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| **Exploding Snowman** | | | |
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| Making an exploding snowman using bicarbonate and vinegar  Stay safe  Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:    • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others    Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ | | | |
| **Subject(s):** Science  **Approx. time:** 40 - 65 minutes |  | | **Key words / Topics:**   * bicarbonate * card model * chemical reaction * shapes * snowman * vinegar |
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| **Suggested Learning Outcomes** |  | |  |
| * To be able to make an exploding snowman using bicarbonate and vinegar. * To understand that a reaction is when one or more substances are changed to a different substance. | | | |
| **Introduction** |  | |  |
| This is one of a series of resources designed to allow learners to use the theme of the Christmas period to develop their knowledge and skills in Science and Engineering. This resource focusses on making an exploding snowman model using bicarbonate and vinegar.  This activity is a fun way of learning about the effects of chemical reactions. Can you make a snowman that will explode?! | | | |
| **Purpose of this activity**  In this activity learners will use the theme of Christmas to make an exploding snowman model using bicarbonate and vinegar. They will make a card model of a snowman and mix the bicarbonate and vinegar to see the effects of the reaction.  This activity could be used as a main lesson activity to teach learners about chemical reactions when one or more substances are changed to a different substance. It could also be used to explain foams, as liquids or solids containing gas bubbles. | | | |
| **Activity** |  | | **Teacher notes** |
| **Introduction (5-10 minutes)**  Teacher to explain that learners are going to make a model of an exploding snowman using bicarbonate and vinegar and see a chemical reaction that looks like the snowman is exploding.  **Exploding snowman activity** **(30-45 minutes)**   * Step 1 – Learner to add colour to decorate the snowman. * Step 2 – Learners to carefully cut out the templates with scissors on the solid lines. Fold the tabs on the dotted lines and then put glue on tabs A to C. ⚠ * Step 3 – Join the snowman together and stick tabs A and B. Then join the base together and stick tab C. ⚠ * Step 4 – Turn the base over and place on a 50 g container. Place the snowman on top of the base and check the fit is ok. * Step 5 – Make the mixture by mixing **one** tbsp each of bicarbonate and washing-up liquid. Add **two** tbsps of water and mix together. Pour the mixture into the container. ⚠ * Step 6 – Place the snowman model on the container. To test the exploding mixture, add **one** tbsp of food colouring with **third of a cup** (80 ml) of vinegar. Add the mixture to the container and watch the snowman explode! ⚠   **Review (5-10 minutes)**  Discuss the exploding mixture effects with the class. How quickly did the explosion happen? How could the reaction be slowed down? |  | | Print the activity sheet.  Small cake decorating 50 g containers are best for this activity. Teacher may either bring in small plastic bottles or get the learners to bring in the bottles/containers.  Steps 5 – 6. Teacher to ensure covers are placed on work surfaces or trays are used to prevent spills and catch the exploding liquid. ⚠  When using the food colouring learners can use non-latex gloves to prevent colouring fingers. ⚠  The bicarbonate and vinegar mix produces carbon dioxide gas, which is evident because of the formation of bubbles in the foaming mixture. Eventually all of the solid dissolves and reacts producing a new liquid solution. ⚠  The products of the reaction are relatively safe though caution should be taken not to get splashes in the eyes and clothes should be protected. The exploding mixture produced can be disposed of by washing down the sink with plenty of water. ⚠ |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| * Pre-cut the snowman templates on the activity sheets. * Learners may also need assistance to steadily pour the mixtures into the container. |  | | * Learners to create their own snowman designs using the activity sheet. * Watch YouTube – Chemical changes: <https://www.youtube.com/watch?v=37pir0ej_SE> and discuss the key points. |
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| **Resources** |  | | icon-doc**Required files** icon-pdficon-ppt |
| * Plastic container 50 g * Paper or thin card * Paint and brushes * Coloured pencils * Scissors * Glue sticks   For exploding mixture:   * Food colouring * Water * Washing-up liquid * Bicarbonate * Vinegar |  | | Teacher presentation – Exploding snowman  icon-doc Exploding snowman activity sheet |
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| **Additional websites** |  | |  |
| * **YouTube** – **Chemical changes:** Video explaining how chemical changes are identified. <https://www.youtube.com/watch?v=37pir0ej_SE> * **BBC Bitesize – Types of reaction**: Notes explaining different types of chemical reactions – useful for high ability learners to extend their knowledge. <https://www.bbc.co.uk/bitesize/guides/zqd2mp3/revision/1> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Show the video: Chemical changes: <https://www.youtube.com/watch?v=37pir0ej_SE> and discuss the key points of the video. | | **Extension** (Options)   * Learners to create their own snowman designs using the activity sheet.   **Plenary**   * Discuss the exploding mixture effects with the class. How quickly did the explosion happen? How could the reaction be slowed down? | |
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| **The Engineering Context** film |
| * Engineers use chemical reactions to help solve a number of problems. For example, rocket engineers mix chemicals together to make a reaction that powers a space rocket. |

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| **Curriculum links** | |
| **England: National Curriculum**  Science  KS2 Properties and changes of materials   * explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. | **Northern Ireland Curriculum**  The World Around Us  Science and Technology   * Changes that occur to everyday substances. |
| **Scotland: Curriculum for Excellence**  Materials  Properties and uses of substances   * SCN 2-15a | **Wales: National Curriculum**  KS2 The Sustainable Earth   * chemical changes using some common examples. |
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| **Assessment opportunities** | | |
| * Formal teacher assessment of finished snowmen and the results of the experiment. * Self/peer assessment of finished snowmen. * Formative verbal teacher feedback during the activities. | | |
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