

# Science Essay

Oh, boy, do I have a special call for you this morning—and this is the transcript. Today's topic has international commercial significance. My challenges are to (a) to make it understandable, (b) make it interesting and (c) tie it to our Vollara business theme.

The inspiration for this message comes from a medium length article in Discover magazine—the July/August 2011 issue. I don't know how many millions of readers have access to Discover by library, subscription or maybe a corporate or institutional waiting room. It's not a magazine I'd expect to see in a dental office or salon or on an airline. And even if you get your hands on a July/August 2011 issue, chances are you'll scan this article or skip it entirely because on the surface it may seem unimportant.

That assessment would be wrong. The article is about a group of elements called the rare earth metals, elements with names that are hard to pronounce. We now use these materials on a regular basis and some are now more valuable than silver. The negative part is that their refinement is 97% in the hands of China, which is one of the reasons I want to do today's presentation.

I did some background research because some of our listeners have never heard of these elements. Maybe half of you

noticed these strange words (in high school) on the Periodic Table, which is a scientifically important graphical chart—created in 1869 by the Russian chemist Dmitri Mendeleev—that shows the atomic relationships of the 91 regularly occurring elements and 19 transitory elements that man has synthesized.

One tie-in to Vollara is the fact that many common nutrients are minerals that of course are listed on the Periodic Table. On the left side of the chart we see Mg, magnesium; K, potassium; and Ca, calcium. In the middle we see Mn, manganese; Fe, iron; and Zn, zinc. And on the right we see P, phosphorous; Se, selenium, and I, iodine.

We also see two common and familiar elements: Na, sodium, on the left and Cl, chlorine, on the right. The Periodic Table's value is that it allows us to predict the properties of these building blocks of our universe.

Speaking of the universe...here is an off-topic factoid that may make this article a little more memorable. Astronomers can identify the presence of these same elements in distant stars and galaxies. In the last couple of years we have even been able to identify elements in the atmospheres of distant planets. If we ever find a planet that has a high concentration of atmospheric oxygen we will

definitely have found alien life...because the only way oxygen could be plentiful in a planet's atmosphere would be if there were something akin to bacteria or plants to create it.

Now back to our topic.

It's not a surprise to a chemist that sodium from the left side of the Periodic Table would combine electrically with chlorine from the right side to form salt. These elements earn their positions on the Table based on how many positively charged protons each element contains in its nucleus. That proton count—known as atomic number—also determines how many electrons can be in orbit around each nucleus...and it's those electron patterns that determine how each element can bond with other elements.

The Discover article does not go into the Periodic Table. That was background stuff. The article focuses on several metals from a family of elements called the "rare earths." The importance of these elements is that we now use them extensively in the—yep, you guessed it—in the computer industry. If they had nice easy names like iron, oxygen or lead we would know these names by heart. As it turns out, their odd names are part of the story.

There is a small town in Sweden named Ytterby, that's Y-T-T-E-R-B-Y. The first ore containing rare earth elements was collected

there and that's how we got the name ytterbium. That makes sense but it's hard to remember.

Are you wondering if calcium was discovered in California? You probably aren't. But I'll tell you that calcium is derived from the Latin word for lime, which forms in the oceans from sea-shells (trillions of microscopic shells; not just clams and coral). Shells from dead animals settle for millions of years and eventually become limestone. Calcium-based limestone is in cement and plaster of Paris and the body uses it to manufacture bones and teeth. In our nutrition line it is found in **Re:Build, Re:Fuel** and **Re:Claim**. We get dietary calcium from citrus fruits, green, leafy veggies, sardines and salmon (since we eat the bones) and from milk products. Now can you visualize why cheeses hold their form so well, as if they are made of glue? How's that for inter-mixing some nutrition training in this story about rare earth metals???

Okay, this guy in Ytterby sends some ore to a chemist in Finland and it takes 7 years to finally identify it. This was in the late 1700s, back when the Founding Fathers of our country were arguing about what wording should be in the US Constitution.

By the time George Washington was president this chemist had come up with 7 elements and based on the name Ytterby he began with ytterbium; then he dropped a syllable and named the second one erbium; then he added a T and gave us terbium;

then from the city Stockholm he gave us holmium; then came scandium from Scandinavia and thulium from the Latin word for Scandinavia. This is more than you need to know, but if you are a little nerdy you may mention this knowledge to someone and bore them to gastro-intestinal regularity (thereby helping them achieve uncompromising health). Or you can give them a printout of these notes.

These "rare earth" elements are not actually rare. Cerium is more abundant than copper and all but one are more abundant than silver. The twist to this story is that these elements occur in hard rocks, such as granite. Nothing so simple as limestone. Therefore, they are difficult to extract and China has most of the world's processing capacity. If you are connected to a big company, maybe you can react to this essay by convincing some powerful person to begin investing in more processing capacity for the US. At \$40 per ounce, some of these rare earths are worth more than silver.

