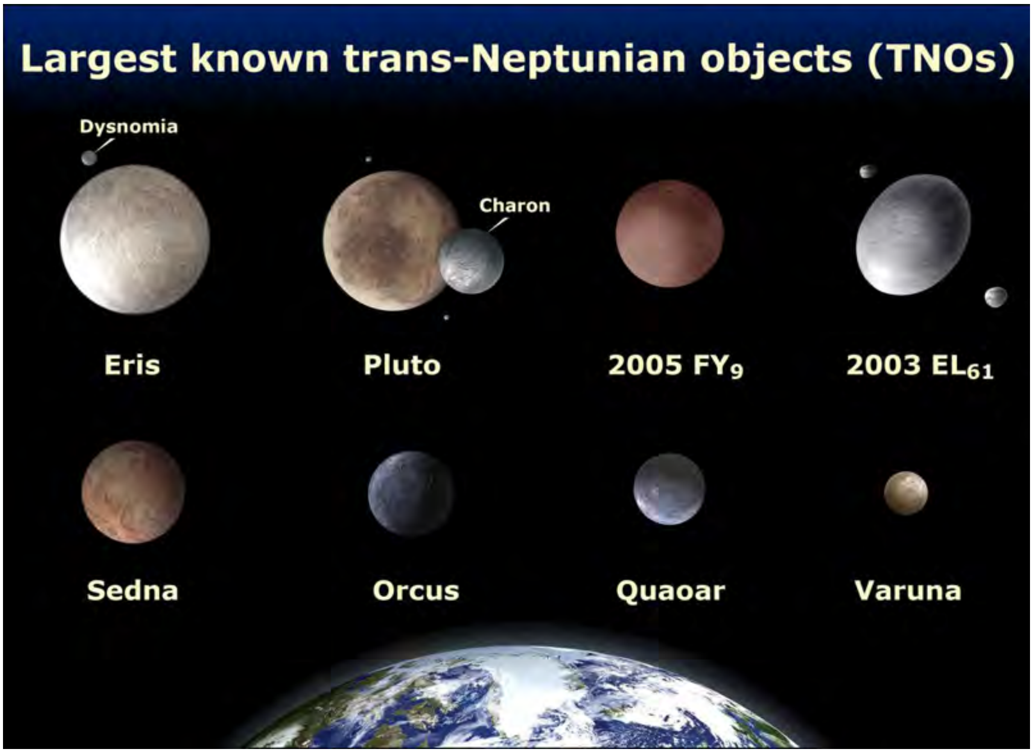

Fig 7.3.12 – This NASA diagram illustrates comparative sizes of celestial bodies outside Neptune's orbit. These objects are known trans-Neptunian objects (TNOs) or Kuiper belt objects (KBOs). To date, more than 800 of these objects have been discovered using digital technology and computers available in the 1990s. Note that Pluto, which is no longer designated as a planet, is not the largest object among the group of KBOs. Although accurate in its portrayal of size, the colors and textures are only artist's conceptions. Located far from the Sun, these icy worlds retain water from their formative period. Their frozen and reflective surface aids in their detection.

discovered, most commonly described as "***icy worlds.***" Once carrying the distinction of being the tenth planet, Pluto is now considered a KBO, or sometimes a TNO (trans-Neptunian object) and is described as having a water-ice surface. As we venture further into space, many new observations of yet-unknown worlds will be made and the photos and images taken will only be understood by using correct models.

How do the observations and data we have discussed, fit within the Hydroplanet Model so far? The discovery of abundant water everywhere in the solar system and the continued discovery of icy worlds and water-ice phenomena on planets and moons continue to validate and support the Hydroplanet Model. As we turn our focus closer to home, a new dimension in our understanding of the role water plays in the formation of rocks and minerals that make up the crust of the Earth will become apparent. This understanding will add to our ability to interpret correctly the origins of material on other planets and moons.

7.4 The Crystallization Process

Having established that water is found throughout the universe, in galaxies, stars, the Sun, planets, and moons, we turn now toward the Earth. Just how much water is here, inside our own blue planet? About 70 percent of the planet is covered in oceans and a much smaller amount is locked away in the glaciers and polar ice caps. But there is more, far more to the story of water. The Earth, following the Universal Law of Water, was formed from primordial water. Then, a Crystallization Process formed the rocks and minerals we see all around us as mountains and continents. This subchapter, for the first time in modern science, sets forth a comprehensive model of water-based rock and mineral formation.

The Dark Age of Science prevented a true understanding of the Universal Concept and Laws of Water and the real process of the crystallization of natural minerals. But the rocks themselves have a story to tell, and nearly all testify of their water-born existence.

Crystallization—Making Rocks

There are three basic forms of matter: gas, liquid and solid. Solids can crystallize from a gas or liquid, but in nature, the vast majority of minerals form as the result of a liquid process. Further, in nature, there are only two inorganic-liquid processes from which minerals form. These are:

1. **Water processes**
2. **Melt processes**

Nearly all of the Earth's minerals were formed in processes involving water. We know this because nearly all natural minerals are crystals, the exception being a small percentage of rocks that were melted, which formed *glassy* or *glass-like* rocks such as pumice, obsidian or other lava rock. Even so, water played a pivotal role in the formation of these glass-like rocks as well. Here is how crystals differ from glass:

"In chemistry and mineralogy, a **crystal** is a solid in which the constituent atoms, molecules, or ions are packed in a **regularly ordered**, **repeating pattern** extending in all three spatial dimensions." Note 7.4a

The "regularly ordered, repeating pattern" of crystals is a simple key to understanding the origin of nearly all of Earth's natural minerals. In the Magma Pseudotheory, we discussed how quartz *glass* and quartz *crystals* have very different physical properties. The most important distinction is that *glass is amorphous and does not have a regular crystalline lattice or structure.* Quartz *crystals* do have a very orderly structure.

Even though pure quartz (SiO_2) and glass (Also SiO_2) can be chemically the same, quartz is over 1000 times more thermally conductive. This is because heat can travel quickly through the *ordered* quartz crystal lattice, whereas the *disordered* structure of glass is more like a maze.

Minerals, like quartz are good examples of the Universal Law of Order and the Law of Crystallization which will be presented in Chapter 22, The Energy-Matter Model. Quartz is an example of the third law of the **Universal Concept of Water,** the Law of Hydroformation:

All natural crystalline minerals formed in water

Water is the universal substance that provides a medium in which natural crystals will form and in this subchapter, we examine some of the evidences for this. The Second Universal Law of Water explains *why* geologic research based on the magma paradigm has been unsuccessful at reproducing natural minerals from melted rocks without water. Researchers have been unsuccessful because nature does not work this way. For this reason, the vast majority of minerals are formed from water—because it is ***only within a water medium*** that the crystal structure of a mineral will form.

The crystallization process is not limited to just a small percent of Earth's minerals. This can be better understood as we examine the following quote from a popular book, *Crystals and Crystal Growing*. This statement was taken from that book under the subsection *The Genesis of Minerals*:

"If someone suddenly said to you, "Find a crystal, and be quick about it," you would probably forget the sugar in the bowl, the salt in the shaker, and leap out of doors to hunt for a glittering rock. The minerals of which rocks are made furnish the most familiar examples of crystals; everyone recognizes quartz, gems, and most semiprecious stones as crystalline. **But it is less familiar that the entire solid crust of the earth is crystalline, with little exception**. Indeed, most of the crust will show this to a sharp eye, aided here and there by a small magnifying glass." Bib 44 p46

Recognizing this is the first step in gaining wisdom of ***how*** the Earth was formed—that is, with little exception the Earth is a *crystal*. Modern geology has failed to comprehend how the Earth formed because it has not recognized the fact that natural crystals come from water. The authors of *Crystals and Crystal Growing* go on to make this insightful declaration:

"**Just how the earth arrived at the form in which we find it is a question still far from settled**." Bib 44 p46

Why is this question far from settled? We identified many of the reasons in the Rock Cycle Pseudotheory chapter—geology is literally full of mysteries that will never be answered under the magma paradigm. It is time for science to candidly accept this fact and look toward a new model, a new paradigm that is true and can answer these mysteries.

"Just how the earth arrived at the form in which we find it is a question still far from settled."

Crystals and Crystal Growing
Alan Holden and Phylis Morrison

With the understanding that the vast majority of the terrestrial rocks are crystalline based, and that natural crystals are formed only from water, we can begin to discover *how* rocks and minerals come out of water in a crystalline state. To comprehend this we must revisit and clarify the meaning of the word **precipitation**.

Precipitation Redefined

Most people have heard of 'precipitation' as it refers to the weather. Snow and rain are 'precipitates.' Nevertheless, to the chemist or the physicist, this word takes on a different meaning. In Webster's Dictionary, we find the general definition for **precipitate**:

"Precipitate – to separate (a substance) in solid form from a solution." Bib 7 p622

However, this definition is far *too* general in its scope. For example, a kitchen 'strainer' also separates a substance in solid form from a solution. Thus, we need a more refined definition for our purposes. We found this one in *The Facts on File Dictionary of Chemistry,* where **Precipitate** is defined as:

"A suspension of small particles of a solid in a liquid formed by a **chemical reaction**." Bib 83 p199

In a chemistry lab class, a precipitate is often demonstrated by mixing two clear liquids together and watching a solid form out of the clear solution at the bottom of the test tube. Is this the ***only*** way solid particles can come out of a solution—by a chemical reaction? To answer this question, we turned to the following definition of precipitation from Wikipedia:

"**Precipitation** is the formation of a solid in a solution during a **chemical reaction**. When the **chemical reaction** occurs the solid formed is called the precipitate. This can occur when an insoluble substance, the precipitate, is formed in the solution due to a reaction or when the solution has been *supersaturated* by a compound. **The formation of a precipitate is a sign of a chemical change**. In most situations, the solid forms ("falls") out of the solute phase, and sinks to the bottom of the solution (though it will float if it is less dense than the solvent, or form a suspension)." Note 7.4b

Note the bolded words, "chemical reaction" and "chemical change" in this definition. After looking at several resources and talking to a number of chemistry professors, we concluded that this definition of precipitation was not entirely correct. The reason was that crystallization could take place *without* a chemical change, but simply by a ***physical change*** to the solution.

Back in 1958, researchers discovered that the most abundant mineral on Earth's continents, silica (quartz), could crystallize out of solution by altering the physical properties of *temperature or pressure* of the solution. From an article in *The Geological Society of America*:

"Crystallization in silicate systems is so intimately tied to temperature that the possibility of isothermal [constant temperature] crystallization is **rarely** considered; **yet complete crystallization, starting with a liquid containing no crystals, can take place with no drop in temperature**. This is possible because of the manner in which the water affects the liquids and because the amount of water held in the silicate melts is a function of **pressure**…

"Crystallization in these hydrous systems can be promoted by **temperature lowering**, **pressure lowering**, **or pressure increase**." Note 7.4c

The importance of clarifying the definition of 'precipitation' cannot be overstated. The significance of this change allows for a mechanism for natural mineral growth, one that has heretofore gone unnoticed. Although researchers realized many years ago that quartz crystallization can take place by altering temperature or by raising or lowering pressure, they have been unable to see the connection between this important physical fact and the fact that all minerals grow in a water solution.

Let us summarize the redefined process of precipitation, with the added mechanisms known to be responsible for the formation of crystal solids:

Precipitation is the formation of crystalline solids out of solution either chemically or by changes to **temperature and/or pressure**.

Evaporate Rock Pseudotheory

What effect has the lack of a true definition of **precipitation** had on science? As noted, the true and complete definition of precipitation is not being taught in the physical sciences because students are taught that precipitates come only from chemical reactions. They also come from temperature and pressure changes. This clarification opens a completely new opportunity for discovery. When we are in possession of this truth, new technology and natural processes can be evaluated and better understood.

