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**REMOTE LEARNING LESSON PLANS**

The Remote Learning Lesson Plans are adapted from the IQWST Teacher Edition to support continuous learning. Each plan condenses what is taught with specific teaching recommendations and identifies the digital resources, print resources, and materials needed to teach and learn IQWST remotely.

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| **UNIT TITLE** | **IC2** |
| **DRIVING QUESTION** | How can I make new stuff from old stuff? |
| **UNIT STORYLINE** | [IC2 Storyline](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1571332280-ic2-3.0-storyline-with-appendix.pdf) |
| **IQWST OVERVIEW** | [IQWST 3.0 Overview](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1534960182-iqwst-3-0-overview.pdf) |
| **TEACHER EDITION** | [IC2 Teacher Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1532975745-san-ic2stuffv3-te.pdf) |
| **STUDENT EDITION** | [IC2 Student Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1538741878-san-ic2stuffv3-se-color.pdf) |
| **LESSON PLAN OVERVIEW** | [Remote Learning Overview](http://activatelearning.com/wp-content/uploads/2020/05/remote-lesson-plans-overview.pdf) |

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| **STUDENT MATERIALS:** Each student will need the following materials. Teachers can modify lessons based on which materials the students have access to. For Blended Learning options, teachers may draw from a combination of digital and print resources. | | |
| **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS NEEDED** (FOR EACH STUDENT) |
| * Access to Interactive Student Edition * Access to teacher-led lesson or video * Access to IQWST lesson videos * Audio recordings of readings   **Access from any device with a web browser.**   * For PCs and Chromebooks, we recommend using **Chrome** as the browser * For Macs and iOS, we recommend using **Safari** as the browser * Internet Explorer is NOT supported * Read the full Technical Requirements [here](https://s3.amazonaws.com/al.general/website/pages/ALDP+Requirements.pdf)   **Login:** <http://activatelearning.com/digital-resources/>   * Select your program * Enter the Username and/or Password provided by your teacher | * IC2 Student Edition * Hard copies of selected Projected Images (PIs)   *Print student editions are necessary for students who do not have internet access (or reliable access).* | **IQWST Equipment (from kit)\***  1 piece of white chalk  2 small clear containers with lids  2 resealable plastic bags (quart size)  plastic spoon for measuring  30 mL vinegar  1 spoonful baking soda  2 spoonfuls coarse salt (road or pool salt)  1 coffee filter  2 small pieces of copper  small amount of clay  1 pkg powdered drink mix  1 seltzer tablet  glow stick, necklace or bracelet  **Household Items**  cleaning products and/or food packages with labels  water (used only to read labels)  ⅓ cup pancake or corn syrup  small pan with lid  paper towel  1 tsp sugar  ⅓ cup cooking/vegetable oil  2 Tbsp + 1 tsp table salt  **Students may also need the following General Classroom Supplies (if not using the IDE):**  Pencils and sharpener  Colored pencils  Black marker and/or ink pen  Plain paper for drawing (10-20 sheets)  Glue stick or transparent tape  Pad of sticky notes  Scissors  *\* If kits have been purchased, they include enough equipment for 8 groups of 4 students. You will need additional equipment if you opt to provide materials to each student.* |

