Planning Sheet for Single Science Lessons	Lesson Title: Types of Chemical Reactions – Synthesis and Decomposition	Cluster: 2: Chemistry in Action S.L.O: S2-2-07 Grade: 10

Learning Outcomes/Goal Focus	Teacher Reminders – Learners Tasks	Equipment Required
A. Scientific Inquiry Initiating, Researching & Planning N/A Implementing; Observing, Measuring & Recording S2-0-4b:Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment S2-0-4e: Work cooperatively with group members to carry out a plan. Analyzing & Interpreting S2-0-6a: Interpret patterns and trends in data, and infer and explain relationships. Concluding & Applying S2-0-7e: Reflect on prior knowledge and experiences to develop new understandings. **B. STSE Issues/ Design Process/ Decision Making** N/A **C. Essential Science Knowledge Summary** In this lesson, students will be taught that different types of chemical reactions exist. They will be introduced to two types in this lesson, synthesis and decomposition. They will be able to look at an equation and tell if it is a synthesis or decomposition reaction. They will build on their existing knowledge of the Law of Conservation of Mass and balancing equations. Students will also develop their ability to work cooperatively with their lab partners and follow lab safety procedures. **How will you assess?** I will perform an informal assessment on the responses to my questions throughout the lesson and students' written answers to the questions after the experiment. I will do a formal assessment after the second lesson through an assignment.	1. Begin class with a demonstration of a synthesis reaction, magnesium combining with oxygen to form magnesium dioxide. Do not tell them it is a synthesis reaction. Perform as discrepant event. While holding the magnesium ribbon with tongs, ask students to make a prediction of what they think will happen when the magnesium ribbon is heated. Inform students not to look directly at the burning magnesium because it is very bright. Heat the magnesium, it should turn white. Ask students what tells them a reaction has occurred. Ask them if the ribbon looks the same as it did to begin with, and if it seems to behave differently (it is powdery now). Ask students what they think the magnesium combined with. Give students chemical equation of the reaction: Mg (s) + O_2 (g) →MgO (s). Ask students if this chemical equation is balanced. Ask students to recall their prior knowledge about the Law of Conservation of mass to balance the equation. Explain reaction: the magnesium oxide was formed (synthesized) from solid magnesium and oxygen gas. Inform students that this is a synthesis reaction. 2. Tell students that a synthesis reaction means exactly what it says. A new substance is synthesized from two or more other substances. Give them an analogy: A synthesis reaction is like a man and woman having a baby. The man and woman represent two different substances that come together to form a new substance: the baby. Give students another example of a synthesis reaction: S (s) + O_2 (g) →SO_2 (g). 3. Organize students into groups of two. Inform students they will be performing a lab experiment on another type of chemical reaction: decomposition. Distribute lab handout to each student. Materials will be at the front of the room (aprons, safety goggles, latex gloves, test tubes and holders and Bunsen burners). One person from each pair at bench 1 will come up to get these materials then one person from bench 2 will come up. The other materials will be at the centre of each bench, students will retrieve these materials as they require them. Students will be reminded on lab safety, particularly when heating the test tube. They must make sure they point the opening of the test tube away from people. They have performed lab experiments previously so they should be aware of the safety precautions and rules. 4. Tell students they will have 15 minutes to complete the experiment. Students begin lab experiment. Circulate room to answer any questions. 5. Instruct students to clean up and wash hands. All test tubes must be washed and materials must be returned to the front. 6. Instruct students to answer the questions individually and have them check if the chemical equation is balanced. If not, instruct them to balance it. Circulate. When they are done, write the equation on board: $NaHCO_3$→CO_2+$NaCO_3$+H_2O. Balance it. Ask students to explain what happened in the reaction. Ask them what the products and reactants are. Tell students this is a decomposition reaction. Ask them what this means. They should respond: "the breaking down of something into smaller parts." 7. Give students the following analogy: decomposition is like a divorce. A couple is breaking up into 2 "single" individuals. 8. Closure. Tell students they will look at more types of chemical reactions in the next lesson.	Magnesium ribbon Bunsen Burner Tongs to hold Magnesium Striker Lab handouts (30 copies) Aprons, goggles, latex gloves Baking soda ($NaHCO_3$) Bunsen Burners Test tubes and holders Wood splints Questions to consider in your planning/ delivery 1. How long will each phase last? 2. How am I going to organize working groups? 3. How will I organise and distribute equipment? 4. What specific skill and knowledge development am I emphasizing? 5. Is there evidence of clear instructions and purposeful questions? 6. What must I look for in monitoring student learning? 7. How can I diversify instruction?

