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| **Erupting volcano** | | |
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| Make an erupting volcano using sodium bicarbonate and vinegar | | |
| **Subject(s):** Science, Design & Technology  **Approx. time:** 40 – 65 minutes |  | **Key words / Topics:**   * volcano * eruption * lava * reaction * sodium bicarbonate * vinegar * carbon dioxide * gas |
| **Suggested Learning Outcomes** |  |  |
| * To be able to make an erupting volcano 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 set of resources designed to allow learners to use seasonal themes to develop their knowledge and skills in Design & Technology, Science and Mathematics. This resource is part of a group for the Summer that could be carried out either in school or at home. It involves making a model of an erupting volcano using sodium bicarbonate and vinegar. | | |
| **Purpose of this activity**  In this activity learners will make an erupting model of a volcano from sodium bicarbonate and vinegar. They will make a card model of a volcano 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. This experiment can also be used to explain foams, as liquids or solids containing gas bubbles. | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction (5-10 minutes)**  Teacher to explain that learners are going to make a model of an erupting volcano using sodium bicarbonate and vinegar. They should see a chemical reaction that looks like lava.  **Erupting volcano activity** **(30 – 45 mins)**  Teacher to lead the learners through the process step-by-step:   * Step 1 – Learners to place a bottle upside down in the centre of the A3 card. Trace around the bottle neck with a pencil. Carefully cut out the circle with scissors. * Step 2 – Wrap the card around the bottle and secure with sticky tape. Cut around the cone and make a volcano shape. * Step 3 – Decorate the volcano either with paints, coloured pencils or using the activity sheet. * Step 4 – Make the lava by mixing one tablespoon each of sodium bicarbonate and washing-up liquid. Add two tablespoons of water and mix together. Pour the mixture into the bottle. * Step 5 – To test the volcano mix one tablespoon of food colouring with half a cup (125 ml) of vinegar. Add the mixture to the bottle and watch the volcano erupt!   **Review (5-10 minutes)**  Discuss the lava effects with the class. How quickly did the eruption happen? How could the reaction be slowed down? |  | | This activity could be carried out individually or in pairs.  Sodium bicarbonate is also known as bicarbonate of soda.  You could either bring in plastic bottles or get the learners to bring in the bottles. If the bottles are larger than 200 ml, the quantities should be scaled up, otherwise the ‘lava’ may not exceed the volume of the bottle.  Step 3 – learners could create their own designs on the rear of the activity sheet if desired.  Steps 4 and 5. Ensure covers are placed on work surfaces or trays are used to prevent liquid spills and catch the lava flow. Jugs could be used for mixing and/or funnels could be used to reduce spills.  When using the food colouring learners should 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. If required by the school’s risk assessment, safety googles should be worn. The lava produced can be disposed of by washing down the sink with plenty of water. |
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| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| * Pre-cut the volcano design on the activity sheet. |  | | * Learners to create their own volcano designs using the activity sheet. * Watch YouTube – Chemical changes: <https://www.youtube.com/watch?v=37pir0ej_SE> |
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| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Small plastic soft drink or water bottles (ideally 200 ml) * Scissors * Sticky tape * A3 thin card * Paint and brushes * Coloured pencils   For volcano lava:   * Food colouring * Water * Washing-up liquid * Sodium bicarbonate * Vinegar * If available, jugs and funnels |  | | icon-ppt Teacher presentation – Erupting volcano  icon-doc  Erupting volcano handout |
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| **Additional websites** |  | |  |
| * **YouTube** - Iceland Volcano Eruption**:** <https://www.youtube.com/watch?v=KwGReC3_2C0> * **YouTube** – Chemical changes: <https://www.youtube.com/watch?v=37pir0ej_SE> | | | |
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| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Real volcanoes in action. Show the video: **YouTube –** Iceland Volcano Eruption**:** https://www.youtube.com/watch?v=KwGReC3\_2C0 | | **Extension** (Options)   * Learners to create their own volcano designs using the activity sheet. * Watch YouTube – Chemical changes: <https://www.youtube.com/watch?v=37pir0ej_SE>   **Plenary**   * Discuss the lava effects with the class. How quickly did the eruption happen? How could the reaction be slowed down? | |
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| **The Engineering Context** film |
| Engineers use chemical reactions to help solve many 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** | | |
| * Informal teacher assessment of the practical activity | | |
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