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| **Learning Set 1: How Is Stuff the Same and Different?** | | | | |
| **Lesson 1**  **(1 session)** | **How Is This Stuff the Same and Different?** | [Download Lesson 1 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177704-ic2lesson-1.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 1.1  *Can I Make New Stuff from Old Stuff?* | **Anchoring Phenomenon:** Teachers are able to launch the anchoring phenomenon as described in the Teacher Edition (TE)--remotely--by either demonstrating the activity themselves or sharing the video of the initial activity provided here.  A ball of aluminum foil is placed in a copper chloride solution, and Ss observe several changes (that they will later come to know as a *chemical reaction*). This launch of the anchoring phenomenon sets the context for asking questions about other changes in materials and how “old stuff” becomes “new stuff” through chemical reactions. (Described in detail in the TE.)  Do the opening activity or Show/Share the Video. If teachers demonstrate the phenomenon live, setting the beaker on a white surface will enable Ss to more easily observe the color change.  In class, Ss would notice 1) the temperature of the solution increases when the foil ball is added (and continuous to increase significantly), 2) the solution bubbles, 3) the foil becomes a crumbly brownish-orange material, 4) the blue liquid becomes murky and grayish, and 5) the resulting material gives off an odor where Ss noticed no particular odor initially.  For remote learning and a live enactment, be sure Ss are able to note as many of these changes as possible. For all remote learning, when using video, watch first so that Ss can make observations, and then after discussion, show a second time, so that Ss who didn’t notice particular aspects the first time will do so the second time. Or, show the video and voice over it to note changes, perhaps cuing Ss to “Pay attention to X” or asking, “What are you noticing about Y?”  Discussion Prompts: Throughout the unit, teachers should:  1) choose discussion prompts applicable to remote learning and ability to discuss with Ss, or  2) have Ss write answers to teacher-selected prompts that can be added to the slide deck, if discussion is not possible, or  3) choose questions for Ss to discuss remotely, perhaps writing responses that are then submitted.  Questions in the SEs: Throughout the unit, teachers should decide on the method by which the lesson will be delivered, and then have Ss ignore any questions in their SEs that do not fit the way in which the lesson will be enacted remotely. Teachers may provide a handout for print-only Ss who cannot access the curriculum remotely, so that they know which questions in their SEs they should respond to.  **For remote learning, components of Activities 1.1, 1.2 (comparing materials), and 1.3 (chalk) could be combined to be done in one (or two) class periods, with the Driving Question Board begun following Activity 1.3.**  After 1.3: Introduce the Driving Question Board (DQB): Throughout the unit, Ss record their own, original questions as they arise. See the TE and the *IQWST Overview* for more information on how to use and manage the DQB.  Key: To pique interest and to generate questions related to the Driving Question. | Access to Student Edition (SE) in Interactive Digital Edition (IDE)  SE Activity 1.1  [Setup Video 1.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_1-461.mp4)  [Activity Video 1.1](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-1.1-copper-chloride-activity.mp4)  Teacher-created DQB (e.g., jamboard, padlet) or physical DQB to share during virtual lessons.  Ss will post their own original questions in the “Questions” tab of the IDE | Hard copy of the Student Edition (SE) to be used for all activities,  readings, writing tasks.  SE Activity 1.1  In addition, the readings in the SE connect in-class investigations of phenomena with other, everyday phenomena that Ss have either experienced or with which they are familiar.  Ss will write questions on sticky notes, and post at the front of their SEs on the *Driving Question Notes* pages. | (1) Pad of sticky notes |
| Reading One | *What Is Important about the Stuff I Use?*  See TE for Reading Intro and Followup.  Key: Supports Ss thinking beyond the anchoring activity to consider the rationale for the Driving Question: Why DO scientists make new materials out of original substances? | SE Reading One | SE Reading One |  |
| Activity 1.2  *How Is This Stuff the Same and Different?* | The activity, as written, cannot easily be done remotely, as smelling and feeling of the two materials is as important as making visual observations.  However, if a teacher is able to show fat/lard/shortening so that Ss know what material they are reading about when the unit references “fat,” that would be helpful.  Use the “Introducing the Activity” discussion.  To adapt the activity for remote learning: If possible, show Ss two or more similar looking materials (e.g., flour, sugar, salt, baking soda, baking powder, cornstarch), and center the discussion on how unknown materials can be identified.  If teachers plan to make soap remotely the references to soap throughout the unit can be maintained. Some activities that emphasize fat and soap are de-emphasized or omitted in this plan for remote learning. In the classroom, these activities are used to contextualize much of the learning because the unit concludes with Ss using fat (shortening) and sodium hydroxide to make soap. Without Ss making soap, emphasis on other examples makes more sense to support their learning.  Key: The importance of careful observations in science. | SE Activity 1.2 | SE Activity 1.2 |  |
| Reading Two | *What Makes a Substance a Special Kind of Stuff?*  See TE for Reading Intro and Followup.  The reading has a remote activity built in: Ss look at ingredients labels of products they have available Have Ss do this activity, and then follow up as described in the TE.  Key: Reviews substances and properties, and the difference between substances and mixtures (initially addressed in IC1). | SE Reading Two | SE Reading Two | Ss look at labels of any cleaning product(s) or food item(s) they have available. |
| Activity 1.3  *Demonstration and Review of Substance, Mixture, and Property* | Show chalk and break it apart as described in the TE.  Key: To summarize key ideas about substances and their properties, and the key difference between substances and mixtures (initially addressed in IC1). | SE Activity 1.3 | SE Activity 1.3 | (1)piece of white chalk that Ss can break into smaller pieces. |

