Analysis of carbon-14 and radium-226 isotopes

An isotope is a form of a chemical element that contains the same number of protons but different amount of neutrons, which are located in the nucleus telling us that their atomic number and their chemical properties stays the same, but it affects their relative atomic mass. The isotope have been classified into two the stable isotopes and the radioactive isotopes the stable isotopes are isotopes which have a counterweight between the identification number of protons and neutrons in the nucleus and unlike the radioactive isotope these types of isotope do not disintegrate. This equalizer in the stable isotopes is brought by the number of neutrons present in the atom. If an atom tends to have way too many neutrons or too less neutrons it becomes unstable and starts to decay. Unlike the radioactive isotopes the stable isotopes don’t decay therefore these types of isotopes do not emit radiation or have any health danger to human beings when exposed to them. Scientists that are involved in experiments regarding the environment and ecology use stable isotopes like carbon, oxygen, nitrogen, hydrogen, and sulfur. In geochemistry scientists try to identify and study the relative number of the chemical elements that make up the geological materials for example ancient minerals and rocks. Stable isotopes are tools used by scientists to determine facts about geological materials like how old they are and where they have originated from.

Coming to radioactive isotopes these are isotopes, which have an unstable balance of protons and neutron in the nucleus. These types of isotopes decay and emit radiation which, include alpha, beta, and gamma rays. Scientists have split the radioactive isotopes into the long lived, cosmogenic, anthropogenic and radiogenic. Radioactive isotopes that have been ever

since the solar system was created are known and come under the long lived isotopes. When a reaction occurs between the atmosphere and the cosmo rays produced by the stars they create isotopes known as cosmogenic isotopes. Isotopes which are created or come from human made which involve nuclear activities like weapon testing and the production of nuclear fuel are known as anthropogenic isotopes. Last but not least the isotopes that are left behind as an end result of decay are called radiogenic isotopes . Radioactive isotopes are useful in majority of professional fields like agriculture, food industry, pest control, archeology and medicine . In the field of medicine gamma rays which are emitted by radioactive elements are used to identify tumors in the human body and also gamma rays are used in food irradiation which is used to kill bacteria present in the food we eat to make it safer for us . I will be going in more detail about carbon- 14 and radon- 226.

Carbon- 14 is classified under cosmogenic isotopes as it has been obtained by a reaction between the atmosphere and the cosmo rays emitted by the stars. Radium- 226 is classified under the long lived isotopes as it has been ever since the solar system was created. Carbon 14 contains 6 protons and 8 neutrons as you can see above in the picture unlike the original carbon that we find in the periodic table which has 6 protons and 6 neutrons. The difference in the number of protons and neutrons makes carbon 14 a radioisotope with a half life of 5730 years and it emits beta particles. Carbon 14 is also known as radiocarbon. Half life is basically the amount of time an element takes to undergo a specific process in which half of the atom decays. This tells us that carbon 14 disintegrates by half after 5700 years. Carbon 14 which is generally found in nature is generated by the cosmic rays

which are emitted by the stars hit the atmosphere and the speed at which the regeneration takes place of carbon 14 has been unchanged for centuries. This feature is held responsible by the flux of particles which strike the earth’s atmosphere and also the strength of the magnetic field which has the ability to divert these rays. The magnetic field and the particle flux have changed over time and therefore this affects the amount of carbon 14 formed on the earth. When a living organism dies, the radioactive carbon present in it is no longer being absorbed and the carbon 14 present in that living organism starts to decrease. The amount of carbon 14 left in the living organism which was once alive can be used to figure out its age. The measure of carbon 14 in the atmosphere increased after the nuclear bombs explosion in 1950.

