BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS		
QUALIFICATION DEVELOPER (S)	Botswana University of Agriculture and Natural Resources		
TITLE	Diploma in Analytical Chemistry	**NCQF LEVEL**	6
STRANDS (where applicable)	N/A		
FIELD	Natural, Mathematical and Life Sciences	**CREDIT VALUE**	362
SUB FIELD	Physical Sciences		

New Qualification	✓	Legacy Qualification		Renewal Qualification	
				Registration Code	

SUB-FRAMEWORK	General Education		TVET		Higher Education	✓									
QUALIFICATION TYPE	Certificate	I		II		III		IV		V		Diploma	✓	Bachelor	
	Bachelor Honours		Post Graduate Certificate		Post Graduate Diploma										
	Masters		Doctorate/ PhD												

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

The development of a qualification on Diploma in Analytical Chemistry is a response to Botswana's urgent need to transition from a resource-dependent economy to a knowledge-based one, as outlined in key national strategies such as NDP 11 (2017–2023), Botswana Vision 2036, the HRDC Priority Skills (2023/2024), and the ETSSP (2015-2020). These frameworks emphasize the importance of science, technology, and innovation in driving economic growth and socio-economic development.

The focus of this qualification is to cultivate specialized skills in chemical analysis, instrumentation, quality assurance, and laboratory management, which are vital for supporting critical sectors like manufacturing, health, environmental management, and resource monitoring. As Botswana strives to build a skilled workforce capable of supporting industries with advanced analytical capabilities, the qualification aims to bridge existing skills gaps by producing competent technicians and analysts who can operate modern laboratory equipment and conduct environmental and health-related assessments.

Additionally, this qualification aligns directly with national priorities to develop local capacity, reduce reliance on imported analytical services, and foster innovative scientific solutions. It supports government efforts to meet international environmental monitoring standards and strengthens the country's ability to implement effective pollution control, environmental protection, and health initiatives.

By emphasizing practical training in analytical techniques and laboratory skills, the Diploma in Analytical Chemistry qualification will enhance Botswana's industrial resilience, environmental sustainability, and public health systems. It will prepare graduates to contribute to the country's long-term vision of becoming an equitable, prosperous, and sustainable nation by 2036. In essence, this qualification addresses a critical skills shortage in the science and analytical fields, supporting Botswana's broader goal of a knowledge-driven economy and a resilient, innovative society.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with advanced knowledge, skills and competence to:

1. Perform and interpret chemical analyses using standard laboratory techniques and advanced instrumentation to accurately collect, prepare, and analyse samples, interpret results, and identify sources of error.

2. Work safely and ethically in a laboratory environment while complying with relevant regulations.
3. Apply quality assurance and quality control (QA/QC) principles to ensure the reliability of laboratory results.
4. Solve analytical problems and manage projects in a professional laboratory or industrial setting to address laboratory challenges, such as troubleshooting instrument errors or optimizing analytical methods.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

1. Applicants must have a minimum of Certificate IV, NCQF Level 4 (TVET/GE) or equivalent
2. Candidates who do not meet the minimum academic qualifications stated above will be considered through the Recognition of Prior Learning (RPL) and Credit Accumulation Transfer process which shall be administered according to the National RPL and CAT Policy.

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SECTION B	**QUALIFICATION SPECIFICATION**
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1. Apply advanced analytical techniques and instrumentation to perform accurate and reliable chemical analyses across various industrial applications.	1.1. Operate and troubleshoot advanced analytical instruments to obtain accurate and precise chemical analysis results. 1.2. Analyse and interpret data obtained from chemical analyses to make informed recommendations for industrial process improvements and quality control. 1.3. Implement analytical techniques and processes to optimise accuracy, efficiency,