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| **Lesson 2**  **(2 sessions)** | **Do Fat and Soap Dissolve in the Same Liquid?** | [Download Lesson 2 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177718-ic2lesson-2.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 2.1  *Investigating Solubility* | Teacher Demonstration: Investigating Solubility  Show/Share setup video. Data for this demonstration is found in the TE - Discussion: Pressing for Understanding.  Activity 2.1 and 2.2 videos can both be shown at the same time as examples of observations one would make to determine whether something is soluble.  Key: Solubility is a property of substances, and how to know whether something is soluble. | SE Activity 2.1  [Setup Video 2.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_2-469.mp4)  [Activity Video 2.1 Butter in Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.1-solubility--butter-in-water.mp4)  [Activity Video 2.1 Butter in Oil](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.1-solubility--butter-in-oil.mp4)  [Activity Video 2.1 Calcium Chloride in Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.1-solubility--calcium-chloride-in-water.mp4)  [Activity Video 2.1 Calcium Chloride in Oil](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.1-solubility--calcium-chloride-in-oil.mp4)  [Activity Video 2.1 Baking Soda in Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.1-solubility--baking-soda-in-water.mp4)  [Activity Video 2.1 Baking Soda in Oil](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.1-solubility--baking-soda-in-oil.mp4) | SE Activity 2.1 |  |
| Reading One | *Why Can I Easily Wash Soap off My Hands with Water?*  See TE for Reading Intro and Followup.  Ss may be able to do the salt-in-water dissolving investigation remotely for hands-on experience with a phenomenon related to solubility. Check in with Ss to discuss their results.  Key: Reinforces solubility as a property of substances, and how to know whether one material is soluble in another. | SE Reading One | SE Reading One | 2 glasses of room temperature water--one containing ¼ cup the other with ⅛ cup of water; 2T salt. (Needed for the activity in the reading). |
| Activity 2.2  *Investigating Solubility of Soap and Fat* | Show/Share setup video. See Apple Icon in TE for discussion of this video  As noted above, both Activity 2.1 and 2.2 videos could be viewed back-to-back as examples of solubility.  If teachers are not making soap, thus choosing to use soap and fat in each of the properties lessons, this activity could be skipped. The data are in the TE and will be needed in Lesson 5. In lesson 5, the data could simply be provided so that Ss can write an explanation even without having done the soap-making preparation of measuring fat and soap properties.  Key: Understanding solubility of fat and soap (as this will later apply to soap making). | SE Activity 2.2  [Setup Video 2.2](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_2-468.mp4)  [Activity Video 2.2](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-2.2-solubility-of-soap-and-fat.mp4) | SE Activity 2.2 |  |
| Checkpoint:The *Reading Follow Up* section of the TE includes a question that can help teachers gauge the sense Ss are making of solubility as a property of substances. Reading One also has several questions that may be used to gauge sense-making as they ask Ss to apply their understanding of solubility. | | | | |

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| **Lesson 3**  **(2 sessions)** | ***Do Fat and Soap Melt at Different Temperatures?*** | [Download Lesson 3 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177737-ic2lesson-3.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 3.1  *Investigating Melting Point* | Show/Share setup video.  Given that it is not safe for Ss to do this activity remotely, the teacher demonstration for Activity 3.1 and/or the Activity videos for Activity 3.1 will suffice.  Share: data table from TE for discussion  Key: A substance’s melting point is the temperature at which a solid \*starts\* to become a liquid. | SE Activity 3.1  [Setup Video 3.1A](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-margarine_melting_points-458.mp4)  [Setup Video 3.1B](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-fat_melting_points-467.mp4)  [Activity Video 3.1 Melting Point: Butter vs Margarine](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-3.1-melting-point-of-margarine-and-butter.mp4)  [Activity Video 3.1 Melting Point: Soap vs Fat (2.5 cm)](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-3.1-melting-point-of-soap-v-fat-2.5cm.mp4)  [Activity Video 3.1 Melting Point: Soap vs Fat (5.0 cm)](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-3.1-melting-point-of-soap-v-fat-5cm.mp4) | SE Activity 3.1 |  |
| Activity 3.2  *Does the Size of Something Affect Its Properties?* | The emphasis of this activity is hardness as a property. Given that it is not safe for Ss to do this activity remotely, teachers might choose to demonstrate the scratch test of metals.  Using Readings One and Two with Ss will support their understanding of the properties of melting point and hardness.  Key: Because melting point is the property of a substance, the amount of the substance does not affect the point at which it begins to melt. | SE Activity 3.2 | SE Activity 3.2 |  |
| Reading One | *Melting Points*  See TE for Reading Intro and Followup, and possible assessment.  Key: All pure substances have melting points. | SE Reading One | SE Reading One |  |
| Reading Two | *Does the Size of Something Affect Its Properties?*  See TE for Reading Intro and Followup.  Key: Size is not a factor in determining properties. Also, scientists have determined the properties of many substances that cannot be tested using classroom tools. | SE Reading One | SE Reading One |  |

