Chemistry in the development of synthetic gemstones

Science, Chemistry

Synthetic Gemstones Throughout history, gemstones have been reserved mainly for royalty and families who were very wealthy. People who could not afford them often sought ways to have the things that they desired. The practice of imitating jewels and gemstones has been around almost as long as they have been coveted. This is true as far back as the " Ancient Egyptians who feigned gemstones with glass and glaze, because genuine were too expensive and/or too rare" (Schumann, 242). One of the earliest imitations to resemble turquoise, prized by the Egyptians, and some 7, 000 years ago they constructed a turquoise-colored ceramic substance, termed faience, that was used for beads, amulets, pendants, and rings (Matlins and Bonanno, 227). Also, blue glass gems were found in King Tut's tomb (Matlins and Bonanno, 227). It is fair to say that imitation gems have been around for quite awhile. Not only have the poor made them, but also royalty such as King Tut, because the " real thing" was just too rare to get a hold of. Glass and other substances have been used to imitate gemstones for a very long time. It wasn't until recently that an actual gem was synthesized using a special technique developed by a French chemist A. V. Verneuil. Verneuil created the flame fusion process in 1883 where he synthesized the first gemstones. He " succeeded in producing gem quality synthetic rubies in 1888" (Schumann, 243). His method melts powdered aluminum oxide with some other additives, which include a dye. The molten parts form into a pear shaped boule. Although there aren't any crystal faces, the crystal structure is the same as the natural gem. Synthetic blue sapphires were produced in 1910 and sometime later, colorless, yellow, green, and alexandrite-colored sapphires were perfected (Schumann, 243). Synthetic diamonds have always

been a sought after item, mainly because of their price and rarity. However, their price and scarcity are totally artificial. The diamond seller DeBeers is long known to have a monopoly over the sale and distribution of diamonds across the whole world. It is also known that DeBeers has large stockpiles of diamonds that they withhold from the market so that the price stays high, and so that the public still sees the diamond as a rare and precious stone. Synthetic diamonds will put a stop to all of that. In the past, several companies have tried to enter the market, competing with DeBeers. Since DeBeers has such a hold on the market, they were able to drop the prices so low that the new companies couldn't afford to be in business. Again, all of that is going to change with synthetic diamonds. Even if the price of diamonds drops significantly, the cost to produce one carat of synthetic diamond by Chemical Vapor Deposition is five dollars. When examined by a diamond expert, the only way that he could tell that it was artificial was that it was too perfect. The crystal structure was ideal. The expert said that no where in nature could a diamond this perfect be found. That is why DeBeers is so scared of these new diamond " growers," they can produce a large, perfect diamond at an almost ridiculous price. The jewelry market isn't the largest draw for synthetic diamonds; it's only a temporary way to pay for research into the field of diamond semiconductors. Today's computer chips are operating at a very high heat. In order for a computer chip to perform at its best, it must perform at the highest speed possible without failing because of the heat. Diamonds are the highest conductors of heat that we know of. If we were able to make a computer chip out of diamond rather than silicon, the speed would increase dramatically. The diamond chips could

withstand heats that would turn a silicon chip into liquid. Synthetic diamonds don't only have one application. Think about synthetic diamond windows in a space shuttle. There would be no worries about meteor showers or other debris potentially cracking or penetrating the windows, or how about a scratch less countertop so mothers everywhere wouldn't worry about leaving their families alone in the kitchen. Synthetic diamonds offer a brand new way of thinking about how new lab made gemstones can be used. Synthetic gemstones are going to become more and more popular because of their price and that they are becoming easier to get a hold of. Synthetic gemstones are becoming more perfect then the real thing. When one man was asked if it mattered whether or not a gemstone was artificial or not, he replied: If you see a beautiful flower in a flower shop, do you really care if it was grown in the jungles of Costa Rica or in some green house in California? It doesn't really matter. All that matters is that the flower is beautiful. Society is going undoubtedly going to take that attitude that it doesn't matter whether the rock was grown in the ground or in a lab. If a woman had a choice between a half, and a one carat stone, and the price along with everything else was the same, what do you think she would choose? Synthetic gemstones are now quickly beginning to saturate the market. Many people are grateful, others are worried that because of this advance in chemistry, they are going to be sold a gemstone that was synthesized but they are going to be charged the price of a stone that was mined from the earth. Not only has this new technology advanced what we now can achieve, it has brought us one step closer to many more new technologies such as super fast super small computers, or quite soon watch crystals made out of

diamond. The technology is new; therefore its applications are endless. Science has made a large advance by reproducing what took the Earth millions of years to make. Whether used for jewelry or the latest electronics, this advance in chemistry will benefit all of us. Bibliography Matlins, A. G. and Bonanno, A. C. (1997). Gem Identification Made Easy. Woodstock, VT. GemStone Press. Nassau, K. McClute, S. F., Elen, S. and Shigley, J. E. (Winter, 1997). Synthetic Moissanite; A New Diamond Substitute. Gems and Geology, vol. xxxiii, p. 260-275 Schumann, W. (1997). Gemstones of the World. NY; Sterling Publishing Co.