentation	Record inspection and /or test results in a batch card, logbook, or electronic system as per the SOP	1
V. Communication	Notify production or quality control teams about accepted, conditionally accepted, or rejected materials.	1

(5 Marks)

2.2.2.	Answer the following questions (10 Marks)
I. Explain the importance of following proper procedures when transferring production materials. (2 Marks)	
Following proper procedures ensure materials are transferred safely, preventing spills, contamination, and exposure to hazardous chemicals.	

II. Explain how proper storage of production materials contributes to workplace safety.

(2 Marks)

Proper storage prevents chemical reactions, contamination, and deterioration of materials. It ensures safe access, reduces the risk of spills or leaks, and protects employees from exposure to hazardous chemicals.

III. Discuss the consequences of neglecting transfer and storage procedures for chemicals.

(2 Marks)

Neglecting proper procedures can lead to spills, contamination, chemical reactions, injuries, defective products, production delays, regulatory violations, environmental harm, and financial losses.

IV. Explain how record-keeping supports compliance and operational efficiency during material transfer and storage.

(2 Marks)

Records provide traceability of each batch, showing when materials were received, transferred, or stored. They help monitor stock levels, identify discrepancies, prevent misuse or loss, support audits, and ensure adherence to SOPs.

V. Describe the role of PPE and containment measures during the transfer of hazardous chemicals.

(2 Marks)

PPE protects operators from exposure to harmful chemicals, dust, or vapours. Containment measures prevent spills from spreading, protecting the workplace and environment. Together, they minimize risks and ensure compliance with safety procedures.

(10 Marks)

2.2.3.	Discuss the operations and functions of the chemical manufacturing equipment mentioned below. (10 Marks)	
Equipment	Functions and Operations	Marks
I. Reactors / Mixing Tanks	Facilitate chemical reactions and ensure uniform mixing; maintain temperature, pressure, and agitation	2
II. Pumps and Conveyors	Transfer liquids, slurries, or powders; maintain flow and accurate dosing; monitor for leaks or clogs.	2
III. Heat Exchangers / Boilers / Heaters	Control process temperatures; ensure energy efficiency and product consistency; prevent overheating.	2
IV. Filtration / Separation Units	Remove solids or separate phases; maintain product quality and prevent contamination downstream.	2
V. Storage Tanks / Silos	Store raw materials, intermediates, or finished products safely; monitor levels and conditions; segregate incompatible chemicals.	2

(10 Marks)

(55 Marks)

..... TOTAL 100 MARKS.....

Marks Allocation Grid (For use by Assessor Only)

Question 1	Marks	Allocated Marks
1.1.1	10	
1.1.2	10	
1.1.3	5	
1.1.4	10	
1.1.5	5	
1.1.6	5	
Total Question 1	45	
Question 2	Marks	Allocated Marks
2.1.1	10	
2.1.2	5	
2.1.3	10	
2.2.1	10	
2.2.2	10	
2.2.3	10	
Total Question 2	55	
Total marks obtained		
Percentage obtained		

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Assessor Details

Assessor Name and Surname	
Registration Number	
Signature	
Date	

Moderator Details

Moderator Name and Surname	
Registration Number	
Signature	
Date	

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