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| **Lesson 4**  **(1 session)** | **What Other Properties Can Distinguish Soap from Fat?** | [Download Lesson 4 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177752-ic2lesson-4.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 4.1  *Exploring the Relationship between Mass and Volume* | Do the demo live, if possible, or share videos on density.  (These videos contain information beyond the scope of the initial investigation, but they will enable Ss to learn about what density is.)  See the TE preparation section for more on density, as it is an especially challenging concept for Ss.  Key: Density is another property of substances. A substance’s density is always the same, regardless of the size of the sample being measured. | SE Activity 4.1  [Activity Video 4.1 Teacher Demo : Density](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-4.1-teacher-density-demonstration.mp4)  [Activity Video 4.1 Student Density Investigation](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-4.1-density-of-chalk-measurements.mp4)  [Video 1: density](https://youtu.be/bm1infT_jII) [Video 2: density](https://youtu.be/GnBQ6vIutDM) | SE Activity 4.1 |  |
| Reading One | *How Can Two Objects That Are the Same Size Have Different Masses?*  Walking through the reading with Ss as a think-aloud will be helpful. See TE and *IQWST Overview* for ideas on how to do this.  An activity in the reading may be do-able for Ss who have access to pantry items such as water, vegetable oil and syrup (corn or pancake syrup). Check in with Ss to discuss their results, perhaps demonstrate this for Ss to see if they are not likely to be able to do this one on their own.  Key: Understanding density and how it is calculated. | SE Reading One | SE Reading One | ⅓ c cooking oil/vegetable oil, ⅓ c water.  If possible, ⅓ c. pancake syrup or corn syrup. |
| Activity 4.2  *Do Fat and Soap Have the Same Density?* | The teacher may choose to demo this activity (the density of fat and soap), to share the video, or to simply share the data table from the TE and discuss. Given the likelihood of reduced time for remote learning, and if teachers will not be focusing on soap making, sharing the data table may be sufficient.  Key: Focus on calculating density and density as a property. | [Activity Video 4.2 Densities of Soap and Fat](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-4.2-density-of-soap-and-fat-measurements.mp4) | SE Activity 4.2 | SE Activity 4.2 |

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| **Lesson 5**  **(1 session)** | **How Are Fat and Soap Different?** | [Download Lesson 5 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177772-ic2lesson-5.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 5.1  *Are Fat and Soap the Same or Different Substances?* | Ss need the data from the previous four lessons in order to proceed and write this Claim-Evidence-Reasoning (CER) formatted explanation for soap. If teachers are working with soap and fat throughout the unit, share and discuss the data table from the TE and then have Ss write this explanation.  **However**, teachers may choose instead to focus more on Reading One and on using the “Constructing a Scientific Argument” section, in which Ss use data to explain whether the unknown substances in two rings are the same or different. It is not necessary for Ss to construct both the soap and the rings arguments.  Share PI : Scientific Explanations (via the slide deck or the teacher portal)  Key: Several core concepts from this first Learning Set are summarized in the Wrapping Up section of the TE. | SE Activity 5.1 | SE Activity 5.1  PI: Scientific Explanations |  |
| Reading One | *What Evidence Would I Use to Tell if the Stones in a Ring Are the Same or Different?*  Use as suggested above.  Key: What counts as *evidence* for a claim in science. | SE Reading One | SE Reading One |  |
| Reading Two | *Could Someone Change Straw into Gold?*  The fairy tale “Rumpelstiltskin” elicits what Ss already know intuitively: That things can only be turned into certain other things. A real-life cooking example elicits this knowledge as well. This reading sets the stage for making sense of chemical reactions at a molecular level.  Key: When you combine substances, what you end up with depends on what you start with. | SE Reading Two | SE Reading Two |  |
| Checkpoint: The explanation in the reading picks up the theme about a ring that could be either diamond or cubic zirconium, and is an opportunity to assess Ss understanding of properties, substances, and constructing a scientific argument. | | | | |

