From Mine to Magnificence
By Elizabeth Brown

About the author
Elizabeth Brown is a chemical research scientist at the STEAM Centre for Excellence at Mater Christi College. She has been researching the process of mining exquisite gems and metals and how they are shaped into beautiful pieces of jewellery for over ten years and has published numerous scientific papers.

Abstract
The process of mining metal and gemstones from the earth has been carried out for over hundreds of years but more recently the effect on the environment is a major concern for some countries. In this article Elizabeth delves into the damage that is being done not only to the environment but to the people of the developing nations where our jewellery comes from.

Magnificence in gold and sapphire
This 18-carat gold ring has an oval shaped blue sapphire surrounded by brilliant cut diamonds. Carats are used to describe and measure the fineness of gold. It is a heavy and soft metal which weighs twice as much as lead. It is valued because of its shine and deepness of colour. It is described as malleable and ductile which means it can be shaped and bent to certain angles. (Britannica School, 2017a) The chemical formula of gold is AU.

Gold was discovered in the 1800s in many places across the world. Major gold rushes occurred in the United States, Australia, South Africa, and Canada in the 19th century. (Britannica School, 2017b) The yellow dots on diagram 2 show where gold deposits have been found around the world.
The sapphire is a transparent corundum, or aluminum oxide. Sapphires range from white through blue, violet, yellow, and green to near black. Blue star sapphires with six rays are favourite stones. Fine sapphires are equal in value to diamonds of equal size. Found in Myanmar, Thailand, Sri Lanka, and Jammu and Kashmir. (Britannica School, 2017c)

The Mining Process

Diagram 2 (The Ohio State University, 2015)

Diagram 3 (The Mining Process, 2012)
Economic development issues

Responsibly undertaken, gold mining and its associated activities can have a transformative effect on socio-economic development in countries where gold is found. When produced in conformance to high social, environmental and safety standards, gold provides employment opportunities, improved infrastructure and tax revenues. It can also drive foreign direct investment and generate foreign exchange. Respect for local societies and human rights are of particular importance for responsible gold-mining companies. Many companies undertake their own social responsibility programmes, as well as sign up to international standards such as the Voluntary Principles on Security and Human Rights. Responsible gold mining also means addressing concerns that resources could fund unlawful activity, particularly when operating in areas affected by armed conflict, such as civil war or militia activity. (Responsible Gold, 2000)

Sapphire and Yellow Gold – the preferred mineral and metal

Sapphire is the most precious and valuable blue gemstone. It is a very desirable gemstone due to its excellent colour, hardness, durability, and lustre. (Sapphire: The gemstone Sapphire information and pictures, 2008)

The Physical properties of Gold are the characteristics that can be observed without changing the substance into another substance. Physical properties are usually those that can be observed using our senses such as colour, lustre, freezing point, boiling point, melting point, density, hardness and odour. (Gold Properties, 2018)
References