	and adherence to environmental, safety, and industry regulations.
2. Manage laboratory operations effectively by implementing safety protocols, resource management, and ensuring compliance with quality standards.	2.1. Implement and monitor safety protocols to ensure a secure laboratory environment. 2.2. Apply effective resource management techniques to optimize the use of lab materials, equipment, and facilities. 2.3. Ensure compliance with quality standards and regulatory requirements through regular inspections and proper documentation.
3. Demonstrate comprehensive mastery of quality assurance and control processes, ensuring the accuracy, reliability, and integrity of chemical testing and analysis to meet industry standards and uphold scientific rigor.	3.1. Apply quality assurance and control procedures to validate the accuracy and precision of chemical testing results. 3.2. Evaluate testing and analysis data to identify and address any discrepancies, ensuring reliability and integrity. 3.3. Implement corrective actions and continuous improvement measures to uphold high standards of scientific rigor and compliance with industry requirements.
4. Apply innovative thinking and practical problem-solving skills to promote sustainable resource management, enhance environmental protection, and drive technological advancement, aligning their efforts with national development objectives to foster long-term socio-economic and ecological sustainability	4.1. Develop innovative solutions for resource management challenges that support sustainability and environmental protection. 4.2. Analyse complex environmental and societal issues to identify practical and effective problem-solving strategies. 4.3. Implement technological advancements and best practices aligned with national development goals to promote long-term

	ecological and socio-economic sustainability.
5. Communicate scientific results effectively to both technical and non-technical audiences using appropriate terminology and visual aids.	5.1 Present scientific findings clearly and logically using scientific terminology accurately and appropriately for the target audience 5.2 Select and apply suitable data presentation tools such as tables, graphs, charts, and infographics to communicate results effectively. 53 Adapt communication style to suit diverse audiences demonstrating the ability to simplify complex scientific concepts without distorting meaning

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SECTION C	**QUALIFICATION STRUCTURE**				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [5]	**Level [6]**	**Level [7]**	

FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Foundations in Mathematics	12			**12**
	Foundations in Chemistry		14		**14**
	Foundations in Biology	14			**14**
	Foundations in Physics	14			**14**
	Computer Basic Skills	12			**12**
	Communication and Academic Literacy Skills		12		**12**
CORE COMPONENT Subjects/Courses/ Modules/Units	Analytical Chemistry		108		**108**
	Physical Chemistry		28		**28**
	Organic Chemistry		28		**28**
	Inorganic Chemistry		28		**28**
	Laboratory Quality Management Systems		20		**20**
	Entrepreneurship Skills			12	**12**

	Environmental Issues		24		**24**
	Chemistry Project		8		**8**
	Industrial Attachment		18		**18**
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [ ]	**Level [ ]**	**Level [ ]**	
1.					
2.					

Electives (Choose ONE from the list)	Green Chemistry		10		**10**
	Natural Products Chemistry				

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
5	**52**
6	**298**
7	**12**
TOTAL CREDITS	**362**

Rules of Combination:

(Please Indicate combinations for the different constituent components of the qualification)

This qualification has 362 credits and requires three years to complete. The credit distribution is as follows:

Level	Credit Value			
	Fundamental	**Core**	**Elective**	**Total**
5	52	0	0	52
6	0	288	10	298
7	0	12	0	12
Total	**52**	**300**	**10**	**362**

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ASSESSMENT ARRANGEMENTS

Formative Assessment

The weighting of formative assessment is 50% of the final assessment mark.

Summative Assessment

The weighting of summative assessment is 50% of the final assessment mark.

MODERATION ARRANGEMENTS

There will be a provision for internal and external moderation for the qualification. Moderators must be registered and accredited by BQA. Both internal and external moderation will be in accordance with existing institutional and national polices.

RECOGNITION OF PRIOR LEARNING

There will be provision for awarding of the qualification through RPL in line with the national Polices on RPL.

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulation Transfer (CAT) polices which are in line with BQA's Polices will be used so that candidates can gain part or full qualification through the stated arrangements.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathways

1. ***Horizontal Articulation:***

- Diploma in Animal Health and Production
- Diploma in Laboratory Technology
- Diploma in Horticulture
- Similar diploma in applied sciences, chemical sciences, environmental sciences, or related technical fields.