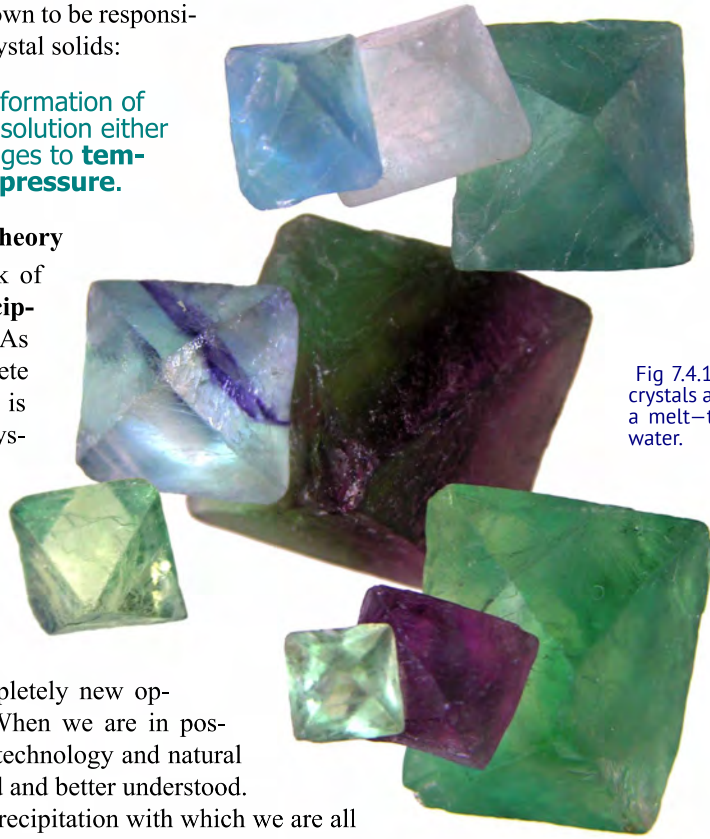

Fig 7.4.1 – Natural Fluorite crystals are not formed from a melt—they are formed in water.

One natural process of precipitation with which we are all familiar is **evaporation**. When a solution of salt and water evaporates, the salt minerals precipitate out of the solution, leaving behind a crystallized mass called an **evaporite**. This is the process alleged to be the origin of many mineral deposits, such as salt, encountered in nature. We read of this process in Wikipedia:

"Although **all** water bodies on the surface and in aquifers contain dissolved salts, **in order to form minerals from these salts, the water must evaporate into the atmosphere in order to precipitate the minerals**." Note 7.4d

Is this statement true? Is evaporation the *only* way for salts to precipitate into minerals? Not according to The Geological Society of America, (see the earlier quote). In the Rock Cycle Pseudotheory chapter, statements from salt researchers were cited, showing the real origin of salt is absent in today's geology. Moreover, many scientific evidences were given in the Rock Cycle chapter, demonstrating that "the vast geological 'evaporite' deposits are not evaporites" at all. What then is the process?

Precipitate Salt Deposit Model

A tasty treat called Rock Candy, seen in Fig 7.4.2, is made of sugar crystals grown out of a supersaturated solution of sugar and water. Evaluating this process identifies one of the key factors in the precipitation process.

To begin, sugar is added to water and stirred until it dissolves. Applying heat to the water will allow more sugar to dissolve into the solution. Eventually, no more sugar will dissolve because the solution will have become supersaturated. At that point, the solution is removed from the heat source and allowed to cool. Pour the cooled solution into wide-mouthed bottles. Place a stick in the solution, cover with an airtight lid to prevent evaporation from taking place, and wait. Eventually, small sugar crystals will begin forming on the stick. Colored dye or flavors can be added to the solution to alter the appearance and taste of the rock candy crystals.

Sugar crystals formed as the supersaturated sugar-water ***cooled.*** *Temperature reduction is a method of precipitating minerals,* a process quite different from that of evaporation. Lowering the temperature of a solution is a common occurrence in physics and chemistry labs, but the same cannot be said of geology. Today, there are no large bodies of cooling, supersaturated salt water allowing the precipitation of massive, kilometer-thick salt formations. However, there *was a time* when huge, supersaturated hot oceans cooled producing enormous salt deposits, just like the ones we see in many parts of the world today.

The most common and the most important salt in both geology and biology is NaCl—common table salt. When water temperature is increased from 0° to 100° C, the solubility of NaCl increases from 35g/100 mL to nearly 40g/100mL. Like our sugar crystal example, supersaturated NaCl solutions will allow salt crystals to precipitate from the solution when the temperature drops (although not as dramat-

Fig 7.4.2 – These are sugar crystals formed on strings suspended in supersaturated sugar water. As water is heated, sugar will dissolve more readily into solution until it becomes 'supersaturated.' As the high-temperature, saturated-sugar solution is cooled, sugar crystals precipitate out of the water onto the strings. Blue dye provides added color. This is the process for making this tasty 'rock candy' treat. It is essentially by the same process that massive, natural salt formations are formed.

ically as the sugar solution does). In general, geology has not considered the real possibility that large hot oceans covered the Earth and as a result have not considered that massive salt deposits could have grown from a supersaturated solution because of temperature reduction. Each of the six salts in the ocean, identified in the Rock Cycle Pseudotheory, will crystallize out of solution, *at different temperatures and pressures*. This is ***how*** massive, pure salt deposits were formed!

"Crystallization in these hydrous systems can be promoted by **temperature lowering, pressure lowering, or pressure increase**."

Origin of Granite in the Light of Experimental Studies in the System, O. F. Tuttle and N. L. Bowen, *The Geological Society of America*, 1958, p67-69

Similar to the formation of rock-candy sugar crystals, mysterious salt deposits, like those discussed in the Rock Cycle Pseudotheory chapter, formed as salt precipitated *under* water. This is ***why*** vast geological salt deposits are not 'evaporites.' This is also the reason why researchers have never been able to reproduce or adequately explain large-scale salt deposits formed by evaporating seawater.

Precipitate Salt Deposit Model
Thick salt deposits were formed when salt precipitated out of an aqueous solution because of changes in temperature and pressure.

Salt Origin Without Evaporation Confirmed

Is there laboratory or field evidence of the Precipitate Salt Deposit Model? The idea that massive salt formations were formed by precipitation of salt resulting from temperature and pressure changes came about during the year 2000. Since then, there have been few if any experiments or observations in the geological community, investigating whether salt deposits came from anything other than evaporation. That changed in July 2006 when a group of Norwegian scientists published a groundbreaking research article in the journal of *Marine and Petroleum Geology*. This research was also reported in the *Oil & Gas Journal*:

"A group of authors led by a Statoil ASA specialist in marine geology has proposed an unconventional theory for **the origin of salt** that could have **far reaching implications** for oil and gas exploration.

"**Masses of solid salt may form and accumulate underground, independently of solar evaporation of sea water**, Martin Hovland of Statoil and four other authors have suggested." Note 7.4e

Here we have researchers proposing an "unconventional theory" having "far reaching implications." However, the implications reach beyond the field of oil and gas exploration and affect *all of geology*. The article further stated that the research team "demonstrated how solid salt forms." They also said it was the physical properties of water that caused the precipitation:

"The Norwegian research team **demonstrated how solid salt forms in high temperature/high pressure (HTHP) conditions when seawater circulates in hydrothermal systems in the crust or under piles of sediment**.

"It is the **physical properties of supercritical water that stimulate the precipitation**." Note 7.4f

The Norwegian team demonstrated how large salt deposits form through laboratory experimentation and actual observations in the field. Details from their observations will be further outlined in the Salt Mark subchapter of Chapter 8. Returning to the *Oil & Gas Journal* report, the authors charge geologists with overlooking this important process:

"Geologists, whose current model for salt deposition and accumulation relies **only on solar evaporation of seawater**, **have overlooked this novel hydrothermal outsalting mechanism**." Note 7.4g

A hydrothermal mechanism, utilizing high pressure and temperature is the foundation for the processes that formed large salt deposits, including the salt domes discussed in the Rock Cycle Pseudotheory chapter. There are large salt deposits on all the continents, yet there are no signs of gradual continental uplift. To determine how these salt deposits came to be in their current locations, we must identify and examine the physical evidence of increased ocean temperatures and ocean depths of former times. The main objective of the next chapter, the Universal Flood, is to do just that. In that chapter, we will discover details about the ***origin*** of massive solid salt deposits and the origin of sodium and chlorine (these do not exist in elemental form in nature) from which the salt deposits and the salt of the seas are made.

The Prethermation Process

Here for the first time, the scientifically demonstrated precipitation process of "hydrothermal outsalting" is recognized as being able to explain the formation of the largest single-mineral rock formations in the world—salt domes. How do these ideas apply to other rocks and minerals?

It is commonly known that salt and sugar will *dissolve* in a glass of water—but when was the last time anyone saw a rock like granite ***dissolve in water?*** Most will agree that rocks, especially quartz rocks like granite do not typically dissolve in water. However, this is the first step in understanding how quartz rocks *grow out of water*. The ***fact*** that common rocks can, and do dissolve in water has been overlooked in the geosciences community. This is a central theme of the this chapter.

Obviously, common minerals such as quartz sand are not seen dissolving and precipitating out of natural waters by evaporation today. However, the present is *not always* the key to the past. Because we do not experience or observe certain processes today does not mean it did not happen in the past. Many such processes can be duplicated to some degree in the laboratory.

At a pressure typical of sea level (about 14-psi) and at a temperature of 1,700° C, quartz will *melt*. However, at 375° C and at the high pressure of 14,000-psi, *quartz will dissolve in mineralized water*. This is not a new observation but it is not well known.

The process in which salts dissolve and precipitate through evaporation is so commonly seen and understood, naturalists have for centuries, used it to explain all salt deposits, even though it doesn't satisfactorily account for most of the salt deposits. By understanding that *rocks* can be dissolved in water, we can also begin to understand that crystal or mineral growth out of water can happen by methods *other than by evaporation*. The crystallization of minerals such as quartz takes place in one of three ways:

1. Temperature lowering
2. Pressure lowering
3. Pressure increasing

If we discard the Uniformity Principle, established as being incorrect in previous chapters, and open our minds to the possibility that the Earth, in former times, experienced elevated temperatures and high pressures from deep water, we will be rewarded with the true knowledge of the processes of rock and mineral crystallization.

High pressure can come from being deep under water. As depth increases, pressure increases exponentially. It has only been within the last two decades that researchers have had the technology to withstand the crushing pressures found at the bottom of the ocean. Elevated temperatures come from sources such as frictional heating, first discussed in subchapter 5.3.

Prethermation is the process of obtaining a **precipitation** of solids from a solution/gas when the pressure or temperature changes.

This newly recognized environment is one in which minerals are *known to form* by processes yet unnamed. We will define some new words to describe these processes. The first, **Prethermation** [prĕh· thûrm·ay·shun], is the process of obtaining a *precipitation* of solids from a solution or gas by changes of pressure or temperature.

Just as we use the term ‘evaporation’ to describe how some minerals crystallize following the evaporation of water, prethermation describes how minerals crystallize because of a change in pressure, temperature, or both. The word prethermate is formulated from the words ‘**pre**ssure’ and ‘**therm**al’ and is used to describe the solids left behind from the **Prethermation Process.** These are called **prethermites** [prĕh·thûrm·īte]. A prethermite is similar to an evaporite. An evaporite is described in geology texts as being salts left behind after evaporation whereas a prethermite mineral formed because of pressure, and/or temperature changes.

Prethermite is the **precipitate** from a solution/gas when the pressure or temperature changed.

Evaporation and *prethermation* are related processes. Both are crystallization processes involving solids that have been dissolved in an aqueous solution. Water is said to evaporate when it changes from a liquid to a gas and escapes, leaving behind previously dissolved solids. When the solution is exposed to temperature and/or pressure changes, prethermation can occur. In nature, there are no ‘pure’ waters and all evaporated water will leave behind a residue of solid material. When crystals form because of a change in temperature (like rock candy) or a change in pressure, a prethermite is formed.

