Model Curriculum

QP Name: Lab Chemist/Analyst – Petroleum Products

QP Code: HYC/Q 3901

QP Version: 1.0

NSQF Level: 5.5

Model Curriculum Version: 1.0

Hydrocarbon Sector Skill Council
Second Floor - OIDB Bhawan,
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Noida, Uttar Pradesh - 201301

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Training Parameters

Sector	Hydrocarbon
Sub-Sector	Downstream
Occupation	Petroleum Product Testing
Country	India
NSQF Level	5.5
Aligned to NCO/ISCO/ISIC Code	NCO/2015 3116.0500
Minimum Educational Qualification and Experience	Completed 3-year of UG(Chemistry) after 12th OR Pursuing 3rd year of 3-year UG (Chemistry) and continuing education OR Completed 2nd year of diploma (Petroleum/Chemical) (after 12th) with 1-year of relevant experience OR Completed 2nd year of 3-year UG(Chemistry) with 1-year of relevant experience OR Completed 3-year diploma after 10th with 2-years of relevant experience OR 12th Grade pass (Science) with 3-years of relevant experience OR Previous relevant Qualification of NSQF Level 5 plus 1.5 years of relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	3-May-2023
Next Review Date	2-May-2026
NSQC Approval Date	3-May-2023
QP Version	1.0
Model Curriculum Creation Date	3-May-2023
Model Curriculum Valid Up to Date	2-May-2026
Model Curriculum Version	1.0
Minimum Duration of the Course	-
Maximum Duration of the Course	600

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills.

- Carry Out testing and analysis of petroleum product
- Working effectively in a team
- Maintain Health & Hygiene Habits

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
HYC/N 3901 Carry Out testing and analysis of petroleum products NOS Version No. –1.0 NSQF Level – 5.5	**90:00**	**240:00**	**60:00**	**Nil**	**390:00**
Module 1: Introduction to Hydrocarbon sector and the job role of Lab Chemist/Analyst – Petroleum Products	03:00	Nil	Nil	Nil	03:00
Module 2: Perform testing and analysis of petroleum products	87:00	240:00	60:00	Nil	387:00
HYC/N 9301 – Work effectively in a team NOS Version No. – 3.0 NSQF Level – 4	**15:00**	**45:00**	**15:00**	**Nil**	**75:00**
Module 3: Effective working in a team	15:00	45:00	15:00	Nil	75:00
HYC/N9302 – Maintain health, safety and security procedures NOS Version No. – 3.0 NSQF Level – 4	**15:00**	**45:00**	**15:00**	**Nil**	**75:00**
Module 4: Health, safety and security	15:00	45:00	15:00	Nil	75:00
Employability Module (Mandatory)	**15:00**	**45:00**	-	-	**60:00**
Total Duration	**135:00**	**375:00**	**90:00**	**Nil**	**600:00**

Module Details

Module 1: Introduction to Hydrocarbon Sector and the job role of Lab Chemist/Analyst – Petroleum Products

Bridge Module

Terminal Outcomes:

- Discuss the Hydrocarbon Sector
- Discuss the job of a Lab Chemist/Analyst – Petroleum Products

Duration: 03:00	**Duration**: 00:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the oil and natural gas sector and its subsectors. • Explain the importance of a Chemist/Analyst – Petroleum Products. • Explain the roles and responsibilities of Lab Chemist/Analyst – Petroleum Products.	
Classroom Aids:	
• White / Black board and Projector • Digital Presentation • Computer/Laptop • Public Addressing System	
Tools, Equipment and Other Requirements	
NA	

Module 2: Carry Out testing and analysis of petroleum products

Mapped to HYC/ N 3901v 1.0

Terminal Outcomes:

- Performs testing/analysing of samples of petroleum products by processing at different stages, using laboratory apparatus and testing equipment and following standard test procedures to determine physical and chemical properties and ensures prescribed standards of products manufactured
- Analyses contents of products to determine presence of gases using appropriate distillation columns
- Compares tests results with specifications and recommends processing changes to improve and control quality of products
- Develop an efficient method for turning petroleum into effective fuel