2. ***Vertical Articulation:***

- Bachelor of Science in Analytical Chemistry
- Bachelor of Science in Chemical Technology
- Bachelor of Science in Chemistry
- Bachelor of Science in Applied Chemistry
- Bachelor of Science in chemical sciences, environmental sciences, or related fields.

Employment pathways

- Quality control analyst
- Research technician
- Chemical technologist
- Environmental analyst
- Laboratory Technicians
- Environmental Consultant

QUALIFICATION AWARD AND CERTIFICATION

Candidates meeting the prescribed requirements will be awarded the diploma in accordance with the qualification composition rules and applicable polices.

To be eligible for the award of the Diploma in Analytical Chemistry, candidates should have obtained a minimum of 362 credits.

Upon completion of the qualification, candidate will be awarded and be issued a certificate (Diploma in Analytical Chemistry) as well as transcripts bearing the qualification title as registered on the NCQF.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

Comparison with Durban University of Technology (DUT), South Africa

The two qualifications share the same title being Diploma in Analytical Chemistry. The proposed qualification is at NCQF level 6 and that at DUT is at NQF level 6, but slightly differ in credit value (362 credits for BUAN, versus 380 credits for DUT); they share the main exit outcomes, aiming to equip graduates with competencies and skills required for various chemical industries. Qualifications share the same core modules but differ in electives. Both qualifications emphasise on an assessment criterion based on online quizzes, theory tests, laboratory practicals, research projects, examinations and workplace assessment. The qualification is awarded once learners have achieved 362 credits

for BUAN and 380 credits for DUT and the learners have demonstrated competencies as outlined in the learning outcomes. Finally, both BUAN and DUT share common employment pathways such as teaching, research, environmental agencies, quality regulatory bodies and a broader range of opportunities in chemical industries.

Comparison with Mbeya University of Science and Technology (MUST), Tanzania

The title of the qualification at MUST is Diploma in Laboratory Science and Technology at UQF level 6, while at BUAN is Diploma in Analytical Chemistry at NCQF Level 6. The duration for both qualifications is 3 years. The Diploma in Analytical Chemistry at BUAN focuses more on analytical specialization, while the Diploma in Laboratory Science and Technology at MUST put more emphasis on general science. The modules offered at MUST are varied involving biology, chemistry, physics, equipment maintenance, aiming to equip graduates with skills for general laboratory work. In contrast, BUAN modules emphasize on advanced analytical techniques and laboratory management aiming to equip graduates with competencies and skills required for various chemical industries. The qualifications differ in their assessment approaches, with BUAN using a 50/50 examination and continuous assessment weighting, while MUST weighting semester examinations at 60%. The qualification at MUST is awarded once learners have achieved the required credits, completed industrial attachment and achieved minimum required pass mark for all modules. For BUAN, the qualification is awarded once learners have achieved 362 credits and demonstrated competencies as outlined in the learning outcomes. BUAN graduates have employment opportunities in chemical industries as analysts, while MUST graduates have employment opportunities in biology, physics, chemistry, and general laboratories as laboratory technologists.

Comparison with Saskatchewan Polytechnic, Canada

The title of the qualification at BUAN is Diploma in Analytical Chemistry, while at Saskatchewan Polytechnic the title is Diploma in Chemical Technology. The proposed qualification is at NCQF level 6 while the level was not provided for Saskatchewan Polytechnic. The two qualifications differ in credit value (362 credits for BUAN, versus 104 credits for Saskatchewan) due to different education and credit system. Qualifications share the same core modules but differ in electives. The modules in both qualifications emphasize on chemical analysis, instrumentation and laboratory quality management. Both qualifications use a combination of theory tests, laboratory reports, and examinations. The qualification at Saskatchewan Polytechnic is awarded once learners have completed capstone (research project) and have accumulated 104 credits. For BUAN, the qualification is awarded once the learner has achieved 362 credits and demonstrated competencies

as outlined in the learning outcomes. The employment opportunities for the two qualifications are similar except that at Saskatchewan Polytechnic includes sales and oil gas sectors.
REVIEW PERIOD
This qualification will be reviewed in a period of five years once registered.

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For Official Use Only:

CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	