



ALIGNED WITH  
NCHSTE  
STANDARDS

**LAB TECHNICIAN I  
SKILLS STANDARDS  
OD48201**

## ***COMPETENCY-BASED EDUCATION: OKLAHOMA'S RECIPE FOR SUCCESS***

### ***BY THE INDUSTRY FOR THE INDUSTRY***

Oklahoma's *CareerTech* system of competency-based education uses industry professionals and certification standards to identify the knowledge and abilities needed to master an occupation. This industry input provides the foundation for development of instructional materials that help prepare the comprehensively trained, highly skilled employees demanded by our workplace partners.

### ***TOOLS FOR SUCCESS***

*CareerTech* relies on three basic instructional components to deliver competency-based instruction: skills standards, curriculum materials, and competency assessments.

**Skills standards** provide the foundation for competency-based instruction in Oklahoma's *CareerTech* system. The skills standards outline the knowledge, skills, and abilities needed to perform related jobs within an industry. Skills standards are aligned with national skills standards; therefore, a student trained to the skills standards possesses technical skills that make him/her employable in both state and national job markets.

**Curriculum materials** contain information and activities that teach students the knowledge and skills outlined in the skills standards. In addition to complementing classroom instruction, curriculum resources provide supplemental activities to enhance learning and provide hands-on training experiences.

**Competency Assessments** test the student over material outlined in the skills standards and taught using the curriculum materials. When used with classroom performance evaluations, written competency assessments provide a means of measuring occupational readiness.

Although each of these components satisfy a unique purpose in competency-based education, they work together to reinforce the skills and abilities students need to gain employment and succeed on the job.

### ***MEASURING SUCCESS***

Written competency assessments are used to evaluate student performance. Results reports communicate competency assessment scores to students and provide a breakdown of assessment results by duty area. The results breakdown shows how well the student has mastered skills needed to perform major job functions and identifies areas of job responsibility that may require additional instruction and/or training.

Group analysis of student results also provides feedback to instructors seeking to improve the effectiveness of career and technology training. Performance patterns in individual duties indicate opportunities to evaluate training methods and customize instruction.

### ***TRUE TO OUR PURPOSE***

"Helping Oklahomans succeed in the workplace" defines the mission of Oklahoma *CareerTech* and its competency-based system of instruction. Skills standards, curriculum, and assessments that identify and reinforce industry expectations provide accountability for programs and assure *CareerTech*'s continued role in preparing skilled workers for a global job market

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**LAB TECHNICIAN  
SKILLS STANDARDS  
Frequency and Criticality Ratings**

Duty A: General Laboratory Safety

Duty B: Scientific Mathematics

Duty C: Professional Support Skills

Duty D: Lab Glassware and Equipment

Duty E: Laboratory Techniques I

Duty F: General & Inorganic Chemistry

Duty G: Organic Chemistry

**Frequency:** represents how often the task is performed on the job. Frequency rating scales vary for different occupations. The rating scale used in this publication is presented below:

- 1 = less than once a week
- 2 = at least once a week
- 3 = once or more a day

**Criticality:** denotes the level of consequence associated with performing a task incorrectly. The rating scale used in this publication is presented below:

- 1 = slight
- 2 = moderate
- 3 = extreme

**DUTY A: General Laboratory Safety**

CODE	TASK	F/C
A.01	Describe proper dish washing technique for chemical glassware	3/3
A.02	List the errors that may be caused by unclean glassware	3/3
A.03	Describe the disposal of laboratory clean-up materials and tools	3/3
A.04	Identify the need for various safety equipment	3/3
A.05	Identify the use of safety equipment	3/3
A.06	Demonstrate the operation of laboratory safety equipment	3/3
A.07	Define the chemical hazard communication program for laboratories	3/3
A.08	Define the various labeling programs and their focus <ul style="list-style-type: none"> <li>• NFPA, HMIS, DOT, ANSI</li> </ul>	3/3
A.09	Identify the parts and uses of a MSDS	3/3
A.10	Demonstrate the proper storage, handling and disposal of various chemicals <ul style="list-style-type: none"> <li>• Inorganic, Organic, chlorinated chemicals, flammable, corrosive</li> </ul>	3/3
A.11	Describe clean-up procedures used for flammable, corrosive and organic materials	3/3
A.12	Define the appropriate industrial hygiene practices for a chemical, based on its MSDS	2/3
A.13	Describe the major physical hazards in the lab	3/3
A.14	Use appropriate safety equipment for protection from physical safety hazards	3/3

A.15	Explain the expected safety behavior for carrying chemicals or climbing in the lab	3/3
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### DUTY B: Scientific Mathematics