Duration: 87:00	**Duration**: 240:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe how to check and verify the calibration of testing equipment • Explain the preparation of the test solutions, compounds for conducting tests and follow test procedures • Describe the collection of samples for analysing and testing of crude oil and petroleum product • Describe how to test and analyse the sample as per American Society for Testing and Materials (ASTM) / Bureau of Indian Standards (BIS)/ Institute of Petroleum (IP) standards and procedure • Describe how to determine the crude oil fractions, analysis of fuel additives, oil contaminants, composition, quality and value of crude oil and other petroleum products, such as gasoline, diesel fuel, Naptha, Kerosene / Aviation Turbine Fuel (ATF), lube oil, etc. • Describe how to analyse the sample to determine presence of gases, gum, sulphur, aromatics olefins, water and sediment using appropriate distillation columns • Describe how to separate crude oil into oils with different boiling points to determine their properties • Describe how to ensure the industry standards to maintain the quality	• Demonstrate how to check and verify the calibration of testing equipment • Demonstrate the preparation of the test solutions, compounds for conducting tests and follow test procedures • Demonstrate the collection of samples for analysing and testing of crude oil and petroleum product • Demonstrate how to conduct tests and analyze the sample as per American Society for Testing and Materials (ASTM) / Bureau of Indian Standards (BIS)/ Institute of Petroleum (IP) standards and procedure • Demonstrate how to determine the crude oil fractions, analysis of fuel additives, oil contaminants, composition, quality and value of crude oil and other petroleum products, such as gasoline, diesel fuel, Naptha, Kerosene / Aviation Turbine Fuel (ATF), lube oil, etc. • Demonstrate how to analyse the sample to determine presence of gases, gum, sulphur, aromatics olefins, water and sediment using appropriate distillation columns • Demonstrate how to separate crude oil into oils with different boiling points to determine their properties

• Describe how to collect data of testing and analysis of crude oil and other petroleum products to determine the chemical makeup and physical properties, density and viscosity • Describe how to compare test results with specifications and recommended processes to improve and control quality of products • Describe how to develop an efficient method for turning petroleum into effective fuel • Describe how to follow safety procedures during the test • Describe how to record test results, calculations, and output in the log book or datasheet	• Perform tests to determine the quality of crude oil and other petroleum products, such as gasoline and diesel fuel • Demonstrate how to Analyse samples of crude oil and other petroleum products ensure the industry standards to maintain the quality • Demonstrate how to collect data on chemical composition of samples in order to create a sample database • Perform tests and analyse the sample of crude oil and other petroleum products to determine the chemical makeup and physical properties, density and viscosity • Demonstrate how to compare test results with specifications and recommended processes to improve and control quality of products • Demonstrate how to develop an efficient method for turning petroleum into effective fuel • Demonstrate how to follow safety procedures during the test • Demonstrate how to record test results, calculations, and output in the laboratory log book or datasheet

Classroom Aids:

- White / Black board and Projector
- Digital Presentation
- Computer/Laptop
- Public Addressing System

Tools, Equipment and Other Requirements

1. Erlenmeyer flasks 250 ml Borosilicate Glass, Erlenmeyer flasks 100 ml Borosilicate Glass, Burettes with Teflon stop cock -25 ml Borosilicate Glass, Burettes with Teflon stop cock -50 ml Borosilicate Glass, Pipettes 10 ml Borosilicate Glass (Volumetric Type), Pipettes 25 ml Borosilicate Glass (Volumetric Type), Pipettes measuring 0 to 5 ml Borosilicate Glass, Pipettes measuring 0 to 10 ml Borosilicate Glass, Pipettes measuring 0 to 1 ml Borosilicate Glass, Pipettes 1ml (graduated) Borosilicate Glass, Measuring cylinders 25 ml Borosilicate Glass, Measuring cylinders 50 ml Borosilicate Glass, Volumetric flask 100 ml Borosilicate Glass, Volumetric flask 250 ml. Borosilicate Glass, Volumetric flask 500 ml Borosilicate Glass, Volumetric flask 1000 ml Borosilicate Glass, Weighing bottles polyethylene or glass 50 ml, Weighing bottles polyethylene or glass 100 ml., Funnels with regular & long stem 7 cm. dia., Funnels 4 cm. dia. Borosilicate Glass, Funnels Buchner different sizes 10 to 25 cm. dia., Funnels separatory 250 ml. Borosilicate Glass, Beakers 100 ml. Borosilicate Glass, Beakers