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| **Learning Set 2: How Can I Make New Substances?** | | | | |
| **Lesson 6**  **(1 session)** | **What Happens to Properties When I Combine Substances?** | [Download Lesson 6 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177796-ic2lesson-6.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 6.1 | Teacher Demonstration of Investigation Procedure  Demo the activity or share the video.  A gas fills the bag and causes it to expand. A white precipitate (solid) forms--that does not dissolve-- and will collect on the sides and in the corner of the bag.  If Ss are able to do the activity remotely, have them do it as written. They can also filter the precipitate by pouring the contents of the sandwich bag into a coffee filter, spread out the coffee filter that contains the precipitate, and let the material dry. When it is dry, they can rub between their fingers, or rub on a chalkboard or sidewalk to see that what was produced in this chemical reaction was chalk.  Key: “Signs” might indicate that something new results when some substances are put together. Definition of a *chemical reaction*. | SE Activity 6.1  [Setup Video 6.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_6-466.mp4)  [Activity Video 6.1](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-6.1-chemical-reactions.mp4) | SE Activity 6.1 | (1)zip-seal plastic sandwich- or quart-size bag,  10mL water  plastic spoon for measuring, 1 spoon baking soda, 2 spoons road salt or pool salt,  container to hold 10mL water and to fit inside the resealable bag  (1) coffee filter |
| Reading One | *What Is a Chemical Reaction?*  The reading contains all of the data for this investigation and has Ss use the data as evidence to support a claim about whether this was, indeed, a chemical reaction.  Key: Emphasis on the fact that while there are observable signs that suggest a chemical reaction the only way to be sure of whether new materials are made is to compare properties before and after. | SE Reading One | SE Reading One |  |

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| **Lesson 7**  **(1 session)** | **Is Burning a Chemical Reaction?** | [Download Lesson 7 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177817-ic2lesson-7.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 7.1  *Is Burning a Chemical Reaction?* | Share setup videos.  Share data tables of properties in TE for discussion  That magnesium (a solid) burns and produces extremely bright light is the phenomenon addressed in this lesson. It is used as the context for introducing the language of chemical reactions: interactio, reactants (old stuff), and products (new stuff). It also introduces ball-and-stick models, chemical equations and chemical formulas as ways to represent chemical reactions---all of which should be introduced to Ss.  Key: Chemical reactions can be represented in word equations and with other models. | SE Activity 7.1[Setup Video 7.1A](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_te_v2_0_5_video-lesson_7-464.mp4)  [Setup Video 7.1B](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_te_v2_0_5_video-lesson_7-470.mp4)  [Setup Video 7.1C](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_7-457.mp4)  [Activity Video 7.1 Teacher Demo: Burning Magnesium](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-7.1-burning-magnesium.mp4)  [Activity Video 7.1 MgO Breakdown](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-7.1-magnesium-before-and-after-burning.mp4)  [Activity Video 7.1 Mg + HCl reaction](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-7.1-magnesium-chemical-reaction.mp4) | SE Activity 7.1 |  |
| Reading One | *Is Burning a Chemical Reaction?*  Key: Emphasizes the concepts from the lesson using fireworks as an example. Burning is always a chemical reaction. | SE Reading One | SE Reading One |  |