Planning Sheet for Single Science Lessons	Lesson Title: Types of Chemical Reactions - Single & Double Displacement	Cluster: 2: Chemistry in Action S.L.O: S2-2-07 Grade: 10

Learning Outcomes/Goal Focus	Teacher Reminders – Learners Tasks	Equipment Required
B. Scientific Inquiry Initiating, Researching & Planning N/A Implementing; Observing, Measuring & Recording S2-0-4b:Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment S2-0-4e: Work cooperatively with group members to carry out a plan S2-0-5c: Record, organize, and display data using an appropriate format. Analyzing & Interpreting S2-0-6a: Interpret patterns and trends in data, and infer and explain relationships. Concluding & Applying S2-0-7a: Draw a conclusion that explains the results of an investigation. S2-0-7e: Reflect on prior knowledge and experiences to develop new understanding. **D. STSE Issues/ Design Process/ Decision Making** N/A **E. Essential Science Knowledge Summary** In this lesson, students will learn about single and double displacement reactions. Students will learn how to classify chemical equations as single or double displacement by referring to the general equations (in point 1), the kinesthetic demonstrations and the analogies presented in the lesson. They will develop their skill to interpret the results of an investigation by answering the questions at the end of the lab handouts. Continued on next page.	1. Begin lesson with a brief overview of a single displacement reaction. "In a single displacement reaction, one element replaces another element in a compound. Explain using the following: A + BC → B + AC. Give students an example of a single replacement: Zn (s) + 2HCl (aq) → $ZnCl_2$ (aq) + H_2 (g). Explain to students that zinc is replacing the hydrogen in the compound. Next give a brief overview of a double displacement reaction. "A double displacement reaction involves the reaction of two compounds to form two new compounds." Explain using the following: AC + BD → AD + BC. Give students an example of a double displacement chemical equation: FeS (s) + 2HCl (aq) → H_2S (g) + $FeCl_2$ (aq). Ask students what is happening in the reaction (what elements are being displaced). 2. Kinesthetic demonstration. Ask three students to come up and volunteer. Instruct two of them to walk down an aisle together, instruct the other student to cut in and "take the place" of one of the students. Explain using the formula above. For example, ask students: in this case, John and Mary would represent what part of the equation? How about Jimmy? Give students an analogy: single displacement is like a couple at a dance. They are dancing and another guy comes and cuts in and dances with the girl. 3. Kinesthetic demonstration. Ask for four volunteers. Organize these students into two pairs. Ask students what should happen next if this were a double displacement reaction. They should respond "each pair needs to switch partners." Give students an analogy: double displacement is like square dancing, two couples switch partners to form two new couples. 4. Organize students into working pairs. Distribute lab handouts to each student (1 pink, 1 yellow). Stations are set up at both benches (3 single displacement stations at bench 1 and 3 double displacement stations at bench 2 to accommodate the total number of students). Each station will have a coloured sheet pasted to the lab bench (pink, yellow). At each station, students will refer to their respective coloured sheet. Tell students at lab bench 1 to come up first to get their safety equipment (apron, latex gloves and goggles). Tell students they will need to visit 2 stations, one at each bench. Do not tell them which station is single or double displacement, they will need to determine this in the question section of the lab handout. Students will have 20 minutes for each station. Tell students they will need to record observations in the table on handout and answer the questions. Tell students to begin lab. Circulate to answer any questions and offer help. 5. Go over students answers to questions. Begin by writing both equations on the board. Ask students if these equations are balanced. If not, ask them what needs to be done to balance the equations. From here, analyze one equation at a time. Ask students in first equation ($CuSO_4$ + NaOH → $Cu(OH)_2$ + Na_2SO_4 , what are the reactants? What are the products? What type of reaction is this? How do you know? Try to ask different students for each question. Do the same for the second equation: Fe + Cu SO_4 → $FeSO_4$ + Cu. 6. Clean up. Students will wash test tubes and beakers and put equipment back. 7. For homework, students will be given a number of chemical equations. They will need to balance each and determine the type of chemical reaction for each using their knowledge from yesterday's and today's lesson.	Aprons, safety goggles Test tubes Test-tube racks Dropper bottles of CuSO4 solution Dropper bottles of NaOH solution Beakers Iron nails Copper (II) sulfate solution Paper towel Rulers Lab Handouts (30 pink and 30 yellow) Questions to consider in your planning / delivery 8. How long will each phase last? 9. How am I going to organize working groups? 10. How will I organise and distribute equipment? 11. What specific skill and knowledge development am I emphasizing? 12. Is there evidence of clear instructions and purposeful questions? 13. What must I look for in monitoring student learning? 14. How can I diversify instruction?