250 ml. Borosilicate Glass, Beakers 400 ml. Corning, Beakers 600 ml. Borosilicate Glass, Watch glasses 5 cm. dia., Watch glasses 7.5 cm. dia., Dishes evaporating 7.5 cm. dia., Thermometers 0 to 110°C, Thermometers 0 to 250°C, Thermometers 0 to 350°C, Thermometers for drying oven, Boiling flasks with round bottom 250ml., Boiling flasks with round bottom 500ml. for each distilling flasks 50 ml., 100 ml., 250 ml., Filtering flasks 250 ml., Filtering flasks 500 ml., Condensers Liebig 30 mm. long Borosilicate Glass, Gas generator (Kips) 500 ml., Gas washing bottles (Dressler), Crucibles porcelain 5 cm, dia, height 4 cm indigenous, Test tube (160 mm x 15 mm.), Tubes for centrifuge, Bottles with droppers for indicator solutions & semi-micro qualitative analysis 30 ml., Bottles for solids 50 ml. Borosilicate Glass, Bottles for solids 100 ml. Borosilicate Glass, Bottles for solutions 100 ml. Borosilicate Glass, Bottles for solutions 250 ml. Borosilicate Glass, Bottles for solutions 1000 ml. Borosilicate Glass, Bottles for solutions 2000 ml. Borosilicate Glass, Desiccators vacuum 150mm Diameter Borosilicate Glass, Tongs (forceps) nickel for crucibles & weights size 8 inches, Tongs long for crucibles (muffle furnace) size 15 inches, Spatulas nickel 8", Test tube support for 10-12 test tubes, Tripods, Asbestos wire gauage, Test tube holders, Burette stand with clamp & clamp holders, Triangles clay, Glass rods, Petri Disc, Slide for Microscope, Flash Point Tester, Total Acid Number (TAN) tester, Viscosity Meter, Oxidation Stability Analyzer, Cloud Point Analyzer, Octane Rating Analyzer, Sulphur Analyzer, Copper Strip Corrosion Analyzer, Karl Fischer Titration Analyzer, Gas chromatograph, Refractometer

Module 3: Effective working in a team

Mapped to HYC/N9301 v 3.0

Terminal Outcomes:

- Describe how to interact with others effectively and appropriately.
- Demonstrate how to deal with colleagues at workplace

Duration: 15:00	**Duration: 45:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe methods to communicate clearly with the supervisor and reporting authorities. • Explain how to share information in line with organisational requirements. • Explain the organisation's policies and procedures. • Explain how to identify causes of interpersonal conflict at workplace. • Describe ways/methods to resolve interpersonal conflict. • Explain the importance of gender equality. • Explain the importance of supporting and respecting colleagues and other members of the organisation without any bias based on gender, culture, disability etc. • Explain the importance of gender-neutral behaviour while interacting with others.	• Demonstrate ways to handle interpersonal conflict at the workplace. • Demonstrate the ways of developing suitable rapport with other team members. • Demonstrate how to respond during emergencies. • Demonstrate how to communicate in a manner that is respectful of gender, culture and disability.
• Classroom Aids:	
• White / Black board and Projector • Digital Presentation • Computer/Laptop • Public Addressing System	
Tools, Equipment and Other Requirements	
• Dummy team	

Module 4: Health, safety and security

Mapped to HYC/N9302 v 3.0

Terminal Outcomes:

- Identify the possible cause of accident and hazards
- Explain how to maintain safety and healthy environment
- Demonstrate how to use PPE kit at workplace

Duration: 15:00	**Duration**: 45:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain importance of using PPE like face mask, hand gloves, goggle, protective clothing/equipment, etc. at workplace. • Explain how to monitor the health and safety of self and other team members. • Explain the hazard and risk associated with mishandling various tools and equipment. • Discuss safe work practices as per the company's guidelines and procedures. • Explain the good housekeeping practices to prevent any hazard. • Explain how to record and report all incidents, damages or injury. • Explain importance of personal and workplace hygiene.	• Demonstrate how to appropriately wear and discard PPE kit. • Demonstrate how to respond promptly and appropriately to an accident. • Demonstrate how to administer first aid. • Demonstrate various rescue techniques. • Demonstrate how to use fire extinguishers. • Show the correct way to lift heavy objects.
Classroom Aids:	
• White / Black board and Projector • Digital Presentation • Computer/Laptop • Public Addressing System	
Tools, Equipment and Other Requirements	
• First aid kit • Dummy for first aid treatment • Housekeeping kit • Personal Protective Equipment (PPE)	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Degree/Diploma in Chemical Engineering from recognized university/board	-	**2**	-	1	-	
B.Sc. (Chemistry)	-	**2**	-	**1**	-	
Certified trainer under CITS instructor program						

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for the Job Role: "Lab Chemist/Analyst – Petroleum Product", mapped to QP: "HYC/Q 3901, v1.0". Minimum accepted score is 80%	Recommended that the trainer is certified for the Job Role: "Trainer (VET & Skills)", mapped to the Qualification Pack: "MEP/Q2601, v2.0". Minimum accepted score as per MEPSC guidelines is 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Degree/Diploma in Chemical Engineering from recognized university/board	-	2	-	1	-	
B.Sc. (Chemistry)	-	2	-	1	-	
Certified trainer under CITS instructor program						

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for the Job Role: "Lab Chemist/Analyst – Petroleum Product", mapped to QP: "HYC/Q 3901, v1.0". Minimum accepted score is 80%	Recommended that the Assessor is certified for the Job Role: "Assessor (VET and Skills)", mapped to the Qualification Pack: "MEP/Q2701, v2.0". Minimum accepted score as per MEPSC guidelines is 80%

Assessment Strategy

The assessment of candidates/trainees will be on the basis on assessment outcome/assessment criteria of the Qualification. In the assessment criteria for each NOS marks have been defined for theoretical and practical skills, on which the candidate will be assessed. The emphasis is on 'learning-by-doing' and performance criteria is based on the practical demonstration of skills and knowledge.

