CHEMISTRY II LEARNING OBJECTIVES

I. Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.

1. The learner will understand and follow safe lab procedures.
2. The learner will identify and discuss the practices employed by scientists to collaborate, share, and critique scientific information.
3. The learner will be able to make precise metric measurements.
4. The learner will analyze and interpret data and communicate results.
5. The learner will be able to use dimensional analysis to solve problems.
6. The learner will understand how to use a calorimeter.
7. The learner will use factor-label method for conversions and problem solving.
8. The learner will use data to construct graphs.
9. The learner will interpret data from graphic information.
10. The learner will use significant figures.
11. The learner will apply rules of significant figures in measurement and calculations.
12. The learner will be able to complete thermochemistry calculations.
13. The learner will be able to calculate the rates of chemical reactions.
14. The learner will investigate a model describing how chemical reactions occur as a result of collisions.
15. The learner will use Le Chatelier's principle to explain how various factors affect chemical equilibria.
16. The learner will calculate equilibrium concentrations of reactants and products using the equilibrium constant expression.
17. The learner will calculate acid and base concentrations and determine concentrations experimentally.
18. The learner will complete a titration and determine the concentration of an unknown.
19. The learner will discover how oxidation numbers of elements in compounds are determined and how they relate to electron transfer.
20. The learner will discover how oxidation-reduction reactions produce electric current.
21. The learner will determine the voltage of the current produced by pairs of redox half-reactions.
22. The learner will determine the direction of current flow for a particular pair of redox half-reactions.
23. The learner will investigate how electric current can be used to carry out redox reactions.
24. The learner will be able to measure naturally occurring radiation.

II. Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.

25. The learner will understand specific heat and units of energy.
26. The learner will write thermochemical equations.
27. The learner will understand enthalpy, entropy, and free energy.
28. The learner will understand Hess's Law.
29. The learner will be able to predict if a reaction will be spontaneous or nonspontaneous.
30. The learner will compare the rates of chemical reactions under varying conditions.
31. The learner will understand the collision theory.
32. The learner will understand reaction rate laws and determine reaction order.
33. The learner will understand instantaneous reaction rates and reaction mechanisms.
34. The learner will determine the solubilities of sparingly soluble ionic compounds.
35. The learner will explain how buffers resist changes in pH.
36. The learner will understand and calculate pH and pOH.
37. The learner will understand the Arrhenius model and Bronsted-Lowry model.
38. The learner will be able to write acid-base neutralization reaction.
39. The learner will examine the processes of oxidation and reduction in electron-transfer reactions.

40. The learner will separate redox reactions into their oxidation and reduction processes.
41. The learner will use two different methods to balance oxidation-reduction equations: The Oxidation-Number Method and Half-Reaction Method.
42. The learner will understand a voltaic cell.
43. The learner will be able to calculate electrochemical cell potential.
44. The learner will understand the process of electrolysis and electroplating.
45. The learner will identify types of radioactive decay and solve decay rate problems.
46. The learner will describe the reactions involved in nuclear fission and fusion.
47. The learner will compare the structures and properties of alkanes, alkenes, and alkynes.
48. The learner will be able to name alkanes, alkenes, and alkynes.
49. The learner will recognize and compare the properties of structural isomers and stereoisomers.
50. The learner will understand how useful hydrocarbons are obtained form natural sources.
51. The learner will be able to recognize the names and structures of several important organic functional groups : halocarbon, alcohol, ether, amine, aldehyde, ketone, carboxylic acid, ester and amide.
52. The learner will classify reactions of organic substances as substitution, addition, elimination, oxidation-reduction, or condensation and predict products of these reactions.
53. The learner will be able to relate the structures of synthetic polymers to their properties.

III. Students, through the inquiry process, demonstrate knowledge of characteristics, structures and function of living things, the process of diversity of life, and how living organisms interact with each other and their environment. *None purposefully written for this standard for Chemistry*

IV. Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space. *None purposefully written for this standard for Chemistry*

V. Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures, and societies.

54. The learner will learn about applications of nuclear reactions and the effects of radiation exposure.

VI. Students understand historical developments in science and technology

55. The learner will investigate the historical impact of chemistry and technology on society.
56. The learner will trace the history of nuclear chemistry from discovery to application.