Evaporites and prethermites are both precipitates that crystallize from solids dissolved in a solution. A solution exposed to evaporation, like seawater, will leave behind evaporites made from minerals that were in the solution, but only shal-

Fig 7.4.3 – These crystals each contain an air bubble that can be seen as it moves in the water, trapped within the specimens shown. Rocks that contain observable water with an air bubble are called **enhydros**. These are naturally formed specimens of quartz and calcite and can be found all around the world. Though unfamiliar to most people, enhydro rocks profoundly demonstrate that these minerals were grown in a water environment.

Enhydro Rotated

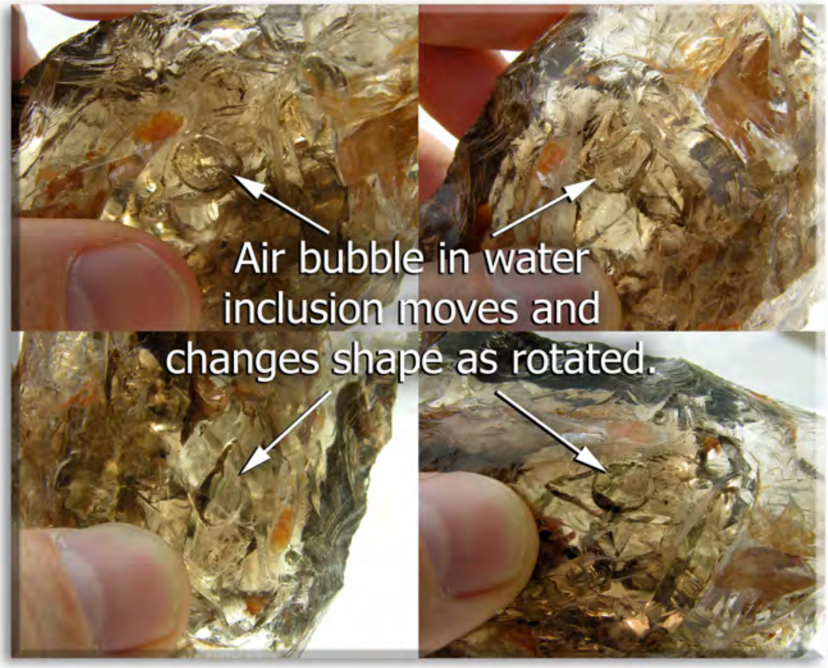

Fig 7.4.4 – These four photos were taken as this Brazilian quartz crystal was rotated. The photos show how the bubble in this specimen moves and changes shape as the rock is rotated.

low seawater (around 1 meter or less) has ever been observed to evaporate and leave behind solids. When this happens, all six salts within the seawater will be present, often deposited in layers. There is no possibility of large homogeneous deposits of a single type of salt, forming from evaporation. It is because of this the Salt Mystery exists. Now, with the understanding of the prethermation process, we can describe the origin of the massive salt deposits.

Most of us understand that salts dissolve in water, and then recrystallize when the water evaporates. We also know they will dissolve again, if water is added back in. Other minerals like quartz do not dissolve in natural waters. Because we are unfamiliar with the idea that quartz crystals grow out of water, it is quite amazing to actually 'see' water in rocks.

The Enhydro Evidence

It is not surprising that most people have never heard the word 'enhydro.' Also surprising is the fact that many graduate students and professors of geology do not know what an enhydro is either. Although the word is not listed in the typical dictionary, it is defined in the *Glossary of Geology* and they are known by rock enthusiasts. The knowledge of these unique gems, and their importance is about to change.

A number of enhydros are shown in Fig 7.4.3. An **enhydro** is a rock that contains observable water, (sometimes, large amounts of it) and a gas bubble. Many specimens contain multiple water pockets, each with their own bubble. Often, the gas bubbles move freely about as the rock is tipped and turned. Fig 7.4.4 shows how a bubble trapped in a quartz crystal moves and changes shape as the rock is rotated.

During the formative years of the UM, interested parties were shown enhydros and nearly all reacted the same. As they handled the water-included rock with an observable moving bubble, their first reaction was one of bewilderment. Having never seen a rock like this before, it was intriguing and necessitated explanation. As the realization set in that water was trapped in the rock, astonishment turned to confusion.

Because incorrect theories of rock formation were taught in school and because pop-culture shows the hot, molten Earth, the last thing one would expect to find inside a rock, is water. It is a real paradigm shift when we examine one of these rocks for the first time. This naturally leads to the critical question:

How did water get inside enhydros?

The answer is quite simple. When crystal growth is rapid, growth protrusions form and trap some of the liquid-gas and solvent in which *the mineral was growing*. What is the liquid-gas in which the crystals grew? It was water. You can actually grow your own Ice Cube Enhydro in a freezer, if the water can be frozen fast enough. Fig 7.4.5 is an example of what an Ice Cube Enhydro looks like. Of course, there should be no confusion as to how water became trapped in the frozen ice cube. The bubble is evident because the water was not completely frozen. The existence of water within these crystals clearly establishes that a water environment was present when the ice cube was frozen. In the same way, mineral enhydros inform us of the mineralized solution in which the enhydro grew.

To understand how crystals can grow in water saturated with minerals that do not readily dissolve in natural surface water is

Fig 7.4.5 – We can understand how enhydros are made by observing Ice Cube Enhydros. When water freezes fast enough, air is trapped and is encapsulated within the ice cube. The gas (air bubble) and liquid (unfrozen water) trapped within the ice cube ***clearly*** came from the solution that made the ice cube. In the same way, mineral enhydros entrap liquid and gas of the same material in which they were formed. They are a testament to the water environment in which they crystallized.

a matter of understanding how pressure and temperature alter the solution's ability to become saturated.

The Enhydro Sci-bi

Some researchers have proposed that enhydros formed when ground water seeped into the open cavities of rocks. For example:

"The term ***enhydros*** refers to a **water-filled geode**. Since **geodes are essentially produced by mineral-laden waters percolating into a cavity**, it is not uncommon to find the growth process still taking place." Note 7.4h

Recall that in the Quartz Mystery (subchapter 6.4 in the Rock Cycle Pseudotheory) statements by geologists studying geodes clearly established that although several theories had been proposed, "none seems to be entirely adequate to explain all geode features." They have not adequately explained geode formation and they certainly have not been able to explain how water entered the geode. The theory, or more correctly, the sci-bi that mineral-laden water percolated into a cavity to create a geode has not been observed, nor will it. Why? Quartz crystals larger than a couple millimeters do not form in low pressure, room temperature, mineral-laden water.

Enhydros can lose their water once they are removed from their natural environment and exposed to freezing temperatures, extreme heat, or damage. However, many do not lose their water. If specimens have thick mineral walls, they can withstand some changes in pressure and temperature. Many have been in the possession of collectors for decades without losing their water. They attest to how well sealed enhydros can be. Moreover, solvents and other substances that have been preserved inside the enhydros can tell us a great deal about the water environment where the crystal geodes grew. This evidence shows unequivocally that these rock crystals grew in water and did not come from a melt.

Fig 7.4.6 – This specimen is a large, naturally formed quartz crystal enhydro. It has a large amount of freely moving water and a large open and exposed cavity. The exposed empty cavity, indicated in the diagram, shows where a large water inclusion once existed before it escaped the crystal, probably from the pressure exerted by the freezing or heating of the water. Enhydros can also indicate specific environmental forces that existed at the surface locale of the Earth where the specimen was originally found.

Learning From Enhydros

We can learn much from the enhydros that *lose their water* once they have been removed from their native environment in Earth's crust. When rocks with water inside them are exposed to freezing conditions, the water inside will expand causing the chambers to burst. In Fig 7.4.6, a large cavity can be seen on the side of the quartz crystal. There are other chambers in this specimen that are surrounded by thicker walls that still contain water and can be seen moving about inside the crystal. One important detail that intact enhydros reveal is that the environment in which they formed could not have changed dramatically since the crystal was originally formed. This fact becomes more significant when we recognize that most water-containing enhydros are found on or near the surface. Had they been subjected to the freezing conditions of the so-called ice ages, far more of them would have burst, leaving empty, broken fragments.

Why do we find enhydros near the surface if crystal rocks and minerals came from deep within the Earth, as modern geology teaches—why don't rocks at the bottom of the Grand Canyon contain enhydros? In the next chapter, we will discuss why these enhydro rocks are found near the surface—because they ***formed on or near the surface***. This suggests that wherever they are found, enhydros provide direct physical evidence that the surface of the Earth must ***not*** have changed dramatically since the formation of these water-filled rocks.

To the mineralogist, enhydros are an oddity and it was not surprising to find relatively little research on them. In fact, only a handful of researchers discuss these types of rocks in the geology journals. We did find some mention of them in engineering research papers that addressed the subject of growing quartz. Later in this chapter, we will discuss why engineers would be interested in water-bearing quartz rocks. Geodes are water-bearing rocks and can contain quite a bit of water. To illustrate how much water can be entombed inside them, we refer to the book *Oddities of the Mineral World*:

"Perhaps **the most prolific enhydros sources** in the United States are the various geode beds already mentioned in the states of Illinois, Missouri, and Iowa. Several of the localities in this area yield geodes that spill water when cracked open.

What would you say if someone told you **all natural rocks** contained water?

The most notable is the St. Francisville, Missouri bed, where **very large geodes were found containing over a quart of water**.” Note 7.4h p51

You could probably have a nice drink from an enhydros—but the water may not be all that pure when you taste it! It is extremely common to read that enhydros have water in them that is ‘millions’ of years old, but there is zero empirical evidence to support that claim. We shall soon discover that the millions-of-years old dating method stems from dating melted rocks—and natural quartz crystals were never melted.

As we noted previously, water-filled geodes subjected to the freezing temperatures of an ice age would have caused the geodes to burst. How is it that the geode fields in Illinois, Missouri and Iowa contain such an abundance of un-burst geodes? Today, the enhydro specimens taken from the Eastern United States must be kept from freezing temperatures once removed from the ground because they will break open if frozen. This repudiates the idea of the ice ages, whether they occurred 10,000 years or millions of years ago. There are so many questions left unanswered.

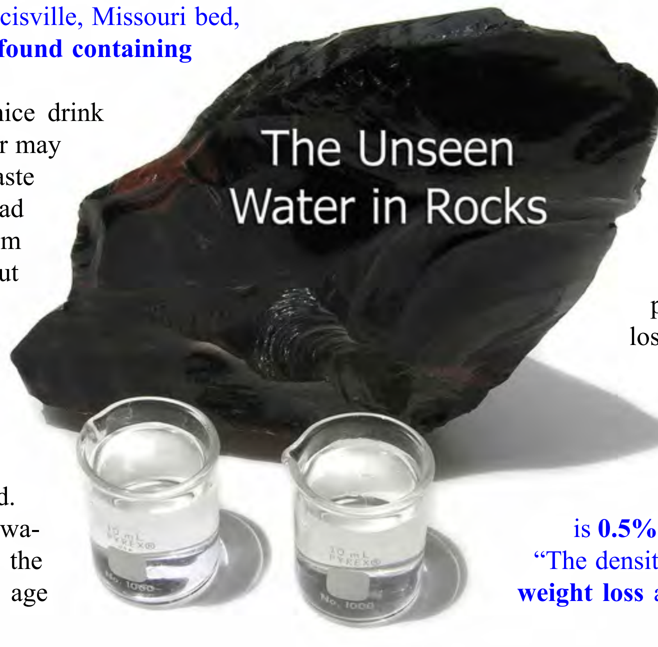

Fig 7.4.7 – This glassy looking rock is obsidian and the amount of water shown in the two beakers (18g) is the amount of water contained in the obsidian rock shown (617g). Yes, this rock actually has up to this much (3% by weight) water in it! Why do we not see the water? For the same reason we do not see germs. The water is in the microstructure of the minerals in portions too small for the naked eye to see. However, we can heat rocks slowly then weigh them after they have cooled to see how much weight, (in water) was lost. Why were we not taught this in school? For the simple reason that the unseen water in rocks has always been a mystery to geology in general and did not fit in well with the magma Earth theory.