Carbon 14 is formed by nuclear reactions that take place in the top part of the atmosphere which is started by the neutrons in the cosmic rays. Once put together the carbon 14 mixes up with oxygen to form 14CO2. Which then goes through the carbon cycle which regulates the carbon 14 throughout the atmosphere, oceans and organisms. Plants take in the CO2 to absorb it and the carbon 14 is blended into the living tissues contained by the plant. When the plant is dead the carbon 14 present in the tissues will no longer be taken. The carbon atom continues to decay with the activity decreasing over time. In medicine carbon 14 is used for a breath test to identify if the human being contain a bacteria called helicobacter pylori which causes ulcers. This breath test identifies if you have helicobacter pylori in your stomach and this can cause some serious stomach problems such as ulcers. Ulcers happen when the thick layer of mucus that protects your stomach from the juices reduces

causing the acids to eat the tissues that line the stomach. The carbon 14 breath test is considered to be one of a kind pharmaceutical test. At the beginning of the test you will have to drink a small amount of radiopharmaceutical and also you have to give give breath samples.

A radiopharmaceutical is a special type of medicine that has to ability to radiate energy. For a successful result you are not supposed to eat for drink anything 6 hours before the test or else results can be shown negative which will make you have to do the test again. You are suppose to bring your own toothbrush and the toothpaste is optional. When you will arrive to there to begin the test you will first be asked to brush your teeth very well with the toothpaste. When you are done the doctor or nurse will give you a small amount of carbon 14 to drink. You will then have to give a breath sample 12 minutes after drinking the radioactive carbon 14. After the test is done at the end you will need to throw away your toothbrush as it may have some carbon 14 on it. Luckily there are no side effects for this test that has or has been found or come to notice by doctors. Carbon 14 has impacted the world of medicine in a huge way by helping us get rid of bacteria called helicobacter pylori which causes stomach problems like ulcers where your own body juices start reducing and the acids start feeding on your tissues that line the stomach. This can have a serious effect on our body if not treated in the right time, due to carbon 14 we can finally identify if a person has this problem and we can treat him as soon as possible so the effects do not get worse. People now have the ability to cure themselves before this problem becomes serious which can lead to nausea, problems in the abdominals, too much weight loss, fever, lack of appetite, and it can even

lead to stomach cancer as it is associated with helicobacter pylori infection. so now people can cure themselves as soon as possible by the help of carbon 14 which helps doctor identify if one of their patients have this type of problem. This impacts the society in a way now that people don’t have to worry about dying from stomach cancer if they feel problems in their stomach they can consult their doctors which can help them identify by the help of carbon 14 if they have helicobacter pylori and if they do the doctors can cure them in order to prevent stomach cancer or other causes of this bacteria.

Carbon 14 has also impacted the world for crime investigators, archaeologists, and geologists by method known as radiocarbon dating. Geologists can identify the age of various old objects like ancient rocks and minerals. We can also use it to identify the death time of a dead body. If someone finds a body which has decayed by the help of carbon 14 in the living organism we can tell how old the body is this ability can be very useful for crime investigators who are trying to solve a murder case as it can tell as to how long the body has stayed in that form. Archaeologists have the ability to tell people how old the cultural or fascinating object are that they find buried deep down earth, in waters, or abandoned caves. These following things done by the isotope of carbon can be also be considered as the advantages of carbon 14. Carbon 14 doesn’t really have any negative properties or effects but it does have some limitations that does affect the results we get. Carbon 14 limitation comes under carbon dating as it does have the ability to predict the age of many old objects but it can only go upto 62, 000 years meaning that dinosaur bones that we have kept in museums

we won’t be able to identify their ages as to how old they are or if we find a mummy we most probably won’t be able to tell the age of it. The people who investigate dead or disintegrated bodies carbon 14 cant tell us when the body started disintegrating or when that person was dead. If we have to trace a body which goes back to 60, 000 years then the results we get can be 5 to 10 years off or if we have to investigate a body that was dead 6 hours we can be off by 3 to 5 minutes. Each step in this is crucial and any step done wrong the whole results can be incorrect and you would have to start all over again.