Theory/Knowledge test– This section will test the trainee on his/her knowledge on the subject/trade. The test will be carried out online/offline with a set of random Question paper. that include multiple choice questions in multilingual, True/False Statement, audio-video question etc.

The Question Bank will be developed by Subject Matter Experts (SME) of the hydrocarbon sector and these questions again be vetted by the Industry Experts, each performance criteria have its marks for theory based on the level of question i.e., easy, medium and difficult.

Practical/Demonstration Test– This stage involves the face-to-face interaction between Assessor and each trainee. The practical knowledge will be tested through trade test which demonstrates the skill required for the job, by which assessor would be able to evaluate the trainee for his/her practical knowledge on respective Qualification.

To ensure the maximum possible consistency in the assessment by different assessors at different locations, orientation of the assessors is also required about the stages involved in the assessment and the assessor role in the assessment process. The assessor must have knowledge of the following concepts before assessment:

- Qualification Pack Structure
- Guidance for the assessor to conduct theory and practical assessments
- Guidance for trainees to be given by assessor before the start of the assessments.
- Guidance on assessments process, practical brief with steps of operations practical observation checklist
- Practical/Demonstration Test guidance for uniformity and consistency.
- Guidance on assessment evidence collection (signed attendance copy, verification of the authenticity of the candidate by checking the photo ID card, Photographs-while assessment undergoing etc.)

The empanelled assessment agencies will be instructed to hire assessors with integrity, reliability and fairness. Each assessor shall sign a document with its assessment agency by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessments. The assessment agencies are instructed to ideally have assessor with sufficient amount of relevant industry experience related to Qualification. The assessors will also have scrutinized and have to undergo orientation of assessment framework, competency-based assessments etc.

Recognition of Prior Learning (RPL)

Under the Recognition of Prior Learning (RPL), the candidates enrolled and the assessment will be carried out as per the assessment criteria and assessment outcome of the full Qualification and the process of assessment will be carry out by the body/bodies empanelled by Hydrocarbon Sector Skill Council

In RPL, the candidate already has the skills and knowledge while working on the job from long, the learners only require to undergo a brief orientation training and the subsequent assessment

process and certification is awarded to those candidates who successfully clears the assessment. The tentative process of RPL would include the flowing stages:

1 Cluster Mapping and Mobilisation of the candidates
2 Counselling & Pre-Screening
4 Candidate registration, batch creation and enrolment
5 Conductions of an orientation program for candidates before assessment
7 Assessment by HSSC
8 Evaluation of Assessment Result
9 Issuance of the Certificate to successful candidates

Assessment Strategy:

- For each Qualification Pack assessment criteria has been developed, which describe the weightage for each NOS/Performance criteria (PC) and assigned marks based on each NOS separately for theoretical and practical skills
- The question bank will be developed by the subject matter experts to assess the theoretical and practical knowledge.
- The accredited assessment agency will carry out the assessment process on the date proposed after completion of the training. The assessment will be carried out on the basis of the two parameters i.e., Theoretical test and Practical test.
- The result of the assessment will be shared by assessment body to the HSSC for review and compliance, after that result will be processed and certificates will be generated
- Assessments shall be conducted in the regional languages in case of any specific requirement from the concerned Training Provider.
- For ensuring the impartial assessment it will be ensured that the Assessment Bodies (AB) are not involved in any type of training delivery with respect to this project.

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down the proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on the knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for the theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
6. To pass the Qualification Pack assessment, every trainee should score a minimum of 70% of % aggregate marks to successfully clear the assessment.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

Recommended Pass % aggregate for QP: 70%

References

Glossary

Term	Description
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements that together specify the technical, generic, professional and organisational specific knowledge that an individual need in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication-related skills that are applicable to most job roles.

Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.

Acronyms and Abbreviations

Term	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
OS	Occupational Standard(s)
QP	Qualifications Pack
KU	Knowledge and understanding
GS	Generic Skills
FAQ	Frequently Asked Questions
BP	Business Partner
KYC	Know Your Consumer
FAB	Feature Advantage Benefit