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| **Lesson 8**  **(1-3 sessions)** | **Does Acid Rain Make New Substances?** | [Download Lesson 8 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177849-ic2lesson-8.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 8.1  *How Can I Investigate Acid Rain in My Classroom?* | Reading One sets the context for this lesson, thus should be read before the activities. Acid rain is the real-world context for the phenomenon in which copper “turns green” in the presence of particular pollutants in the atmosphere, another phenomenon that Ss experience first-hand in class.  For remote learning, teachers may choose to demo the activity, or to have Ss do it remotely if they are able to. Another option is to share the setup video and use discussion of the reading to consider what *would* happen---and then to skip the actual experience of this phenomenon.  Teacher Note: A greenish substance will form on copper in the presence vinegar, while the penny in the presence water (the control) will not change in appearance. Data for the investigation is in the TE Activity 8.2, as the experimental set up needs to set for 24 hours.  Given the likelihood of reduced time for remote learning, portions of Activities 8.1, 8.2, and 8.3 may be combined and addressed in 1 or 2 sessions. The real-world examples are especially important for student engagement  Key: Focuses on a real-world phenomenon that is a chemical reaction. | SE Activity 8.1  [Setup Video 8.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_8-460.mp4) | SE Activity 8.1 | two pennies (dated before 1982) or two small pieces of copper  30 mL vinegar,  30 mL water  two containers that can be closed tightly  Clay to hold copper pieces or pennies upright |
| Reading One | *Why Is the Statue of Liberty Green?*  Key: Contextualizes the activity in a real-world phenomenon and addresses acid rain/pollution as an environmental issue, as well. | SE Reading One | SE Reading One |  |
| Activity 8.2  *Does Acid Rain Make New Substances?* | Show/Share setup video.  Share data table of properties from TE and discuss  Key: Using data as evidence to construct an explanation. | SE Activity 8.2  [Setup Video 8.2](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_8-459.mp4) | SE Activity 8.2 |  |
| Reading Two | *Does Acid Rain Make New Substances?*  Be sure Ss read the example of cutting an onion and watering eyes as a chemical reaction.  Key: Using data as evidence for three explanations that Ss critique, for practice recognizing appropriate and sufficient evidence and a well-constructed explanation, and then determining how explanations can be improved with revision. | SE Reading Two | SE Reading Two |  |
| Activity 8.3  *Representing Chemical Reactions in Words and Symbols* | Share data table from TE and discuss.  Key: Representations and models of chemical reactions: words and symbols, ball-and-stick models. | SE Activity 8.3 | SE Activity 8.3 |  |
| Reading Three | *What Are the Many Ways of Representing Any Chemical Reaction?*  The reading discusses burning of fuels, and suggests that Ss explore the products of other fuels, and why hybrid automobiles were developed. For Ss with access, this activity enables them to apply and extend what they are learning about chemical reactions.  Key: Making Sense of molecular models and data related to the burning of different materials. | SE Reading One | SE Reading Three |  |
| Checkpoint: By the end of this lesson, it is important that Ss understand the various representations of chemical reactions and can interpret word equations and models in light of the definition of a chemical reaction----following a process, atoms in the initial substances rearrange to form new molecules, and the resulting product(s) have different properties from those of the initial reactants. | | | | |

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| **Lesson 9**  **(1 session)** | **Is This a New Substance?** | [Download Lesson 9 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589924378-IC2%20Lesson%209%20.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 9.1  *Does Electrolysis of Water Make New Substances?* | Show/Share setup video. (This video does not show the flame test after gas production.)  Show/Share the video that shows the flame test after the electrolysis of water. (This video uses a different catalyst of sodium hydroxide.)  Key: Thus far, all chemical reactions have involved two substances interacting to form new substances. Electrolysis is an example of only one substance (water) being broken down and atoms rearranged to form two substances (hydrogen, oxygen).  Note: Given the complexity of this lesson, and likely time constraints for remote learning, teachers may wish to focus on particular sections of the reading rather than on this activity, ensuring that Ss are introduced to the key ideas stated here, and perhaps focusing on decomposition as a real-world example that can contextualize the concept and be remembered. | SE Activity 9.1  [Setup Video 9.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_9-462.mp4)  [Activity Video 9.1 Flame Test](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-9.1-electrolysis.mp4)  [Video: flame test](https://youtu.be/vFR9zUGt2C4) | SE Activity 9.1 |  |
| Reading One | *What Is the Same and Different about Boiling Water and Electrolysis?*  In addition to water and electrolysis, the reading ends with a discussion of decomposition, an example with which Ss are likely familiar. Be sure Ss read about this everyday-life example.  Key: Focuses learning on what happens at the molecular level in boiling, electrolysis, and any process of decomposition. | SE Reading One | SE Reading One |  |