The Unseen Water in Rocks

What would you think if you heard that *all rocks contained water*? Although generally unknown to the public, researchers have known for decades that rocks and minerals contain water. This unsolved piece of Nature’s puzzle remains safely tucked away. This might sound bizarre at first, but this little-known fact that rocks have water has far-reaching implications.

Enhydros are unique because they often have large, water-filled chambers inside the rock or crystal, filled with an easily observable liquid/gas solution. Other rocks and minerals also have water. Trapped inside the rock beyond the limits of visible observation, deep within the molecular or crystal lattice structure, water exists.

Evidence that rocks came from water and not from a melt can be demonstrated easily by simply heating rocks. Because rocks contain water in their microstructure, when they are heated, the water will expand, vaporize and escape. This can be verified by comparing the weight of a rock prior to heating, to the weight of the rock after heating.

In one experiment detailed in the *Journal of Geology*, jasper, flint, and other common quartz rocks lost weight after heating. Reported here, jasper and flint sustained losses of .5% and 1.5% respectively, when heated:

“The density of the jasper is 2.68 gm/cc, and the **weight loss** after vacuum heating at 800° C for 12 hours is **0.5% wt %**.”

“The density of the flint is 2.59 gm/cc, and the **weight loss** after vacuum heating at 800° C for 12 hours is **1.5% wt %**.” Note 7.4i

From the *Handbook of Rocks Minerals & Gemstones,* obsidian is reported as having “up to **3%** water” Bib 15 p238. Three percent might not seem significant until we understand that it is 3% by weight. Fig 7.4.7 is a good way to visualize just how much 3% by weight represents and how one’s perspective can change! The water in the beakers represent approximately (3% by weight) how much water is contained in a piece of obsidian of the size shown. This would make a nice enhydro if all the water had been concentrated in one cavity instead of being dispersed throughout the microstructure of the rock!

A water content of 3% by weight may seem to be a surprisingly large amount of water, but there is a class of minerals that has as much as three times the water contained in obsidian. These water-laden rocks are some of the most unlikely rocks thought to contain water—meteorites:

“**The water content (by weight) of the meteorites is about 11 percent** for type 1 chondrites, about **9 percent** for type 2, and **2 percent** or less for type 3.” Note 7.4j

Eleven percent is *an enormous quantity of water* for rocks that presumably came from asteroids that were supposedly at one time melted and should have been void of water. However, if the meteorites came from asteroids or other fragmentary sources that originated in water, then water content of 11% makes sense.

Fig 7.4.8 – This rainbow colored rock specimen is natural opal. Opal is one of the wettest rocks on Earth, holding formative water of up to 30%. Most high quality opal comes from mines located in Australia, but it can be grown synthetically. In nature and in the laboratory, water is essential in opal formation.

There is another mineral that can contain even *more* water—opal. Opal can have an astonishing 30% of water by weight. Like many of nature's crystals, opal has been reproduced synthetically—in a water environment of course. Fig 7.4.8 is an example of a beautiful natural opal specimen in a sandstone matrix, showing off its rainbow of colors.

Even if the origin of unseen water in rocks remains a mystery in modern geology, the fact that all rocks have water in them is not disputed. On the Smithsonian *National Museum of Natural History's* web site, http://geogallery.si.edu/index.php/10026437/water-in-rocks, a new section entitled "All Rocks Contain Water" illustrates this important fact by showing various minerals and the amount of water they contain.

Examining the chemical formulas of a few minerals listed in the book *Rocks, Minerals & Gemstones* there is a common molecule included in many of the formulas—it is H_2O. For example, Gypsum has the chemical formula $CaSO_4+\mathbf{H_2O}$. Analcite is $Na[AlSi_2O_6]\cdot\mathbf{H_2O}$, Natrolite is $Na[Al_2Si_2O_{10}]\cdot 2\mathbf{H_2O}$, and Autunite is $Ca[UO_2|PO_4]_2\cdot 8\text{-}12\mathbf{H_2O}$.

The H_2O designation at the end of a mineral chemical formula means that water is known to be part of the mineral *structure.* Without the water molecule, the mineral would not exist in that form. Remove the H_2O from the $CaSO_4\cdot\mathbf{H_2O}$ formula for gypsum and it is no longer gypsum. It becomes anhydrite, or $CaSO_4$ - without water. Of course, not all mineral formulas listed by mineralogists contain water, but that does not mean that they do not have water in their sub-microscopic makeup.

Perhaps the authors of some mineralogy texts did not realize this, or simply chose to exclude the fact that all rocks have water. Water contained in all rocks can be likened to the germs on a doctor's hands. Until medical doctors came to understand the role germs played in the health of the human body, they could not advance in medical wisdom. The same holds true in geology. Until we come to a realization of the role water plays in the origin of rocks, we cannot advance in geological wisdom.

Volcanic Rocks Contain Water

A crystalline rock or mineral exhibits an order in its makeup whereas an **amorphous** mineral does not. Glass is an **amorphous** substance because it exhibits no apparent crystalline form. Volcanic rocks are commonly amorphous and glassy. Water plays an important role in volcanic eruptions and in the formation of rock, commonly called 'volcanic rocks.' Geology has long known that these types of rocks "contain some water bound up in the minerals of the rock," as we read from the book *Melting the Earth*:

"The importance of water was also supported by chemical analyses; by 1824 Knox had established **by experiment that all volcanic rocks contain some water bound up in the minerals or the rock**." Bib 136 p220

Thus, both volcanic rocks (from melt) and crystalline rocks (from precipitate) contain water. This fact, that all natural rocks on Earth contain water, is confusing to one trained in the magma and rock cycle paradigm. Where did the water come from and why was it not released into the atmosphere or into space during the Earth's supposed hot, melted formative years? These questions have no easy answer in geology today. However, if volcanic rocks originated from frictional heating in the Earth's crust, which contains water, the origin of water in volcanic rocks is easily understood.

Fig 7.4.9 is an image of several pieces of scoria, pitted lava rock. The pits, or holes, are called **vesicles,** and were formed when volatiles such as superheated water escaped from the rock during and after its ejection. Certainly, water played a crucial role in the formation of all rocks exhibiting such vesicles. As we become aware of this, we see substantial evidence of the presence of water in former times. Rocks exhibiting vesicles were not formed from erosion, and the presence of vesicles is not limited to volcanic rock. Many instances of vesiculated rocks, such as sandstone, basalt, and others are evident in nature.

Fig 7.4.9 – These rocks are typical of volcanic rocks. They are amorphous (glass-like) and exhibit characteristic vesicles or 'holes' caused by escaping steam. Researchers have long known that "all volcanic rocks contain some water bound up in the minerals or the rock". This can be easily demonstrated by weighing the rock, slowly heating it and letting the rock cool, then weighing the rock again. The heat causes the water to expand and escape through micro fractures in the rocks.

Mind Over Magma—The Origin of Granite

In 2003, Davis A. Young published the book; *Mind Over Magma.* In it, Young tells the story of igneous petrology and the effort to understand, from the perspective of a magmaplanet paradigm, the mysteries of rocks and minerals believed to have come from magma. The ideas from one of the chapters in his book, *Wet or Dry?—The Origin of Granite,* was previously touched upon the in Rock Cycle chapter. Young concludes the chapter by stating that the debate of whether granite comes from a wet or dry environment had not been settled and that "no consensus had been reached." Amazingly, the entire spectrum of rocks in geology today has been classified in large part by granite research from the 1800s.

Here again, we see that modern science made a serious mistake by building modern geology on 'theories' of granite formation without any hard supporting evidence. As 'natural laws' have fallen out of favor over the last 100 years, the theories of people—albeit highly intelligent people—have taken precedent.

In his book Young recounted the story of the French experimentalist Gabriel-Auguste Daubrée (1814-1896), a mining geologist and professor at the University of Strasbourg, who demonstrated how minerals grew the *wet way*. Daubrée was probably the first person to grow a quartz geode. Unfortunately, the significance of this event was not recognized:

"Although Daubrée's primary contributions focused on metamorphism and meteorites, his studies of **silicates in the**

presence of superheated water demonstrated that many of them crystallized from water temperatures far below their fusion points. **He grew quartz**, **feldspar**, **and pyroxene in the wet way**.

"In experiments on metamorphism, Daubrée (1857) examined the behavior of glass tubes filled with a small quantity of water heated to 400°C for at least a week. The water became charged with alkali silicate. The glass was transformed into an opaque white mass composed of various crystalline substances, one of which was **quartz**, which lined the tube walls **much like a geode**. After a month of heating, he produced quartz crystals as much as **two millimeters long**." Note 7.4k

Daubrée also discovered that the second most important mineral in granite, feldspar, also grew in the "wet way":

"Daubrée knew that feldspar had previously been observed in the upper parts of copper smelting furnaces. Rather than conclude that the feldspar crystallized during cooling of melted slag, however, he suggested that the feldspar was deposited on the furnace walls by **vapor**. After all, he noted, the most skillful chemists had been **unable to produce feldspar synthetically by dry fusion, but his experiments on obsidian demonstrated convincingly that feldspar readily formed in the wet way**." Note 7.4k p86

Despite Daubrée's experiments and the empirical evidence he provided, the intellectual tide of the time opposed the idea of a Hydroplanet Earth, a concept still opposed in modern science. Other professors of that era, Heinrich Rose of Berlin, and American geochemist, T. S. Hunt, argued in vain to convince other scientists that quartz became an amorphous glass when fused or melted, and that natural *quartz would not grow without **water***:

"Heinrich Rose (1795-1864), a Professor of Chemistry at the University of Berlin and older brother of mineralogist Gustav Rose, **showed that after fusion [melt], quartz is converted into amorphous silica [glass] accompanied by a decrease in specific gravity from 2.6 to 2.2. Rose (1859) argued that the quartz in granitic rocks could not have separated from a dry fused mass and could never have experienced elevated temperature because it always has a specific gravity of 2.6**. The American geochemist, **T. S. Hunt** constantly appealed to the experimental work of Rose and others to support his claim that **quartz was never known to be formed in any other way than in the presence of water at temperatures far below those of its fusion temperature**." Note 7.4k p86-87

These quotes came from the text *Mind Over Magma,* published in 2003, and are cited as being the first-ever comprehensive history of the study of such igneous rocks. Rose and Hunt demonstrated that "quartz in granite rocks" could not have come from magma, and "was never known to be formed in any other way than in the presence of water" at temperatures far below melting—***and no one has ever proved them wrong!***

True science is supposed to progress based on observed facts, not prejudiced theories. However, the authoritative control of most scientific publications of the 1800s rested in the hands of a few influential scientific leaders. The pendulum of scientific thought about the Earth's creation swung toward the dry side. Those dry-side scientists envisioned a hot molten Earth and rejected anything related to the 'wet world' of Neptunism, regardless of what the empirical evidence showed. Thus, empirical evidence supporting the "wet way" was laid aside as researchers adopted the "dry way." The 'dry world' of Plutonists prevailed without solid experimentation to support it.

All natural rocks on Earth contain water.

After a century and a half of experimentation and study, geologists have yet to discover how to make natural granite from a dry melt.