CODE	TASK	F/C
B.01	Perform basic addition, subtraction, multiplication and division operations	3/3
B.02	Manipulate whole numbers, fractions and decimals	2/3
B.03	Apply problem-solving techniques to word problems	2/3
B.04	Simplify basic algebraic equations to solve for x	2/3
B.05	Solve problems involving ratio and proportion	2/3
B.06	Express numbers in scientific notation	3/2
B.07	Manipulate numbers expressed in scientific notation back to simple numbers	2/2
B.08	Determine the correct number of significant figures in given values	1/1
B.09	Manipulate values expressing the results in the correct significant figures	2/1
B.10	Define and demonstrate the relative size of units in the metric system	2/1
B.11	Measure distance, area, volume, and weight in English and metric units	2/1
B.12	Manipulate data between English and metric systems	2/1
B.13	Manipulate data within the metric system	2/2
B.14	Convert temperature units between different temperature systems	2/3
B.15	Set up and solve mathematical problems involving percent and proportions	2/3
B.16	Perform calculations on parts per million and similar concentrations	3/3
B.17	Manipulate values between various types of concentrations	3/3
B.18	Describe the units involved in concentrations of molarity, normality, ppm and ppb	3/3
B.19	Describe the factors necessary to perform statistical calculations on sample data	2/3
B.20	Perform standard statistical calculations on sets of data	3/3
B.21	Describe the use of values generally calculated from statistical sample data	1/2
B.22	Identify the probable sources of data sets generated in the laboratory	1/1
B.23	Describe the use of statistics and control charts in the work place	1/1
B.24	Identify outliers and hypothesize their causes and corrective action	2/1
B.25	Identify the probable sources of data sets generated in the laboratory	1/1
B.26	Define the differences in qualitative and quantitative measurements	2/1
B.27	Define the differences in precision, accuracy and random data	1/1

### DUTY C: Professional Support Skills

CODE	TASK	F/C
C.01	Understand the purpose and structure of a laboratory data book	2/3
C.02	Understand the purpose and structure of a chain of custody	3/3
C.03	Define the basics of technical writing skills	2/3
C.04	Demonstrate the use of reality checks on data and results	2/3
C.05	Interpret graphs and the trends in data	3/3
C.06	Develop standard curves and evaluate using equation for a line	2/3

**DUTY D: Lab Glassware and Equipment**

CODE	TASK	F/C
D.01	Explain the sensitivity and care of equipment and glassware	3/3
D.02	Demonstrate proper use of balances	1/2
D.03	Demonstrate reading volume in glassware	2/2
D.04	Identify and use the proper glassware to deliver and contain specific volumes	2/2
D.05	Identify common glassware and utensils used in the laboratory	1/1
D.06	Describe the use of laboratory glassware and utensils	1/2
D.07	Identify the meaning of the abbreviations on the lab ware	1/1
D.08	List the analysis with which each piece of equipment may be associated	2/1
D.09	Identify the common electrical heating equipment used in the laboratory	1/1
D.10	Demonstrate the use of common heating equipment	1/1
D.11	Describe the safety and procedures involved in the use of flame	1/3

**DUTY E: Laboratory Techniques I**

CODE	TASK	F/C
E.01	Record the weight of chemical powders and liquids	3/3
E.02	Demonstrate volumetric dilution of solutions	3/3
E.03	Calculate percent and ppm concentrations of solutions	3/3
E.04	Demonstrate use of significant figures in volumetric dilutions	2/2
E.05	Describe math and use of simple centrifugation	1/2
E.06	Describe math and use of simple filtration	1/2
E.07	Describe math and use of simple evaporation	1/2
E.08	Analyze and evaluate the results for statistics and error	2/3
E.09	Demonstrate the use of viscosity equipment	1/2
E.10	Demonstrate the use of conductivity meters	1/2
E.11	Demonstrate the use of turbidity meters	1/2
E.12	Perform calculations associated with small lab equipment	2/3
E.13	Demonstrate proper use of magnetic stirrers and hot plates	1/2
E.14	Explain the operation of a colorimeter	1/3
E.15	Construct a standard curve from colorimeter data	1/3
E.16	Determine unknown sample results from a standard curve and the equation for a line	1/3

**DUTY F: General & Inorganic Chemistry**

CODE	TASK	F/C
F.01	Differentiate between physical and chemical properties of matter	1/2
F.02	Identify the symbols for the common elements	3/3
F.03	Identify elements, compounds, and mixtures by their properties	3/3
F.04	Describe the structure of the atom and its effect on molecular formulas	3/3
F.05	Describe the order and use of the Periodic Table	2/2

F.06	Identify different chemical reactions	2/3
F.07	Write and balance chemical equations for simple reactions	2/3
F.08	Name and write formulas for binary and polyatomic inorganic compounds	2/3
F.09	Name and write formulas for binary molecular compounds	2/3
F.10	Identify between ionic and molecular compounds	2/3
F.11	Use the mole concept to convert between moles and grams	2/3
F.12	Calculate and use formula weights and molecular weights	2/3
F.13	Define the pH scale	1/3
F.14	Describe the different techniques for measuring pH	1/3
F.15	Describe the operation of a pH meter	1/3
F.16	Explain the use of indicators	1/2
F.17	Properly read a buret	1/3
	<b>Types of Promotional Media</b>	
F.18	Describe how manual acid/base titration is performed	1/2
F.19	Calculate molarity using the standard titration calculation	2/2

#### DUTY G: Organic Chemistry

CODE	TASK	F/C
G.01	Describe the importance of carbon as the basis for organic chemistry	2/3
G.02	Draw the structural formulas for the simplest carbon compounds: alkane, alkene, alkyne	3/3
G.03	Draw the most common functional groups	3/3
G.04	Define IUPAC (International Union of Pure and Applied Chemistry)	2/1
G.05	Identify organic chemical names from their structural formulas, using IUPAC	2/3
G.06	Identify the structural formulas of organic chemicals from their IUPAC names	2/3
G.07	Identify non-IUPAC naming conventions	1/2
G.08	Describe the industry operations that refine aliphatic hydrocarbons	1/1
G.09	Define 'fossil fuel'	1/1