Processing Chemical Reactions

Manitoba	
Grade 5	
Cluster 2: Properties of and Changes in Substances	
Specific Learning Outcomes:	5-2-01 Use appropriate vocabulary related to their investigations of properties of, and changes in, substances. Include: characteristic, property, substance, matter, volume, state, solid, liquid, gas, reversible and non-reversible changes, physical change, chemical change, chemical product, raw material 5-2-03 Investigate to determine how characteristics and properties of substances may change when they interact with one other. Examples: baking soda in vinegar produces a gas; adding flour to water produces a sticky paste... 5-2-05 Identify properties of the three states of matter. Include: solids have definite volume and hold their shape; liquids have definite volume but take the shape of their container; gases have no definite volume and take the volume and shape of their container. 5-2-10 Recognize that a physical change alters the characteristics of a substance without producing a new substance, and that a chemical change produces a new substance with distinct characteristics and properties. 5-2-11 Observe examples of changes in substances, classify them as physical or chemical changes, and justify the designation. Examples: physical — bending a nail, chopping wood, chewing food; chemical — rusting of a nail, burning wood, cooking food... 5-2-14 Research and describe how raw materials are transformed into useful products. Examples: food processing, oil refining, paper milling, plastic moulding, gold smelting...

Cluster 0: Overall Skills and Attitudes	
Specific Learning Outcomes:	5-0-4a Carry out, with guidance, procedures that comprise a fair test. 5-0-4c Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. 5-0-4d Assume various roles and share responsibilities as group members. 5-0-4e Use tools and materials in a manner that ensures personal safety and the safety of others. 5-0-5c Select and use tools and instruments to observe, measure, and construct. 5-0-7h Identify, with guidance, potential applications of investigation results. 5-0-8e Describe hobbies and careers related to science and technology. 5-0-8g Describe positive and negative effects of scientific and technological endeavours.

Grade 7	
Cluster 2: Particle Theory of Matter	
Specific Learning Outcomes:	7-2-01 Use appropriate vocabulary related to their investigations of the particle theory of matter. Include: boiling and melting points, pure substance, scientific theory, particle theory of matter, temperature, heat, conduction, convection, radiation, mixture, solution, mechanical mixture, homogeneous, heterogeneous, solutes, solvents, solubility, concentration, dilute, concentrated, saturated, unsaturated, terms related to forms of energy. 7-2-13 Differentiate between the two types of mixtures, solutions and mechanical mixtures. Include: solutions — homogeneous; mechanical mixtures — heterogeneous mixtures. 7-2-18 Demonstrate different methods of separating the components of both solutions and mechanical mixtures. Examples: distillation, chromatography, evaporation, sieving, dissolving, filtration, decanting, magnetism, sedimentation... 7-2-19 Identify a separation technique used in industry, and explain why it is appropriate 7-2-23 Discuss the potential harmful effects of some substances on the environment, and identify methods to ensure their safe use and disposal. Examples: pollution of groundwater from improper disposal of paints and solvents; pollution of the atmosphere by car exhaust...
Cluster 0: Overall Skills and Attitudes	
	7-0-4a Carry out procedures that comprise a fair test 7-0-4c Work cooperatively with team members to carry out a plan, and troubleshoot problems as they arise. 7-0-4e Demonstrate work habits that ensure personal safety, the safety of others, and consideration for the environment 7-0-5a Make observations that are relevant to a specific question. 7-0-5c Select and use tools to observe, measure, and construct 7-0-7h Identify and evaluate potential applications of investigation results. 7-0-8g Discuss societal, environmental, and economic impacts of scientific and technological endeavours 7-0-9c Demonstrate confidence in their ability to carry out investigations

Grade 9	
Cluster 2: Atoms and Elements	
Specific Learning Outcomes:	S1-2-12 Differentiate between physical and chemical changes. S1-2-13 Experiment to determine indicators of chemical change. Examples: colour change, production of heat and/or light, production of a gas or precipitate or new substance... S1-2-14 Investigate technologies and natural phenomena that demonstrate chemical change in everyday situations. Examples: photography, rusting, photosynthesis, combustion, baking...
Cluster 0: Overall Skills and Attitudes	
General Learning Outcomes:	S1-0-3c Plan an investigation to answer a specific scientific question. S1-0-4a Carry out procedures that comprise a fair test. S1-0-4b Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment. S1-0-4c Interpret relevant WHMIS regulations. S1-0-4e Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. S1-0-4f Assume the responsibilities of various roles within a group and evaluate which roles are most appropriate for given tasks S1-0-5a Select and use appropriate methods and tools for collecting data or information. S1-0-8f Relate personal activities and possible career choices to specific science disciplines. S1-0-9b Express interest in a broad scope of science- and technology-related fields and issues. S1-0-9c Demonstrate confidence in their ability to carry out investigations in science and to address STSE issues. S1-0-9e Be sensitive and responsible in maintaining a balance between the needs of humans and a sustainable environment.

Grade 10	
Cluster 2: Chemistry in Action	
Specific Learning Outcomes:	S2-2-09 Discuss the occurrence of acids and bases in biological systems, industrial processes, and domestic applications. Include: environmental, health, and safety issues. S2-2-11 Describe the formation and the environmental impact of various types of air pollution. Examples: acid precipitation, ground-level ozone, airborne particulates, smog; ozone depletion, respiratory ailments, acidified lakes…
Cluster 0: Overall Skills and Attitudes	
General Learning Outcomes:	S2-0-3c Plan an experiment to answer a specific scientific question. S2-0-4a Carry out procedures that comprise a fair test S2-0-4b Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment. S2-0-4c Interpret relevant WHMIS regulations. S2-0-4e Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise. S2-0-4f Assume the responsibilities of various roles within a group and evaluate which roles are most appropriate for given tasks S2-0-5a Select and use appropriate methods and tools for collecting data or information. S2-0-8f Relate personal activities and possible career choices to specific science disciplines. S2-0-9b Express interest in a broad scope of science- and technology-related fields and issues. S2-0-9c Demonstrate confidence in their ability to carry out investigations in science and to address STSE issues. S2-0-9e Be sensitive and responsible in maintaining a balance between the needs of humans and a sustainable environment.