Without Water—No Continents

If you were to embark on a modern geology course of study today, you would be taught that the Earth has a molten magma interior and that granite is the primary basement rock of the continents. It is highly unlikely that you would hear that "***Water** is essential* for the formation of granite." However, according to several maverick researchers at the Research School of Earth Sciences at Australian National University, who published an article in 1983, water is absolutely essential. Their article, *NO WATER, NO GRANITES, — NO OCEANS, NO CONTINENTS* begins:

"**Water is essential for the formation of granite** and granite, in turn, **is essential for the formation of continents**." Note 7.4l

In 1983, the importance of water in the crystallization of minerals was becoming known, yet as of the printing of this book, it is still heavily resisted. It is amazing how long it has been known that water is an essential ingredient in the crystallization of rocks and the formation of our continents, and it is just as amazing how magma thinking allowed this knowledge to be laid aside. For example, in 1958, some researchers knew that

Fig 7.4.10 – This unique granite outcrop is located in Sonora Mexico near the Gulf of California. Most granite deposits do not exhibit holes like these. Researchers have attempted to form granite through experimentation of many pressure/temperature environments, all without water. They had no success. Eventually, they discovered that "the water content" was the "most critical factor" to simulate nature in growing granite, and without granite, there would be no continents.

"**Water is essential for the formation of granite** and granite, in turn, **is essential for the formation of continents**."

Geophysical Research Letters, Vol. 10, No. 11, November 1983, I. H. Campbell & S. R. Taylor, p1061

without water, no quartz or feldspar crystallization would take place in granite:

"…quartz and feldspar nucleate only with the greatest difficulty. **Dry granite** liquids have been held at temperatures below their liquidus for periods of **ten years and longer with no hint of crystallization** (Tuttle and Bowen, 1958)." Note 7.4m

Dry granite liquids are a *melt*, and produce *no crystallization*. Of course, all natural granite is crystallized. How do researchers account for this? The idea that water is essential for granite formation is not a new idea but it is not widely known among the ranks of researchers. In some cases, the dry magma mindset has induced investigators to discount their findings. For example, in a book published in 1997, *The Nature and Origin of Granite*, the author notes how one researcher, Piwinskii, wrote that previous experiments involved too much "excess water" to be related to any "processes occurring within the earth":

"Luth's review of 1976 showed how these early investigations engendered a plethora of similar work from which both experimentalists and petrologists made extravagant claims as to their relevance to nature. Although the use of synthetic starting materials was appropriate enough in the investigation of a specific phase relationship, and the carrying out of the experiments under **water-saturated conditions** was necessarily dictated by the existing technology, there was a growing realization that such experiments might bear **little relationship to natural processes**. Piwinskii was compelled to write: '**Because the experimental investigation was undertaken in the presence of excess water, no direct link can be established with physico-chemical processes occurring within the earth**.'" Note 7.4n

However, the author of *The Nature and Origin of Granite*, Wallace S. Pitcher, exclaims that the "water content" proves to be the "most critical factor" in the experiments involving natural granite:

"It is the **water content** that proves to be **the most critical factor** in all these experimental attempts **to simulate nature**." Note 7.4n p34

Water content and being formed *out of water* represent two different things. Remember that Pitcher is forming his ideas as one who views the science from within the magma paradigm. In that mindset, granites come from "dry metamorphic rocks":

"It was quickly realized that **if** granites were generated by the melting of **dry** metamorphic rocks deep in the crust, their melts were likely to be relatively **water-deficient and vapour-absent**." Note 7.4n p34

Thus, researchers have searched in vain for a process in which to create "fully crystallized granite" from a relatively water-deficient source:

"This view of the likely **water-undersaturation of natural granitic magmas was amply confirmed** by the new approach initiated by Piwinskii and Wyllie in 1968 and adopted by Wyllie and his co-workers in a long series of experiments (reviewed in 1983). In essence the method involved the **complete melting of natural granite under various pressures**, **temperatures and concentrations of water**, with the conditions adjusted so as to reproduce on cooling the original mineral assemblage in its natural order of crystallization. Despite all the possible reservations, coupled with the realization that such experiments **have never yet been carried out to completion in reproducing a fully crystallized granite**, the results are **highly significant** and, I am tempted to add, geologically realistic." Note 7.4n p34

The only thing "geologically realistic" about these water-*under*saturated experiments and observations is that they were *not* successful. When one comes to realize that each of the individual minerals that make up granite has its origin in water, it is easy to grasp the concept that granite too must crystallize from water.

Confirming the Law of Hydroformation

Continuing in this chapter, we will uncover considerable evidence to support the new Third Universal Law of Water, a law that should be the basis of all geology. This new law is the natural result of the process from which the magmaplanet model is taken from its pseudo-theoretical position and replaced with the Hydroplanet Model and where the truth about the liquid inside the Earth can be known. The outer core of the Earth is liquid, and since this liquid is not magma, there is *only* one other natural liquid that it could be—***water***.

That there is liquid near the center of the Earth is not in question because there have been many seismic observations and data has been collected from all around the world for more than a century. Sound waves generated by earthquakes and the knowledge that such waves do not travel through liquid and solid materials in the same manner, has allowed the mapping of the boundary between the solid and fluid areas of the outer core of our planet. The Earth is essentially an enhydro—a large geode with a watery center. This will become far more self-evident as we understand how much water is inside the Earth and as we learn how geodes are made.

We can apply the Self-Evident Principle: Water must be at the Earth's core because it could be no other way. If this statement is true, we should be able to confirm it with observations and empirical, scientific evidences.

One of the evidences is that the Earth is not glass. Had it formed from a dry magmatic melt, the crustal rocks would have been amorphous (without crystal structure) and glassy. Instead, it is made of minerals that form only in an aqueous solution, which supports the Law of Hydroformation—all natural crystalline minerals formed in water.

Having already established that water exists in all minerals, we will investigate the hydro-forming processes involved in the making of all natural minerals, and in doing so, confirm the Law of Hydroformation.

The Hydrothermal Process

In *Webster's Universal College Dictionary,* **hydrothermal** is defined as:

"Of or pertaining to the action of **hot aqueous solutions** or gases within or on the surface of the earth." Bib 7 p400

This is how the term *hydrothermal* is typically used today, the combination of water and high-temperature. Hydrothermal activity is further defined in the geology textbook *Understanding Earth*:

"Any process involving **high-temperature *groundwater***, especially the **alteration and emplacement of *minerals*** and the formation of **hot springs and geysers**." [Bib 59 p655]

Notice that both modern definitions refer only to high-temperature water. The "alteration and emplacement of minerals" mentioned in the definition cannot be referring to the rocks and minerals we walk on every day because common rocks are not formed this way. Hot spring minerals formed around geothermal vents in places like Yellowstone include the mineral **geyserite**. Geyserite is a soft, silica-based mineral that can be seen around the edges of geysers and hot springs (see Fig 7.4.11). Although geyserite is a silicate based mineral, it is *not* quartz. It is not quartz because it was not under high pressure when it precipitated out of the water. Without high pressure, the silica, dissolved in subterranean hydrothermal waters from surrounding quartz-based rocks, forms the softer mineral geyserite. This story is told in the book, *Geysers of Yellowstone*:

"At depth, the water is heated by contact with the enclosing volcanic rocks. Once heated, it dissolves some of the quartz from the rocks. All of this takes place at very high temperatures—over 400°F (205°C) in many cases; and 460°F (237°C) was reached in one shallow research drill hole. This silica will not be deposited by the water until it has approached the surface and cooled to a considerable extent.

"**Now an interesting and important phenomenon occurs. Although it was the mineral quartz that was dissolved out of the rocks, the deposit of geyserite is a non-gem form of opal**." [Bib 134 p3-5]

The author notes that the process that involves the dissolving of silica from quartz-based rocks and then redepositing it as geyserite is an "important phenomenon" but it is perplexing in modern geology because the silica from dissolved quartz rocks does not become a quartz rock again. Geologists have largely missed the all-important component of *pressure* in mineral formation. In fact, the very word *hydrothermal,* previously defined using modern texts, was changed some years ago. The original definition for the term hydrothermal, as it referred to the formation of rocks and minerals included the very important factor—*pressure*:

"The **term hydrothermal** is purely of geological origin. It was first used by the British Geologist, Sir Roderick Murchison (1792-1871), **to describe the action of water at elevated temperature and pressure** in bringing about changes in the **earth's crust leading to the formation of various rocks and minerals**." [Note 7.4o]

The omission of pressure from the original definition is due to the *dogmagma* that exists in geology today. It is important to recognize that geology has taken a back seat when it comes to understanding natural crystal growth in "water at elevated temperature and pressure." On the other hand, technologists have embraced the idea of crystal growth using a pressurized hydrothermal process. This has resulted in the development of many new synthetic minerals that are very similar to naturally grown rocks and crystals.

We found no term to describe the specific environment that includes the components of water, pressure, and heat (thermal) in the mineral growing process. Because the *hydrothermal* process has come to mean ***without*** pressure, it is inadequate for describing the pressurized environment where most rocks are grown.

The Hypretherm

In order to distinguish the environment of water-pressure-heat from the water-heat only environment, we will use the term **hyprethermal**. It is to be differentiated from hydrothermal as follows:

1. Hydrothermal – minerals formed in a thermal water environment without pressure.
2. **Hyprethermal** – minerals formed in a *pressurized* thermal

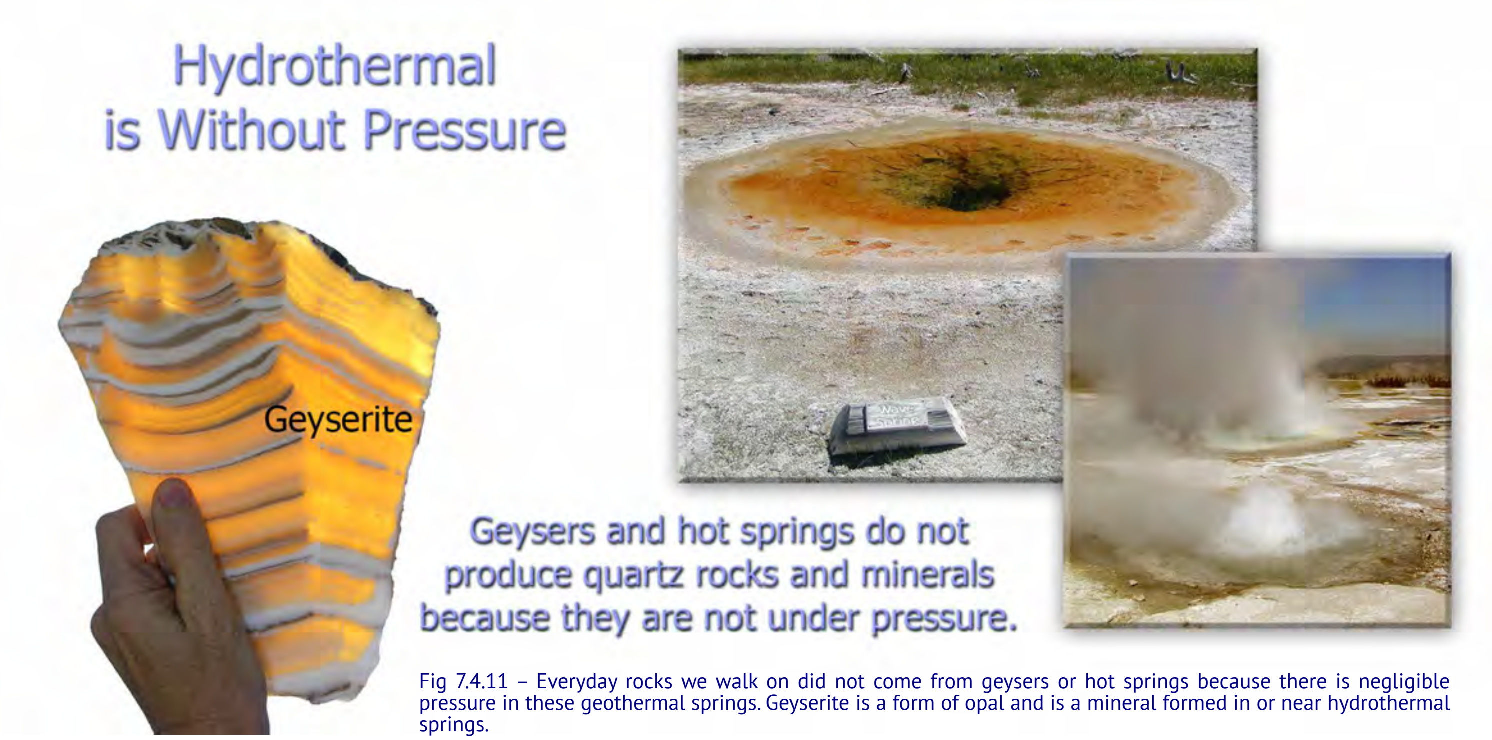

Fig 7.4.11 – Everyday rocks we walk on did not come from geysers or hot springs because there is negligible pressure in these geothermal springs. Geyserite is a form of opal and is a mineral formed in or near hydrothermal springs.

water environment.

