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| **Make your own sparkly slime** | | | |
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| **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: ⚠ | | | |
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| **Age range:** 11-14-year-olds or younger with adult supervision  **Approx time:** 45 minutes – 1 hour |  | | **Key words / Topics:**   * science * consistency * elastic * PVA * viscosity * polymers * molecules * monomers * chemical reaction * non-Newtonian |
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| **Introduction** |  | |  |
| Learners might have played with slime – it’s the gooey slippery stuff that’s fun to pull and stretch. In this activity, we are going to dive into the science behind this sticky stuff and find out how to make glittery slime! | | | |
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| **Resources** |  | |  |
| * 60 ml of PVA glue * ½ tablespoon of bicarbonate of soda * ½ cup of shaving cream (make sure it is cream not gel) * ½ tablespoon of contact lens solution – check that it has boric acid as an ingredient * A glass of water * Food colouring (any colour you would like) * Lots of glitter * A mixing bowl * A wooden spoon. | | | |
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| **Instructions** ⚠ |  | |  |
| **Step 1**  Pour the 60 ml of glue in the bowl.  **Step 2**  Add 1 tablespoon of water and stir with the spoon.  **Step 3**  Add the shaving cream and stir again.  **Step 4**  Add ½ a tablespoon of bicarbonate of soda and stir again.  **Step 5**  Now add glitter and food colouring and stir again.  **Step 6**  Finally, add the contact lens solution slowly whilst continually stirring. Check the consistency - too much and the slime won't be elastic, too little and it will stick to hands.  **Step 7**  Use hands to knead the slime until it’s springy. | | | |
| **Science and maths** |  | |  |
| Slime flows but it is also thick – that’s what makes it interesting to play with. It can feel thick or runny depending on how it is handled. When it is poured or oozes through fingers, it flows like a thick liquid. When it Is squeezed or hit it with a fist, it feels hard, like a wet solid. It feels more solid when you hit or squeeze it because that pressure squeezes the particles in the slime together, making it hard for them to slide against each other.  The word that describes the thickness of a fluid is ‘**viscosity’** and scientists call a material that changes viscosity – like the slime - a **non-Newtonian fluid**. So what’s going on to make all those ingredients we used to make the slime go from sloshy to sticky?  The white glue used is Polyvinyl Acetate (PVA). The molecules in the glue are **polymers**. Polymers are very long molecules made up of many smaller molecules attached together in a repeating pattern. These long chains of molecules slide past each other easily, like strands of dry spaghetti – and that’s what keeps the glue flowing.  The smaller molecules that come together to form polymers are called **monomers**—little building blocks, a bit like Lego bricks, that link together over and over to form a large polymer. When we add the contact lens solution there’s a **chemical reaction** which changes the way the molecules connect and **bond,** and a new substance is formed.  In slime, the molecules from the PVA glue and the contact lens solution have become **‘cross-linked**’. It’s as if spaghetti has been cooked and mixed together so the strands are knotted around each other. The tangle makes the slime stiffer – whilst still sticky. These bonds are also really good at trapping water and so that’s why slime is wet. | | | |
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| **The Engineering Context** | | | |
| Engineering polymers are a group of plastic materials that have improved mechanical and thermal properties that make them ideal for all types of engineering applications. They can be used to replace traditional materials equal or greater in weight, hardness or other properties, while being much simpler to manufacture, especially with complex shapes. | | | |
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| **Curriculum links** | | | |
| **England: National Curriculum**   * **Science** * identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses | | **Northern Ireland Curriculum**   * **Primary; The world around us** * To be aware of how modern technology has influenced design and production of everyday objects * How advances in technology have changed the way we live, work, travel and use our leisure time | |
| **Scotland: Curriculum for Excellence**   * **Science; Materials – Properties and uses of substances; Second**   By contributing to investigations into familiar changes in substances to produce other substances, I can describe  how their characteristics  have changed. | | **Wales: National Curriculum**   * **Science KS2** how some materials are formed or produced | |