The element radium was found by the Curie family in which the people who were responsible for discovering radium are Marie Curie a polish chemist and her husband Pierre Curie a french chemist in 1898. They obtained the element radium from a mineral called pitchblende that contains of uranium after noticing that the not processed pitchblende was more radioactive than uranium when separated. Marie started arguing that the mineral must contain a radioactive element except for uranium. Marie needed to process many pitchblende in order to obtain radium and polonium. Radium 226 is considered to be the most stable isotope amongst the other isotopes of radium but it doesn’t come under stable isotopes as all isotopes of radium are radioactive. Radium 226 has a half of 1600 years. When radium 226 disintegrates it gives us two elements radium 222 and helium 4 as you can see in the above picture and it can also disintegrate into lead 212 by letting a carbon 14 in the nucleus. The curie family has a unit named after their surname which is used to describe the condition of radioactive substances based on the element radium 226. The element radium itself is used to

produce radon a radioactive gas which is responsible for curing some types of cancer. The long lived radioactive radium 226 is found in nature as a product of its repeated formation from uranium 238 decay.

The element radium is said to occur in all uranium ores but is more spread out because of its ability to form compounds that can dissolve in water. The earth’s surface itself contains the element radium in it. In comparison to the other radioactive isotopes of radium, radium 226 has the longest half life. To create a self luminescent paint for watch, clock, and instrument dials radium salt is mixed with a paste of zinc sulfide the alpha radiation gives zinc sulfide the ability glow. From 1913 to 1970 million of radium dials were created by a mixture of zinc sulfide and radium 226. By the 1930 it was found that exposure to radium causes serious health problems to the human body. Women who were working with luminescent paint containing radium suddenly died. They had huge amounts of radium through a technique which was need to use their lip and tongue in order to shape paint brushes to achieve a fine tip by a method called lip pointing. Like calcium and strontium radium also focuses on the bone where the elements alpha particles indulged with the red corpuscles production causing the women to develop anemia and bone cancer. The use of radium 226 in luminescent coating was banned after recognizing its high toxicity. Radium 226 was once used as an additive product to toothpaste, hair creams, and even food items due to its ability to cure diseases. Such products were stopped from using and even got banned in some countries after knowing that it can cause some serious adverse effects on the human health. There are spas in the world that feature radium rich water and are occasionally commented to be beneficial

such as the ones in japan. In the us during the late 1940 and the early 1970 nasal radium irradiation was suggested for kids to prevent them from getting middle ear problems and also to prevent the enlargement of tonsils. Radium 226 itself was used to convert into radon gas which in turn was used to treat cancer. However it was banned as you could gain some harmful effects like anemia, cancer, and genetic mutation. Cobalt 60 which is much more safer than radium 226 is now being used today in this application as it is also much cheaper and does not have effects on the human health.

In medicine Radium 226 had impacted the world in the old time with its ability to cure cancer that way people in society who had cancer could get treated until they studied its effect on the human body and how it can cause some serious health problems. Therefore countries had to take action for the safety of their people and banned the use of this isotope of radium and have started the use of cobalt 60 but if we didn’t have radium 226 in the old time many people would be dying from cancer if a person knew they had the slightest chance of getting cured by radium 226 they would take it cause that was there only chance and only hope at that time to get rid of cancer. It also had a huge impact on the commercial side as many of the products we used like hair cream, toothpaste, and even some foods so people were to keep their teeth clean preventing themselves from getting infection in their gums or getting cavities and we would also get to eat certain food we love due to this isotope and even hunger in the world might have been reduced due to the introduction of the food that came from radium 226. We used all of these products which were made from radium 226 until they banned the use of the isotope of radium.

Well I think radium 226 has a mixture of both advantages and disadvantages as for advantages radium 226 was used to treat cancer in humans but ever since people got to know how dangerous it is they started using cobalt 60 but still in the old times i guess this was a better way then turning you attention to chemotograph which is were you try to treat cancer with eating medicine and this wasn’t taken much effective at those times therefore radium 226 was your best fit of choice when it came to treating cancer. It was even used to make objects like toothpaste, hair product, and even some food but these were all banned after knowing about how exposure to this isotope can cause some serious health problems. I would take these as some useful advantages that we received from radium 226 coming to disadvantages of radium 266. Radium 266 has some serious disadvantages as it very difficult to store this isotope of radium as it emits radiation it is hard to store in houses and its second disadvantage is caused by the first if we store radium 226 it can cause some serious effects on the human body like anemia and cancer which no one really wants to get.