Chemistry 3202
June 2019 Public Exam Outcome Report

<u>Units</u> 1 – From Kinetics to Equilibrium
2 – Acids and Bases
3 – Thermochemistry
4 – Electrochemistry

PART I: Selected Response—Total Value: 50 marks

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
1	28	ACC-1	L1	Identify ΔH from a PE diagram.
2	28	ACC-1	L1	Identify an example of the Kinetic Molecular Theory.
3	28	ACC-1	L2	Given E_a (forward) and E_a (reverse), identify the reaction type and ΔH.
4	30	ACC-2	L1	Identify the condition which would lead to the fastest reaction rate.
5	32	ACC-3	L2	Identify the activation energy of the RDS from a PE diagram.
6	30	ACC-2	L2	Given a reaction, identify the conditions which would lead to the fastest reaction rate.
7	32	ACC-3	L1	Identify the RDS in a given reaction mechanism.
8	32	ACC-3	L2	Identify the catalyst in a given reaction mechanism.
9	38, 40	323-3 323-5	L3	Determine which concentration vs time graph represents the given the equilibrium system and initial conditions.
10	40-42	323-4 323-5	L2	Use LCP to identify the color change and change in concentration given a stress to the equilibrium.
11	44	323-3	L2	Given the percentage yield for a system at equilibrium, describe the relative size of the equilibrium constant and the volume of the system.
12	44	323-3	L2	Identify the K_{eq} expression for the given equilibrium.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
13	44	323-3	L3	Calculate K_{eq} given the equilibrium reaction and equilibrium moles and volume.
14	(Unit 2) 54	320-1	L1	Identify the Arrhenius acid.
15	52, 58	214-1 214-17	L2	Identify which acid or base corresponds to given operational characteristics.
16	56	214-17	L1	Identify an amphoteric substance.
17	66, 80	320-4 320-7	L3	Determine $[H_3O^+]$ based on indicator colors.
18	58	214-17	L1	Identify the strongest base.
19	58, 60	320-2	L3	Given an equilibrium reaction, identify the position of the equilibrium and the value of K.
20	66	320-4	L2	Calculate $[H_3O^+]$ given the pOH of a solution.
21	68	320-3	L2	Identify which species would complete a given equilibrium expression.
22	78	212-8	L1	Select the appropriate instrument used in a titration lab.
23	56, 74	214-7 ACC-5 ACC-6	L2	Determine the most appropriate species to use given the behavior of two other substances.
24	56	214-17	L2	Identify the conjugate acid/base given the equilibrium reaction.
25	80	320-7	L2	Determine pH based on indicator colors.
26	80, 84	320-7 214-5	L2	Given an acid-base titration, identify the appropriate indicator to use.
27	84	214-5	L2	Given a titration curve, interpret the strength of the acid and base.
28	82	214-5	L1	Distinguish between mono-, di-, and triprotic species.
29	(Unit 3) 94	324-3	L2	Perform a calculation using $q = mc\Delta T$.
30	94	324-3	L1	Distinguish between a system and its surroundings.
31	94	324-3	L3	Recognize the relationship between specific heat capacity and reaction rate.
32	98	324-3	L2	Identify the thermochemical equation from a given enthalpy diagram.

Item	Curriculum Guide Page	Outcome	Cognitive Level	Outcome Description
33	100	324-3	L1	Identify the conditions which lead to a positive ΔH.
34	100	324-3	L1	Differentiate between endothermic and exothermic processes.
35	104	324-1	L2	Calculate the energy associated with a substance undergoing a chemical change.
36	104	324-1	L2	Determine an unknown mass, given the heat and the enthalpy change.
37	104	324-1	L1	Identify the correct equation for the standard molar enthalpy of formation.
38	108	214-3	L2	Identify phase and temperature changes for a substance given a specific temperature range.
39	108	214-3	L2	Identify changes in PE and KE on a given heating or cooling curve.
40	114	324-4	L2	Use standard molar enthalpies of formation to determine the enthalpy change of a given reaction.
41	(Unit 4) 124	322-1	L1	Define the terms oxidation and reduction.
42	136	322-6	L1	Use the Standard Reduction potentials table to identify strongest oxidizing/reducing agent.
43	126	322-1	L2	Identify the oxidizing/reducing agent given a redox reaction.
44	126	322-1	L2	Identify a redox reaction.
45	126	322-3	L2	Determine the oxidation number of an atom in an ion or molecule.
46	130	322-2	L2	Balance a reaction under acidic/basic conditions.
47	134	322-4	L2	Identify the species oxidized/reduced based on electrochemical cell notation.
48	132, 142	322-4	L1	Distinguish between an electrochemical and electrolytic cell.
49	136	322-5 322-6	L2	Identify which species would lead to a spontaneous reaction.
50	138	322-6	L2	Given a labelled diagram of an electrochemical cell, determine the cell voltage.

PART II: Constructed Response—Total Value: 30 marks

Item	Curriculum Guide Page	Outcome	Cognitive Level	Value	Outcome Description
51a	30	ACC-2	L2	2	Explain how increasing the concentration of a given reaction would affect the reaction rate.
51b	44	323-3	L2	3	Given the initial concentrations and percent reaction of a species which is allowed to reach equilibrium, calculate the value of K_{eq}.
51c	40	323-4 323-5	L3	2	Use Le Chatelier's Principle and a concentration vs time diagram to determine if a reaction is endothermic or exothermic.
52a	66	320-4	L3	3	Identify an unknown metal given its pOH, mass of sample and volume of solution.
52b	70	320-3	L2	3	Calculate the pH of a solution given the initial weak acid concentration and the K_a.
52c	76, 78	213-3 320-6	L2	3	Calculate the concentration of an unknown solution using data from a titration experiment. (Science Communication)
53a	108 114	214-3	L2	3	Calculate the total energy absorbed by a substance as it is heated, undergoing both phase change(s) and temperature change(s).
53b	114	324-4	L3	3	Use Hess's Law to calculate the enthalpy of a reaction.
53c	118	324-4	L2	2	Use average bond energies to calculate the enthalpy of a given reaction.
54a	130	322-2	L2	3	Balance a redox reaction under acidic conditions.
54b	144	322-8	L3	3	Use Faraday's law to perform stoichiometric calculations to determine the amount of heat absorbed. (Science Communication)