To understand the origin of rocks and minerals on the Earth and on other celestial bodies requires a clear understanding of the hyprethermal environment. Another new term, **hypretherm,** will be used frequently throughout the remainder of the UM to describe this extraordinary environment.

A **Hypretherm** is the physical environment in which mineral crystals grow. It includes the components of water, heat, pressure, a mineralizer and a gas.

Note that the ***hyprethermal environment*** requires all five of the following ingredients:

1. Water
2. Heat
3. Pressure
4. Mineralizer
5. Gas

Fig 7.4.12 – These colorful natural rocks are mostly quartz based and were all grown in a Hypretherm. This is a new word developed with its definition in mind. Minerals in nature are crystalline and require a water (hydro) solution to grow. The rocks also require pressure because most of the rocks seen here are quartz based. The harder the rock the higher the pressure required to grow the crystal. Diamonds are one of the hardest minerals and require the highest pressure to be grown. Salts are considerably softer and dissolve quite readily in water. Unlike most of the rocks seen here, the salts did not grow under pressure. Finally, these rocks require around 350°C – 500°C temperatures (thermal) for the silica to dissolve in the water solution to enable them to crystallize. Putting the words together gives us hy-pre-therm, the environment in which these minerals grow. The hyprethermal environment emphasizes a higher pressure to grow the harder minerals that most of the Earth's crust is made of. Additionally, a mineralizer and a gas are generally involved for the crystal growing process to take place.

As with any recipe, if the right ingredients are not present, the results will not be produced as expected. If we learn the correct recipe and baking instructions, we can easily reproduce our favorite cake, but if the recipe is incorrect, the outcome will fail to produce the favored dessert. It is the same with rocks and crystals.

The hyprethermal process has been made simple with modern technology. Inexpensive autoclaves can be purchased or built and reused to make the many attempts that are needed to find just the right recipe of temperature, pressure, mineralizer and air for the type of crystal to be grown.

Fig 7.4.13 is a collection of images taken to illustrate the process of how to grow a quartz crystal to double its size—in one day—using a hyprethermal process. The device used in this example was a high-pressure reactor, also called an autoclave, which was placed vertically in the oven. The oven was heated to 400°C at the bottom and about 50°C cooler near the top. This induced a natural convection or circulation of the liquid/gas mixture inside the pressurized vessel (the autoclave). The oven was heated using electrical heating elements controlled by a programmable thermostat that increased the temperature gradually. It is important not to increase the heat too quickly. Approximately two inches of pulverized quartz was placed in the bottom of the autoclave. The quartz will dissolve when the temperature and pressure reach a specific level. At the top of the autoclave, a hanger was added to hold small quartz crystals. These crystals will act as the seeds for the dissolved quartz to grow on. The quartz seeds can be as small as microscopic crystals, sand grains or they can begin as very large crystals, depending on the size of the available autoclave. If the hyprethermal environment was large enough, crystals the size of mountains could be grown. We started with small seeds, about 1-2cm since we did not have access to an Earth-sized autoclave.

Once the crushed quartz and quartz seeds were placed in the autoclave, it was filled with a sodium hydroxide (NaOH) water solution that acted as the natural mineralizer in which the quartz will dissolve once the temperature reaches 350-400°C and the pressure reaches 12-17,000 psi. A specific amount of air was left at the top of the vessel, which helps control the pressure. Once the variables were in balance, (it took a number of runs and many years to accomplish this) our patience was rewarded with a quartz crystal, double the size of the original seed crystal and in only one day. This experiment can be repeated quite easily, once the processes and ingredients are known, and today, it is carried out commercially on a large scale, although in only a few places around the world.

Geoscientists will not obtain the wisdom of how quartz-based rocks are formed—**unless** they grow quartz rocks.

Surprisingly, we found no evidence of geological research being conducted using this type of autoclave. How do geoscientists ever expect to gain the wisdom of how quartz-based rocks are made if they do not grow quartz rocks?

Commercial Quartz Growth

During the first half of the 20th century, the majority of crystal quartz used in industry came from Brazil. As demand increased, concern about the reoccurrence of the quartz shortage crisis during World War II led to the development of synthetically produced quartz. Commercial quartz production began in 1958 and by 1971, cultured quartz consumption surpassed natural quartz usage.

Today, commercial autoclaves range in size from 10” diameter by 15’ long to those with diameters of over 1 meter (3+ Ft) and over 12 meters (32+ Ft) in height. Modern quartz producers may have several hundred vessels producing quartz for use in industry. The synthetic quartz produced in these autoclaves is produced in a hyprethermal environment.

Fig 7.4.14 is an example of commercially produced quartz. The clear stripe seen in the center of the lower left image is the ‘seed’ that was hung in the autoclave. The wire hanger can also be seen. This specimen is blue because other minerals were added to the crushed quartz. Varying the environment and changing the ingredients can alter the physical appearance and the properties of the final crystal.

One would think geoscientists would be very interested in this method of mineral growth, but it seems it is not so. It has been the engineers and the technologists that have taken up the slack and reported the similarities between the lab and nature:

“Brazilian quartz is vein quartz. **It is deposited in cavities from supercritical hydrothermal fluid in much the same way that quartz crystals are grown in the lab**.” Note 7.4p

Fig 7.4.15 is natural sandstone matrix with natural white quartz and a layer of synthetic amethyst (purple crystals) quartz

Fig 7.4.13 – This diagram illustrates the hyprethermal quartz-growth process. The word **hyprethermal** is a merger of the words “hydro” (water), “pre” (pressure), and “thermal” (heat). A combination of these three physical properties creates a pressurized thermal environment in which quartz crystals can grow. In this diagram, a hanger holding quartz crystal seeds is placed in the high-pressure reactor. A water solution is added to the reactor and it is placed in an oven and heated until the solution reaches 350-400° C. Compare the images of the crystal before growing and after growing. The crystals experienced a rapid growth rate approximately doubling in size in **one day**, not over millions or even thousands of years.

Fig 7.4.14 – This is a man-made quartz crystal grown for technological purposes. The clear strip seen in the bottom photo is the quartz 'seed' while the blue material is the grown quartz. The addition of the element chromium is responsible for the blue color.

on top. With the addition of other natural minerals to the water solution in the autoclave, various colors can be achieved, like this stunning display of amethyst atop natural quartz. Comparatively little research in this segment of synthetic quartz has taken place except in Russia, where for many years much of that work was kept secret under the control of the Soviet Union.

Why Such a Focus on Quartz?

Why focus on quartz in this and the last two chapters? There are so many minerals and variations of those minerals that it may at first seem limiting to direct such attention to quartz. Concentrating on quartz keeps us from becoming too entangled in the specific mineralogical technicalities and allows us to focus on the one change that must take place in modern geology—that is the paradigm change from a dry-melt origin to an origin-with-water.

Another reason to turn our attention to *quartz and other silica-based rocks* is that there are more silicates on the Earth than all other minerals put together:

"Silicates are metals combined with a silicate group (silicon and oxygen) and are the most common of all minerals. **There are more silicates than all other minerals put together**, both in mass and number. Almost a third of all minerals are silicates, and **they make up 90 per cent of the Earth's crust**. Quartz and feldspar alone make up a huge proportion of most rocks." Bib 151 p59

That said, it is interesting to understand the importance of water in other minerals and that water affects far more than just quartz rocks. One instance where water is apparent in crystal formation is the ***natural*** emerald:

"**Water is present within the structure in natural and hydrothermal but not in flux-grown** [melt] **emeralds**… The water can be **incorporated into emerald only during growth** and cannot be added or removed at a later stage without destruction of the emerald. This can be demonstrated by a test (which obviously cannot be recommended!): the emerald is slowly heated to red heat. Flux-grown [melt] synthetic emeralds are **not** affected **but natural and hydrothermal emeralds shatter** or turn cloudy **owing to the release of their water content**." Bib 104 p128

It is evident why ***natural rocks*** and gems could not have come from magma or a melt. They all have water "incorporated into" their structure—through a hyprethermal process. This can be quite dramatically displayed by the sudden fracturing of rocks when they are heated, due to the rapid expansion of the contained water.

"Indistinguishable" From Natural Quartz

Questioning everything in science with an open mind led us to ask the question "just how similar is hyprethermally formed synthetic quartz to natural quartz?" The answer to this question is important as it will either support or refute the Identity Principle that states:

Identical results come from duplicating processes found in nature.

When the duplication of a natural process can produce synthetic quartz indistinguishable from natural quartz, it is at that moment we become the possessor of a pearl of nature's wisdom. We will know we have discovered a ***scientific truth.*** Once we determine exactly how quartz ***is*** made, we can know with a certainty how it ***was*** made in the past:

"No consistent identifying features are known at present for the reliable differentiation of **synthetic from natural quartz and the two types are so far indistinguishable**." Bib 104 p99

This important statement has profound consequences. A gemologist, not a geologist identified the two types of quartz as being "indistinguishable." As is often the case, the researchers

Fig 7.4.15 – This is a cross section showing natural quartz (white) on a sandstone base with synthetic amethyst quartz (purple) grown on top of the natural quartz. This specimen was made in Russia where much research involving the use of autoclaves was conducted, prior to the collapse of the Soviet Union. This specimen helps illustrate how natural quartz grows in a hyprethermal.

working in the side of technology are responsible for this advancement. Technology succeeds where science fails because technologists are pragmatic and practical whereas pure scientists often operate in the theoretical realm.

This discovery validates the Identity Principle and it should have happened a long time ago. Almost two centuries ago, scientists were on the right track:

"In 1822 Humphrey Davy examined natural quartz crystals containing **liquid inclusions** and found that these inclusions contained **mostly water with some salts** such as alkali sulfates. This observation **correctly established the direction for almost all subsequent quartz growth attempts**." [Bib 104 p100]

Davy's discoveries and correct attempts at making quartz centered on the observation of enhydros—rocks with liquid water inclusions. Unfortunately, quartz research was derailed because of the dogmagma of the melted Earth mindset. Successful quartz growth happened only when investigators returned to the correct paradigm—growing minerals from water.

Fig 7.4.16 – Flux-grown (melt) synthetic emeralds have no water in their crystal matrix, whereas all natural emeralds do. Natural emeralds grow in the same manner as quartz but higher pressures and temperatures.

Natural Hypretherm Growing Conditions Known

It is critical to understand that the hyprethermal process is the ***only proven process*** for making quartz and that quartz-based minerals make up the majority of the *crust* of the Earth. Moreover, the piezoelectric properties of many of the silicates provide another important clue as to the approximate conditions of the hypretherm in which these quartz-based rocks grew. We discussed the piezoelectric effect in subchapter 5.8 and go into much more detail in subchapter 9.5, the Geofield Model. Applying and releasing pressure on α-quartz (alpha-quartz) rocks generates electricity. However, this piezoelectric property begins to diminish as the mineral reaches 570°C. Because nearly all natural quartz-based rocks are piezoelectric, we *know* they did ***not*** grow at temperatures above 570°C. There is no evidence of natural α-quartz being produced above 570°C. This is the limiting temperature of α-quartz. The limiting temperature is also an indicator of the pressure at which the minerals were grown because temperature and pressure are directly proportional.