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| **Learning Set 3: Do New Substances Always Come from Old Substances?** | | | | |
| **Lesson 10**  **(1 session)** | **How Is a Mixture Different from a Chemical Reaction?** | [Download Lesson 10 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177868-ic2lesson-10.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 10.1  *Do I Always Make New Substances When I Put Substances Together?* | Show/Share setup video.  This video shows only the powdered drink mix boiling, condensing, and evaporating.  Share data table in TE to discuss remainder of activity.  Key: Materials can be put together that mix rather than interact; not everything that seems like something new is a chemical reaction. | SE Activity 10.1  [Setup Video 10.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_10-463.mp4) | SE Activity 10.1 | (1)packet of powdered drink mix, small pan with lid, paper towel |
| Reading One | *What Happens to Atoms and Molecules When I See Different Processes?*  Ss may be able to do the two activities in the reading remotely. Follow up to discuss their results if Ss are able to do these activities. The teacher can also choose to demonstrate both.  Key: Reinforces differences between phase changes, mixtures, and chemical reactions. | SE Reading One | SE Reading One | One clear container of water at room temperature, additional water, 1 teaspoon sugar, 1 teaspoon salt |
| Checkpoint: The last question in the reading could be used to assess Ss sense making of phase changes, mixtures, and chemical reactions. Ss could write responses or draw models to represent A, B, C, and D or any smaller number of the four examples. | | | | |

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| **Lesson 11**  **(1 session)** | **How Can I Make Soap from Fat?** | [Download Lesson 11 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177886-ic2lesson-11.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity  *How Can I Make Soap from Fat?*  11.1 | If teachers opt to carry out soap making as a demo, the Setup video is unnecessary. If teachers have been emphasizing the properties of fat/soap throughout the unit, then showing the Setup video enables Ss to see the phenomenon---that surprising reactants (fat and a caustic chemical) can be combined to make something not caustic and not greasy (a bar of soap).  Key: When scientists understand a lot about substances, including their properties, sometimes surprising reactants can be used to make a new product. | SE Activity 11.1  [Setup Video 11.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_11-465.mp4)  [Activity Video 11.1 Making Soap](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-11.1-making-soap.mp4) | SE Activity 11.1 |  |
| Reading One | *Do People Really Make Soap from Fat?*  Reading can be used to address what happens at a molecular level, otherwise it could be skipped if time is an issue.  Key: Compares soap making today to soap making of old, illustrating that at a chemical/molecular level, the process is the same. | SE Reading One | SE Reading One |  |
| Activity 11.2  *Testing the Properties of Soap* | This activity cannot be done remotely. |  |  |  |

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| **Lesson 12**  **(2 sessions)** | **Does Mass Change in a Chemical Reaction?** | [Download Lesson 12 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177899-ic2lesson-12.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 12.A  *Making Gloop (optional)* | Skip this optional activity for remote learning. |  |  |  |
| Activity 12.1  *Does Mass Change When Seltzer Tablets React?* | Show/share setup video. Discuss predictions.  Teachers may choose to demo this activity or to have Ss do it remotely.  If teachers are demonstrating, then they might demonstrate an open system first, discuss, and then immediately repeat the activity by closing the system---doing all of Activity 12 in one session.  Key: Mass changes in an open system. | SE Activity 12.1  [Setup Video 12.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC2_se_v2_0_5_video-lesson_12-456.mp4) | SE Activity 12.1 | (1)seltzer tablet,  (1)small zip-close plastic bag  (1)small clear  container (with a lid for 12.2, lid off for 12.1) |
| Reading One | *What Happens to Mass During a Chemical Reaction in an Open System?*  The last question asks Ss to consider mass in the sandwich-bag investigation from Lesson 6. Their responses provide a window on their thinking before Activity 12.2 in which they investigate the difference between mass in an open and a closed system.  Key: Contextualizing learning by addressing everyday reactions in an open system. | SE Reading One | SE Reading One |  |
| Activity 12.2  *Does Mass Really Change When Seltzer Tablets React?* | The TE contains a review discussion of all phenomena experienced and investigations done in the unit in relation to whether they were open or closed systems, and what that means for the behavior of the atoms and molecules involved in each reaction.  Key: Mass doesn’t change in a closed system--thus illustrating the conservation of matter/conservation of mass. |  |  | Same materials as for 12.1. |
| Reading Two | *What Happens to Mass during a Chemical Reaction in a Closed System?*  Summarizes many of the key points in the unit, beginning with the everyday phenomenon of how glowsticks work.  Key: Type and number of atoms in a chemical reaction and why (at a molecular level) mass stays the same in a closed system. | SE Reading Two | SE Reading Two | Any item that requires bending to activate--a glowstick, bracelet, or necklace. |
| Checkpoint: The last question in Reading Two can be used to assess Ss understanding of what happens to the atoms in a chemical reaction as they analyze a model. Some Ss may need support in understanding that the *reactants* are sodium and water, as shown, in all four examples. They are to determine whether A, B, C, or D would be *possible products* of a chemical reaction as shown in this single-molecules representation (rather than the billions actually involved). | | | | |