These metals are valuable because of their property of fluorescence. They can absorb visible light or UV light and re-emit the energy as a colored glow. So they are used in TV and computer screens and in fluorescent bulbs. The modern world has an insatiable appetite for these products; therefore, the future of rare earth metal applications seems unlimited.

Rare earths are also valued for their strong magnetic properties. They are used in hard drives, microphones and headphones, cordless power tools, arc lamps in the movie industry, UV scanners and UV-blocking sunglasses. The article's author puts it this way, "The iPod takes a triple sip of rare earths: to store digital music, to replay it in ear buds and to display what is playing on a digital screen."

If you are an investor, look up a company called Molycorp Minerals and another known as US Rare Earths. Those are the only companies mentioned in this article.

The use of rare earth minerals goes on and on. The article says that 700 pounds of neodymium are used in building a 2.5 megawatt wind turbine. High speed maglev trains use vast amounts of these minerals in the magnets that levitate the trains a fraction of a micron above the track.

If this bored you, you probably left the call and I will never know how disappointed you were that we didn't say more about nutrition and Vollara.

For now let's refer back to the Periodic Table and add a comment about **LivingWater**. One group of elements—in fact it's called Group 1 in official scientific terms—is known as the alkali metals. This group includes lithium, sodium, potassium and 3 others that are not so well known. Similar properties are

Periodic Table of the Elements																	
1																	2
3	4															10	
11	12															18	
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
87	88	89	104	105	106	107	108	109	110								
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>hydrogen</p> <p>alkali metals</p> <p>alkali earth metals</p> <p>transition metals</p> </div> <div style="width: 40%;"> <p>pair metals</p> <p>nonmetals</p> <p>noble gases</p> <p>rare earth metals</p> </div> </div>																	
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>Li Be</p> <p>Na Mg</p> <p>K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr</p> <p>Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe</p> <p>Cs Ba La Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn</p> <p>Fr Ra Ac Unq Unp Unh Uns Uno Une Unn</p> </div> <div style="width: 40%;"> <p>He</p> <p>Ne</p> <p>Ar</p> <p>Kr</p> <p>Xe</p> <p>Rn</p> </div> </div> <p style="text-align: right;">Yb = ytterbium, 70</p>																	
<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu</p> <p>Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr</p> </div> <div style="width: 40%;"> <p>89</p> <p>90</p> <p>91</p> <p>92</p> <p>93</p> <p>94</p> <p>95</p> <p>96</p> <p>97</p> <p>98</p> <p>99</p> <p>100</p> <p>101</p> <p>102</p> <p>103</p> </div> </div>																	

exhibited by the Group 2 elements magnesium and calcium. The electrolysis engine in your **LivingWater** machine will use the electromagnetic properties of these Group 1 and Group 2 elements to make the alkaline flow that we drink.

My home's well water contains a lot of sulfur—which is on the right side of the Periodic Table and is not desirable for drinking. We have to change our filters more frequently than most homeowners would. I've been changing both filters about every 3 months but this time I'm going to change only the carbon filter, that's Filter # 1, to see if that does the trick.

Most of us are not required to learn intricate details about how things work. We buy phones, refrigerators, TV sets, computers, toilets, antacids, etc., while knowing very little about how they are made. The point of today's message is to expand your awareness of how science fits into our world. An awareness of science helps us make better decisions. No need to buy into every quack idea that flows to our homes via the Internet or even through mainstream

—that may not be true either.

We'll close with some danger statistics that also were covered in the same issue of Discover:

In America there's about a 30% chance that when we die, the cause will be heart disease or cancer. There's a 3% chance that we will die from a stroke. Next come respiratory diseases, miscellaneous accidents—many of which are in motor vehicles—and then diabetes and kidney disease. Suicide is surprisingly high, about 1% according to the statistics. It's the 10th or 11th leading cause of death in the US, competing for that distinction with Alzheimer's.

On the other end of the range, the chance that you will be killed by a shark is 1 in 4 million.

The chance you will be killed by a bee or wasp is 1 in 72,000.

By a dog: 1 in 120,000.

By a flood: 1 in 176,000.

By a hurricane or tornado: 1 in 46,000.

By murder or a firearm accident: 1 in 300.

The firearm number is scary, but I don't worry too much about dogs, sharks or insects.

sources. When something seems too good to be true, it probably isn't. Likewise, if something seems totally scary—as if it may put your life at great risk

Death by hitting a deer on the highway should be a bigger concern.

We ought to be worried about our diets, our exercise, the air we breathe and our use of water and supplements (areas where Vollara can help).

Indoor air pollution is complicit in more than a hundred thousand deaths each year.

Why are people scared to death about the 1 in 7,000 chance of dying in a plane crash and they are not scared at all about the 1 in 6 odds of dying from fried chicken (today's metaphor for death by heart disease)?

I don't know if you are looking at Vollara as a career, as a way of buying products at wholesale or just as an experiment. Whatever your reason, the products we offer can make a big difference.

Vollara can improve your odds of living longer and better. By sharing this program with others, you can help their odds, too.

This essay will be posted on Chippynews.com near the essay on Taking Stock of Your Health.

Bob Giddens



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