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| **Materials and Chemicals** | | **Extension task 1** | **Extension task 2** | **Extension task 3** |
| 1 | |  | | --- | | Draw a poster describing what chemical reactions are involved when superglue works. | | | |  | | --- | | List 5 antibiotics and explain what they can treat and how. | | Research the history of the discovery of antibiotics by careful observation, and explain why we need to find new antibiotics. |
| 2 | Design a machine that could operate in an atmosphere that was different to that of Earth. | | Describe the process of photosynthesis. Explain why plants need to respire. | How is energy conserved in metabolic processes? |
| 3 | |  | | --- | | Investigate the ‘Great Pacific Garbage Patch’ (<http://www.smart-learning.co.uk/ss/th2/chem/t5/L3>) and explain how it has arisen. | | | |  | | --- | | Identify three ways a community could reduce waste, and create a presentation to argue a scientific case for adopting their ideas. | | |  | | --- | | Research and some data on rubbish disposal in your area. Explain your findings. | |
| 4 | Investigate the science behind key sustainable features by researching statistics on the production of waste, energy used in an ‘average’ house and the amount of electricity produced using renewables, before calculating the ‘percentage impact’ of features using estimates to make their final choice of house. | | Describe five changes to food supply, packaging and wastage they could make to improve sustainability. | Compare sustainability issues in different countries,  e.g. development of China and India compared to that of the  UK and USA. |
| 5 | Using a molecular diagram of a simple polymer such as poly(ethene), draw a simplified reaction diagram to show how three or four ethene monomers join to form the polymer. | | Draw algebraic expressions to denote repeat units. | Draw simplified (skeletal) molecular diagrams for organic substances and illustrate straight-chain and branched-chain polymers. |
| 6 | Describe how a ceramic (glass) can be made and the practical applications of ceramics, particularly in the fields of decorative objects, construction and spaceflight. | | Research the chemical bonding present within ceramic materials. | Draw simple structural models and comparing with metallic and ionic structures. |
| 7 | Explain the substances present in the different layers of GORE-TEX® Fabric and the scientific reasons for the inclusion of each one; e.g. Nylon, plus polytetrafluoroethene (PTFE) | | Compare Kevlar with GORE-TEX® Fabric. | Investigate the simplified structural formulas for nylon and oils (lipids), to relate the hydrophobic properties of materials to the bonding within them and the polar nature of water. |
| 8 | Research and present additional data on fuels, energy and trends from secondary sources. | | Compare data from the UK with other countries, such as China, South Africa and Brazil, and predict future trends. |  |
| 9 | Investigate cases where the development and testing of drugs went wrong, such as thalidomide, which was developed to treat morning sickness but caused babies to be born with disabilities. | | Students compare and contrast the development, use and side effects of aspirin with paracetamol and explain why taking a large amount of either drug is dangerous. | Students compare and contrast the development, use and side effects of aspirin with paracetamol and explain why taking a large amount of either drug is dangerous. |
| 10 | Explain cooking reactions in terms of the rearrangement of atoms in molecules and the particle model. Explain why hot substances are more likely to react than cold substances. | | Investigate the role of enzymes in cooking, and how some fruit enzymes can tenderise meat. |  |
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