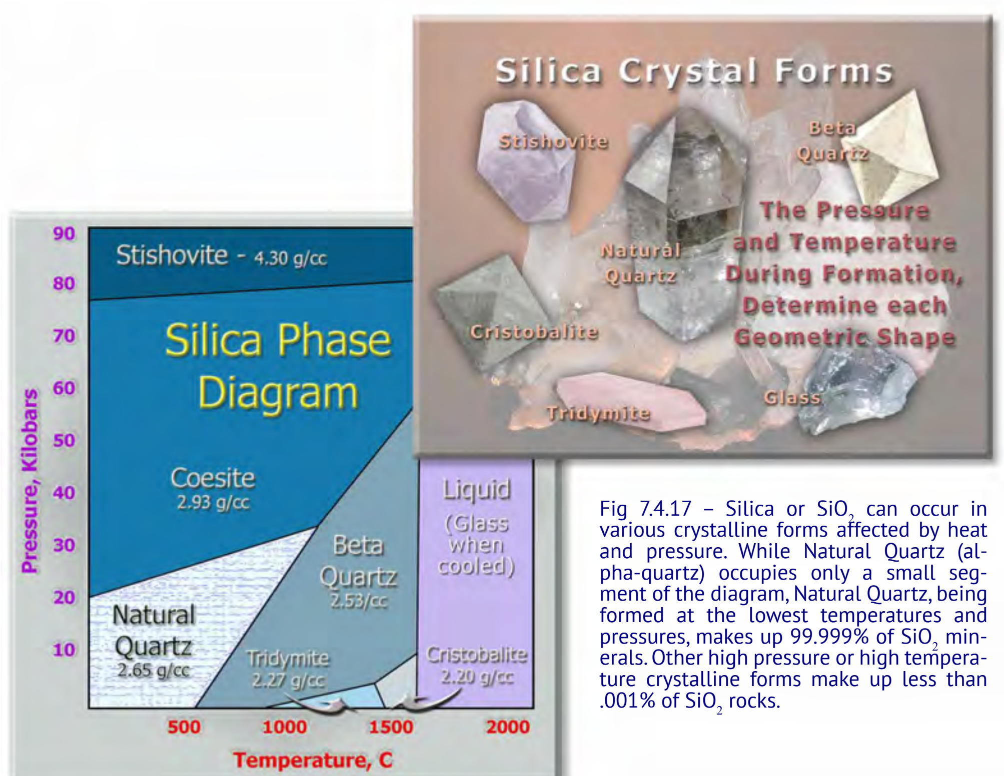

Fig 7.4.17 – Silica or SiO_2 can occur in various crystalline forms affected by heat and pressure. While Natural Quartz (alpha-quartz) occupies only a small segment of the diagram, Natural Quartz, being formed at the lowest temperatures and pressures, makes up 99.999% of SiO_2 minerals. Other high pressure or high temperature crystalline forms make up less than .001% of SiO_2 rocks.

Fig 7.4.17 shows various forms of crystalline quartz and the Silica Phase Diagram. These were introduced in the Magma Pseudotheory chapter. They illustrate the different states of quartz minerals and the variations of temperature and pressure to which they were subjected. The quartz minerals from the highest temperatures and pressures are very rare in nature. Natural α-quartz makes up most of the quartz found in nature and it is grown at *lower* temperatures, not the theoretical temperatures assumed to exist deep in a magmaplanet Earth.

The Hydrothermal History

Although the influence of James Hutton and Charles Lyell's magmaplanet theories ruled the 19^{th} and 20th centuries, there were experimentalists having success growing minerals in a hyprethermal environment. Over 80 minerals were reported to have been grown:

"According to Morey and Niggli (1913), **over 80 mineral species** are supposed to have been **synthesized during 19^{th} century**. The list includes quartz, feldspars, mica, leucite, nephelite, epidote, hornblende, pyroxene of minerals from the silicate group and several non-siliceous minerals like corundum (Al_2O_3), diaspore ($Al_2O_3 \cdot H_2O$), and brucite ($Mg(OH)_2$)." [Bib 156 p58]

Even with successes like these, the resources spent understanding mineral growth was negligible and eventually, false theories and theoretical research edged out previous experimental work, ushering in a Dark Age of Science. Today, the best and brightest of the new crop of scientists seek to be theoreticians, especially those interested in the fields of physics and cosmology. In the geosciences, theoreticians hold great sway and have literally directed research and government grant money toward many fruitless, endeavors resulting in little or no new comprehension about the world around us.

In the first half of the 20th century, Einstein and Darwin's pseudotheories, coupled with the dogmagma of the Rock Cycle and Magma pseudotheories, became the driving force behind modern science. In 1928, Norman L. Bowen published *The Evolution of the Igneous Rocks*; it became ***the*** petrology handbook. In his book, the author propounded Bowen's Reaction Principle, which tried to explain a series of reactions based on the theory that all rocks come from a melt. It is still used in textbooks today, even though *Bowen never showed* his Reaction Principle to be true. Of course, one reason Bowen's experiments failed and ultimately the reason his theory is off the mark was that the temperatures he used were too high and he neglected to recognize the crucial role of *water* in the crystallization process.

By the middle of the 20th century, other geologists followed Bowen's lead in neglecting water, and abandoned the hypretherm environment in favor of the prethermal environment—high pressure and temperature. These experiments yielded little with respect to how nature works. By the 1960s and 1970s, attention was again being focused on the role of water:

"During the 1960s, an intensive study of the hydrothermal process of synthesis and growth of single crystals which did not have the analogues in nature began. During the 1970s, there was a quest for the search and growth of hitherto unknown compounds of photo-semiconductors, ferromagnets, lasers, piezo- and ferroelectrics and, **in this regard hydrothermal technology attracted a great attention**." Bib 156 p74

Again, the credit for understanding and developing the processes for growing large quartz crystals goes not to the geologists, but to the technologists, driven by the demand of the electronics industry. They pursued the development of the hyprethermal process with vigor. By the 1930s and '40s, technologists had made new discoveries using autoclaves and had gained critical knowledge about the roles of the mineralizer, temperature, pressure and gas levels and other variables necessary for optimal growth. The United States, the Soviet Union, and the UK became leaders in the production of synthetic minerals. Eventually, Japan built the largest autoclaves in the world and became the largest producer of commercial, synthetic quartz.

Vein and Geode Crystals

There are excellent opportunities to view nature's own hypretherm by examining geodes and quartz veins. Amazingly, this is an understudied topic in petrology, which is unfortunate, as vein and geode crystals provide some of the best evidence about the origin of *all* minerals. We found only one investigator who had spent time researching geodes, and even he spent little time on the subject. He knew of no other scholars working specifically with geodes. Finding the geosciences unable to offer information about quartz veins and geodes, we drew upon other fields of science and searched their journals for research on these topics. The only reports we found, mainly from the 1980s, offered little new insight.

These reports explained what seems to have become the consensus in geology, that is quartz veins and geodes are presumed to form *hydrothermally*, in an environment of heat and water:

"**Quartz crystals form in nature when a hydrothermal solution saturated with silicon dioxide fills** (or, perhaps, creates) a cavity in a mineral matrix. Crystallization within these cavities forms **veins** of quartz when the cavity is completely full of crystals or forms **geodes** when it is only partially filled. Quartz often is found in cavities in other minerals. When opened, geodes provide remarkably beautiful mineral specimens." Note 7.4p p40

Missing in the formative process explained in the *Chemical & Engineering News* article, is the all-important factor of ***pressure***, which is required for crystal growth. The engineer's utilized pressure in their quartz growth experiments, but the connection that pressure is necessary for natural quartz formation was not made.

How were millions upon millions of veins and geodes formed in the surface layers of Earth's crust? They are found in hard rock and in soft clay-like materials. Geodes are found relatively near the surface and are ***not*** found deep down in sedimentary materials. Many of the veins and cavities found on the Earth's surface are filled with quartz crystals. As evidence that they were not formed deep inside Earth, many of the crystal-filled areas remain undisturbed in unaltered horizontal sedimentary material. Because quartz veins are so common and plentiful, we should ask this FQ:

Are quartz veins and cavities being created today?

Quartz veins are found in the highest mountains, and in many rock types. Some of these were quite obviously cut in after the mountain or rock formation was formed. Geodes and quartz vein growth is not known to be happening anywhere on Earth today, yet it did occur *all over the surface of the Earth a relatively short time ago*. We know how quartz is made, and there-

Fig 7.4.18 – We find beautiful crystals like these in veins and geodes around the world. They can only be reproduced by man in a lower temperature/high pressure water environment verses a melt. However, these crystals are no different from others found in so-called igneous and metamorphic rocks that were supposed to come from much higher pressures and temperatures and without much or any water. The crystals we can hold in our hands actually testify to how the Earth's rocks were originally formed—in a hypretherm.

fore can recognize the missing component of ***pressure*** in the previous quoted article.

There had to be a time when significant pressure existed on the surface of the entire Earth. Pressure, combined with other components present during crystal growth was all a part of the environment we will discuss in the next chapter.

Pegmatite Mystery Explained

In the Rock Cycle Pseudotheory chapter, we introduced the Pegmatite Mystery (Mystery #5, subchapter 6.4) with the following quote:

"Despite the extensive study, pegmatites have yielded little information about the **transition from magmatic to hydrothermal fluids** and in recent years interest in these deposits has waned." Note 7.4q

Previously, we discussed how scientists had hoped that the pegmatite deposits would be the missing link between magmatic or molten rock to the hydrothermal environment believed to have been responsible for the formation of the pegmatites. Interest in the pegmatite deposits "waned" because the physical evidence from studies of them did not provide the hoped-for link. Although the evidence does not support the Rock Cycle Pseudotheory, it is convincingly strong evidence for the Hydroplanet Model.

We will explore a small amount of the vast collection of data showing that all inorganic rocks, if not melted by frictional heating, are formed in a ***hyprethermal*** process. Because the basement rocks of the continental crust are made primarily of granitic rocks, an understanding of the origin of this mineral and its connection to pegmatite formation is critical, if we ever expect to comprehend the original formation of the Earth. From *Origins of Igneous Rocks,* the author says this of the connection between granites and pegmatites:

"The genetic connection between granites and pegmatites **is well established**.

"**An aqueous-rich fluid** is regarded as the **critical element in the genesis of pegmatites**... Although large portions of the pegmatite approximate a granite mineralogy, the quartz cores and veins are most certainly **formed from precipitation from an aqueous fluid that is highly siliceous**." Note 7.4r

Researchers thought that if they could figure out the origin of pegmatites, the origin of the Earth's minerals, including granite would be solved. Remembering that quartz is *a primary constituent of all granite*, we realize that quartz, pegmatites and the granites would have "formed from precipitation from an aqueous fluid." This is precisely what the Hydroplanet Model is.

As you might imagine, researchers steeped in dogmagma would be highly reluctant to admit that the origin of granite and pegmatites are directly connected. In fact, the author from the previous quote went on to say the following regarding the relationship between granites and pegmatites:

"This discussion must remain on a **sketchy** and highly qualitative level." Note 7.4r p244

This statement is only true if you have a paradigm that Earth is a magmaplanet. Consider the data from the Hydroplanet paradigm and the *obvious* answer is "an aqueous-rich" solution.