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| **Lesson 13**  **(0-1 session)** | **Is My Soap a New Substance?** | [Download Lesson 13 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589925049-IC2%20Lesson%2013%20.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 13.1  *Is My Soap a New Substance?* | If teachers have demonstrated making soap, they may wish to use the PIs that show the molecules and the chemical formulas, as a way to help Ss see what happens with complex molecules in a chemical reaction. Otherwise, this lesson may be skipped for remote learning.  Key: Atoms that make up molecules rearrange to form new substances in a chemical reaction--here applied specifically to soap. | SE Activity 13.1 | SE Activity 13.1 |  |
| Reading One | *How Does My Soap Compare with Colonial Soap and Modern Soap?*  This reading can be omitted for remote learning. | SE Reading One | SE Reading One |  |

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| **Lesson 14**  **(1 session)** | **How Can I Improve My Soap?** | [Download Lesson 14 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1590597309-IC2%20Lesson%2014.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 14.1  *How Does My Soap Compare with Commercial-Brand Soap?* | This activity can be omitted for remote learning, as Ss are unable to compare their homemade soap with commercially made soap. | SE Activity 14.1 | SE Activity 14.1 |  |
| Reading One | *The Science behind Rumpelstiltskin*  Ss have now learned everything they need to know to explain--from a science perspective--why straw cannot be turned into gold. The reading challenges Ss to explain.  Key: A complete understanding of why nothing can be done to straw to make it turn into gold. | SE Reading One | SE Reading One |  |
| Activity 14.2  *How Can I Improve My Soap?* | This activity can be omitted for remote learning, as Ss have no soap in which to make improvements. |  |  |  |
| Checkpoint: Reading One can be used to assess Ss understanding of why straw cannot be turned into gold--which is not really about straw and gold, but about their understanding of chemical reactions, atoms and molecules, and reactants and products. | | | | |

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| **Appendix** | | | | |
| **Appendix 1**  **(1 session)** | **Human Impacts on Living Resources** | [Download Appendix 1 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589925272-IC2%20Appendix%20Lesson%201.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 1.1  *Investigating Living Resources: Plants* | Demo the activity or share the video of making ethanol (a source of fuel) from everyday materials.  Key: Synthetic materials come from natural resources. | SE Activity 1.1  [Activity Video APX 1.1 Mixing Yeast, Sugar and Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-apx1.1-yeast%2C-corn-syrup%2C-and-water.mp4) | SE Activity 1.1 |  |
| Reading One | *Corn as a Renewable Resource*  Key: Pros and Cons of ethanol as a fuel source in relation to the impacts on society of its production and use. | SE Reading One | SE Reading One |  |

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| **Appendix 2**  **(1 session)** | **Making and Recycling Plastics** | [Download Appendix 2 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589925309-IC2%20Appendix%20Lesson%202.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 2.1  *Making and Recycling Plastics* | Demo the activity or share the video.  Note: With an adult, Ss could potentially make the bioplastic remotely, but providing glycerin may be cost prohibitive.  Key: Synthetic materials come from natural resources. | SE Activity 2.1  [Activity Video APX 2.1 Plastics for opening discussion](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-apx2.1-plastics-opening-demo.mp4)  [Activity Video APX 2.1 Making Bioplastic](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/ic2/ic2-apx2.1-making-bioplastic.mp4) | SE Activity 2.1 |  |
| Reading One | *What Are Plastics?*  Key: Plastics at a molecular level, and chemical engineers as a type of engineer who works in this field. | SE Reading One | SE Reading One |  |

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| **SUMMATIVE ASSESSMENT:** Ss should be able to write a scientific explanation for the Driving Question. Ss writing from Lesson 14 Reading One can be used to assess their understanding of chemical reactions, atoms and molecules, and reactants and products. The Driving Question may now be answered with a complete, CER explanation using data from various investigations as evidence. |

***Teachers might choose to emphasize only a portion of this as a final assessment, given what they are able to teach and what Ss are actually able to do during this remotely taught unit.***