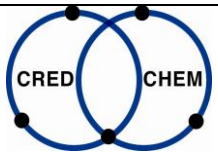
Field of action	**Working in the laboratory**			 **LEE 3a**	
Learning outcome unit	**3a - Spectroscopic analysis of substances (photometry, atomic absorption and atomic emission spectroscopy)**				
EQF level	**Competence level A:** EQF level 3 **Competence level B:** EQF level 4 **Competence level C:** EQF level 5				
Relations to national qualifications	**BG**	**CZ**	**DE**	**IT**	**SK**
		Chemical technician, chemical laboratory technician	Chemical laboratory technician		Chemical technician, chemical laboratory technician, chemical technology modeller, chemical laboratory assistant

Learning outcomes

Competence[1]	**Skills**	**Knowledge**
<u>Competence level A</u> **(EQF level 3)** - analyses substances spectroscopically by using the standard methods (photometry, atomic absorption and atomic emission spectroscopy) and adapts these methods to the given conditions	- accepts orders for spectroscopic analysis of substances and plans all further processing steps until supplying the result - selects methods, respective laboratory equipment and necessary chemicals (solvents…) and handles them accurately, carefully and expertly - evaluates results and calculates respective values - prepares and evaluates the analysis expertly (corresponds to competence of learning outcome 1 and 2)	- knows substances (properties, structure, R/S statements) - knows relationship between measurand and determinant and respective methods (knows steps of action) - knows respective equipment/ apparatuses and their functioning/ operation
<u>Competence level B:</u> **(EQF level 4)** - deals with problems typical for the methods	- analyses the problem, develops solution approaches by applying specialist knowledge and decides how to solve the problem - reflects on whether the problem was actually solved	- knows dependence of values to be measured on environment conditions (temperature, pressure…) - knows reactions which the methods are based on - knows structural characteristics of a material which are responsible for its properties - knows relationship between measurand (extinction) and determinant (i.e. concentration) and its cause (interaction between substance and electromagnetic radiation – absorption of certain wavelengths)
<u>Competence level C:</u> **(EQF level 5)** - optimises methods according to context in cooperation with the team	- works as part of the team, is actively involved in the work process and thus brings the work process forward - communicates with others about scientific and technological content and about the work process	

[1] The competence levels build upon each other.

Field of action	**Working in the laboratory**				
Learning outcome unit	**3a - Spectroscopic analysis of substances (photometry, atomic absorption and atomic emission spectroscopy)**				
Countries	**BG**	**CZ**	**DE**	**IT**	**SK**
Which CREDCHEM learning place offers the learning outcome unit?		Technical School Valasske Mezirici, Technical School Usti n. Labem	Saxon Education Company for Environmental Protection and Chemical Occupations Dresden ltd.		Secondary Technical School Novaky
How many learners can be admitted?		3	3-4		5
At which competence level is the learning outcome unit offered?		A, B	A, B, C		A
In which language is the mobility taught?		English	English/German		English/German
Which methods are used?		Photometry Atomic absorption spectroscopy Atomic emission spectroscopy			
The following occupational tasks[2] (which can also be used for imparting the learning outcomes) have been exemplarily analysed in preparing the LEE:					
Photometric determination of cobalt ions					
Photometric determination of manganese ions					
Photometric determination of iron ions					
Photometric determination of copper ions					
Photometry standard procedure for a colouring agent					
Photometric determination of nitrate ions					
The following examination tasks were designed for the competence levels indicated:					***Competence level***
none					

[2] Occupational and examination tasks can be downloaded at www.credchem.eu.