Many times, researchers come close to bumping into the Hydroplanet Model. A 2002 paper, *Contributions to Mineralology and Petrology*, several researchers described experiments

Fig 7.4.19 – Pegmatites often contain large crystals like this beryl crystal. They are important because they hold clues to how all rocks were made. All of the crystals in a particular pegmatite were made from the same materials at essentially the same time and in the same way. Researchers have finally begun to recognize that "An **aqueous**-rich fluid is regarded as the **critical element** in the genesis of pegmatites..."

with "synthetic granite pegmatite" at hyprethermal pressures of 14,000 & 28,000 psi (0.1 & 0.2 Gpa). Note 7.4s

They considered their experiment to include an "extreme enrichment in H_2O" because water accounted for about ¼ of the total weight of the minerals and solution in the pressure vessels. Six natural minerals were grown simultaneously over a period of less than three weeks. These included berlinite, muscovite, quartz, amblygonite, lacroixite and Cs-bearing alumionosilicate. The best run in their series of experiments occurred at lower temperatures of 450 ºC and with a pressure of 14,000 psi. The pressure, temperature and water levels are within the range of the hyprethermal experiments we performed, as outlined a few pages ago.

These experiments, as performed by Veksler and Thomas (2002) are important because they show that the dissolved minerals formed new fluids and separated into different layers inside the pressure vessel, much as oil and water do. This is called **immiscibility,** and it allows *individual crystal growth* of different minerals *out of the same hypretherm solution*:

"Experimental evidence of the liquid **immiscibility** and mineral reactions documented in our study **offers new explanations of many enigmatic features of natural pegmatites**." Note 7.4s p675

The pegmatite mystery could have never been solved using a 'dry' magma-melt process because all pegmatite minerals are formed in a hyprethermal environment.

Dolomite Hypretherm Evidence

Silicates like quartz are far from being the only rocks to be made in a hypretherm. Dolomite, a very common carbonate based mineral is also not surprisingly formed in hyprethermal conditions:

"Dolomite presents a different challenge. Its nucleation and crystal growth are strongly inhibited at room temperature and, so far, **successful precipitation of dolomite from a fluid or by replacement of a $CaCO_3$ precursor has only been produced experimentally near or at hydrothermal conditions**." Note 7.4t

Here again we recognize that conditions are represented by the researchers as being hydrothermal and as before, they have neglected the pressure component. The dolomite "problem" was mentioned toward the end of the Rock Cycle Pseudotheory (subchapter 6.9). Massive beds of dolomite exist all over the world, in areas that currently are not hydrothermal. Moreover, calcium-magnesium rich hydrothermal waters are not producing modern instances of dolomite. Dolomite does not dissolve readily in meteoric waters that flow naturally through the dolomitic beds and it is highly resistive even to acidic water, whereas limestone is not.

In the journal of *Sedimentology,* we found a paper discussing experiments wherein small dolomite crystals were formed and upon inspection, were found to be similar to natural dolomite:

"Comparison of synthetic dolomites with natural dolomites demonstrates (1) **similar** nanotopography on natural and synthetic dolomites and (2) both natural planar and non-planar dolomite may have island nanotopography." Note 7.4u

How did the research team produce these near-natural synthetic dolomites? An aqueous (water) solution infused with natural calcite ($CaCO_3$), magnesium chloride ($MgCl_2$), and calcium chloride ($CaCl_2$) was placed in a high-pressure "bomb" or autoclave and heated to 200 ºC. In the hyprethermal conditions, the experimenters did not need millions of years to grow dolomite—they only needed about 40 hours. Had slightly higher temperatures been used, the growth process would have likely been even further accelerated.

Geologists have known for many decades that calcite-dolomite ($CaMg(CO_3)_2$)—true dolomite, and magnesite ($MgCO_3$)—dolomite without calcium are almost indistinguishable from true dolomite. Both are found in large quantities and can be transformed from one to the other. In a 1964 *Science* report, researchers were able to dissolve these minerals and grow new crystals. Note 7.4v

The environment researchers used to conduct this experiment was one of low temperature but *not* low pressure. Once again, they achieved success and minerals were grown using hyprethermal conditions with temperatures of 275-420 ºC, *high-pressure*, water and CO_2 gas.

The Dolomite and Calcite Hypretherm Evidence (Carbonate Mark in the Universal Flood chapter) both come from the physical and chemical requirements that are used to grow these minerals. Once again, *only in water at slightly elevated temperatures and under high pressure* do large dolomite crystals form. They are not formed by dissolving other rocks or minerals in water at room temperature as modern geology suggests. Dolomite forms in a hyprethermal process that involves limestone, other solutions, and organics, all of which will be detailed in the following chapter.

Fig 7.4.20 – This is a specimen of **calcite**, the second most common mineral type on the continents next to quartz-based minerals. This colorful piece came from Mexico, with the different colors representing various mineral substances that were in the calcite solution when this crystal grew. Large calcite crystals such as this have only been found to grow in a hypretherm.

Calcite Hypretherm Evidence

Calcite crystals like the one seen in Fig 7.4.20 require hyprethermal conditions for growth. Many researchers have tried to grow calcite crystals in an ordinary surface-water environment with neither elevated temperature nor pressure—those attempts all failed. This has been a source of great frustration because this environment (average atmospheric pressures and temperature), envisioned by the believers of uniformity fail to reproduce calcite crystals.

Another sci-bi that attempts to explain the origin of calcite crystals is diagenesis. Diagenesis is a chemical or physical change that sediment undergoes after being initially deposited, during its lithification (becoming rock). Presumably, this occurs at low temperature and low pressure and is modern geology's proposed transition stage prior to metamorphism. These two terms, diagenesis and metamorphism, have been used to explain changes sedimentary rocks undergo, but a distinction between them is not clear because rock formation as a result of these processes has not been observed:

"There is not a clear, accepted distinction between diagenesis and metamorphism, although metamorphism occurs at pressures and temperatures higher than those of the outer crust, where diagenesis occurs." Note 7.4w

Without observation, there can be no true science. The growth of large calcite crystals *has been observed* in the lab, but it was not from the field of geology that we found it. In the field of optoelectronics, a paper entitled *Hydrothermal Synthesis and optical Properties of Calcite Single Crystals*, published in 2003 contained details on the growth of optical grade calcite crystals. The author, I.V. Nefyodova and his colleagues reportedly grew optical grade calcite crystals in hyprethermal conditions. They reported temperatures ranging from 250-300 ºC, and pressures of 50-100 Mpa (7,250-14,500 psi). Note 7.4x

The results obtained from the experiments conducted by Nefyodova and others were calcite crystal growth of approximately 10mm (3/8") in 30-85 days. The results of these experiments can also be found in the *Journal of Crystal Growth*. Although they were conducted for the purposes of making optically pure crystals for use in the optical and electronics industry, why would the same processes not have application in discovering the true origin of *natural* calcite crystals? Indeed, they are very applicable, and geologists should apply these discoveries to understand the natural world and the true origin of calcite crystals.

Olivine Hypretherm Evidence

The mantle of the Earth is believed to be primarily composed of the silicate mineral **olivine,** which is said to be derived from magma. However, when we investigate the findings of geological researchers, they tell a different story. From the *American Mineralogist* journal, laboratory experiments demonstrated that olivine crystallizes *out of water*. Researchers found that using "air-saturated water" inside an autoclave heated and under pressure that, "...at 300º C and 300 bars for 1368 hours...clear signs of dissolution, and growth" of olivine minerals occurred in the laboratory experiments. Note 7.4y

This is hyprethermal growth similar to the quartz growth process already discussed. Moreover, at higher temperatures (yet far less than melt temperatures) and greater pressures, much less time is required for crystal growth. No experiments were found documenting any evidence that crystalline olivine minerals came from a melt. Later in subchapter 7.10, we will discover what actually happens to olivine when it is melted. Hyprethermal experiments such as the one noted in *American Mineralogist* in 2002 clearly establish that olivine, one of the primary ingredients of the mantle, precipitated from a watery solution.

Because olivine is such an abundant crustal mineral, there are other evidences connecting olivine to the watery nature of the Hydroplanet Model. A study reported in *Science* in 2001 documented "puzzling observations of seismic anisotropy" and attributed it to the presence of abundant water:

"The interpretation of seismic anisotropy in Earth's upper mantle **has traditionally been based on** the fabrics (lattice-preferred orientation) of relatively **water-poor olivine**. Here we show that **when a large amount of water is added to olivine**, the relation between flow geometry and seismic anisotropy undergoes marked changes. Some of the **puzzling observations** of seismic anisotropy in the upper mantle, including the anomalous anisotropy in the central Pacific and the complicated anisotropy in subduction zones, **can be attributed to the enrichment of water in these regions**." Note 7.4z

Seismic anisotropy describes the movement of directionally dependent sound waves through the crust. In the past, geophysicists found this difficult to explain with "water-poor olivine" but "when a large amount of water is added to olivine," it was easy to understand. As we continue further through the Hydroplanet Model, olivine will afford much more evidence about the watery interior of Earth.

Hyprethermal Solution is the *Only* Solution

Just as every fingerprint is different, so to, is every mineral specimen. No two are the same. However, all crystalline minerals require the watery environment of the hypretherm to grow. Some technologists and mineralogists have long recognized this, but it has had seemingly little effect on the theories of the geosciences.

In the book *Gems Made by Man*, author Kurt Nassau explains "the processes by which quartz is grown by man" and the processes in nature "are essentially the same":

"**Interesting enough**, the processes by which **most quartz crystals grew in nature and the processes by which quartz is grown by man are essentially the same**. Although quite insoluble in water under ordinary conditions, quartz becomes soluble if the temperature is high enough. When water is heated under pressure to well above the boiling point, quartz dissolves in one region and deposits in another. This is called **hydrothermal growth**." Bib 104 p100

Why did the author find this fact "interesting enough"? Perhaps because it is not widely known—or perhaps it is because it just makes good sense. To the modern geologist it does not make sense because *entire mountains of crystalline ore exist* and they cannot conceive of the idea that an Earth-sized hypretherm could have existed. The mountains of ore consist of far more than single mineral crystals; they are a complex assemblages of many minerals and crystals that all grew in a hypretherm. Researchers come near to recognizing this as they identified many minerals as being "hydrothermal":

"Among the more important economic minerals found as **hydrothermal deposits are tin** (**cassiterite**); **tungsten** (**scheelite**); **molybdenite**; **sulfides of iron**, **lead**, **zinc**, **and copper**; **and silver and gold ores**; **as well as quartz**, **mica**, **tourmaline**, **and topaz**." Note 7.4aa

How did ore deposits form in the crust and on the surface of the Earth? The *only* solution is in a Hyprethermal Solution. A sci-bi commonly cited throughout modern science is that shallow seas contributed to the ore deposits, but quite the opposite is true. For a hypretherm requires *deep* oceans and *hot* water at depth. Only then are all the necessary components of heat, pressure and water brought together to set the stage for crystallization. Even today, some mineral production is occurring at hot spots deep in the ocean.

What about the metals and minerals that form the ore and ore-bearing rock, from where did they come? They did not come from the basement granite and basalt rocks. There is a general idea among geologists that ore is the result of magma convection but there is no *observational* data supporting the theory of convecting magma. Magma has never been observed and seismic studies actually disprove the existence of magma plumes. The elusive answer is that ores owe their origins to—organics.

Role of Organics Not Understood by Geoscience

With technological advances and as "more and more new findings" are made, the magma and rock cycle crisis will continue to escalate. As each new problem arises, the "geological thinking" must be twisted further and further until it eventually breaks:

"**More and more new findings** and applications in this field [hydrothermal technology] are not only contributing to the scientific knowledge of the hydrothermal technique, but are **also posing new problems**. The role of organics in hydrothermal systems for example, has to be studied more seriously, which would **definitely twist the geological thinking to a greater extent**." Bib 156 p42

This statement was made by scholars in the field of hydrothermal technology because they have seen firsthand what impact new technologies have had on the geosciences. Many new problems are identified because of observations in hyprether-