DIAMONDS, THE TRUTH BEHIND THE BLING

but the majority are used for less glamorous purposes. Diamond grains are used as abrasive coatings on devices that are supposed to cut into hard or delicate materials. Oil and natural gas drilling rigs use huge drill bits that are coated in diamonds. This makes it easier to cut through kilometers of dense earth and rock. Diamond scalpels have also been made for surgery for use on fragile eye and brain tissue. Super strong diamond window panes have been put on spaces ships to withstand the extremes of space travel. Besides being amazingly hard, diamonds are also the best thermal conductors in the world. Diamonds can easily draw heat away from where it is being generated, making them great heat sinks for removing excess heat from highly heat sensitive microelectronic and telecommunications devices.

(7) What if the Earth's crust was made of diamonds? There would be no need to make synthetic diamonds. This may seem ridiculous to you, but in 2004 a planet was discovered that seems to be made of at least one third diamonds. *55 Cancri e* is a planet that orbits a star in our Milky Way galaxy. Based on analysis of its mass, radius and composition, *55 Cancri e* is estimated to be composed mostly of carbon and much of it is of the diamond variety. Having a planetary surface temperature of more than 3000°F/1649°C does a lot to help transform carbon into diamonds.

Article Questions

1) The word diamond comes from the Greek word _____adamas (2)_____ which means ___indestructible (2)___. A diamond's sparkle is called its _____brilliance (3)_____. A _____carat (3)_____ is equivalent to 200mg of diamond. Diamond coated structures can be synthesized using the _____chemical vapor deposition (5)_____ (provide full name) method.

2) What makes diamonds so strong and graphite so brittle and breakable?
   Carbon atoms in a diamond form strong tetrahedral arrangements, but carbon atoms in graphite form honeycomb structures in a flat plane which are much more fragile.(2)

3) How are natural diamonds formed?
   Natural diamonds are formed when carbon deposits are exposed to extreme heat and pressure over hundreds of millions of years.(3)

4) What does HPHT stand for and what does it attempt to do?
   HPHT stands for High-Pressure High-Temperature. HPHT is a synthetic diamond manufacturing method that uses high temperature and pressure over a short period of time to mimic what geological conditions do to make diamonds over hundreds of million of years.(5)

5) Identify two unique properties of diamonds. Explain how each property makes diamonds useful for a commercial application.
   1) Diamonds are very hard. This makes them great for making surgical scalpels to cut into delicate eye and brain tissue. [Various Answers](6)
   2) Diamonds are very thermally conductive. This makes them great heat sinks which can draw excess heat away from electronic devices that are very heat sensitive.(6)

6) Planet *55 Cancri e* has two primary factors that make the formation of diamonds highly likely. What are these two factors?
   An abundance of carbon and high planetary surface temperature.(7)