DOWNLOAD PDF PHYSICS FORM 5 RADIOACTIVITY

Chapter 1 : Half-life | SPM Physics Form 4/Form 5 Revision Notes

SPM Form 5 Physics Chapter 5 - Radioactivity Radioactivity. The Composition of the Nucleus; Radioactivity; 3 Types of Radioactive Emission.

There are three common types of emissions: Beta particle, and iii. In an alpha decay, the nucleus emits an alpha particle. In beta decay, the nucleus emits a beta particle. In gamma decay, the nucleus emits gamma rays. The nature of radioactivity was discovered by husband and wife scientists, Marie Curie and Pierre Curie The tracks are thick because of their high ionizing ability. Straight tracks are due to their large mass, making alpha particle difficult to deflect high inertial. The thin twisted tracks are due to the weak ionizing ability of the beta particle. Twisted tracks are due to their small mass, making beta particles easier to deflect. This is due to the extremely weak ionizing ability of gamma rays. Spark counter When a radioactive source which produces alpha particles is brought near, the air between the gauze and the wire is ionized by it. Radioactive Emissions A Structure and Charge 1. Alpha particle an alpha particle is the nucleus of helium atom and made up of two protons and two neutrons. Beta particle A beta particle is a fast moving electron and has a negative charge Alpha and beta particles have opposite charges, thus they are deflected in opposite directions. Gamma ray is neutral , thus it is not deflected by the magnetic field. B Ionising Power and Penetrating Power Alpha particle have a relatively high ionising power and hence a relatively low penetrating power. Particles that ionise other atoms strongly have a low penetrating power because they lose energy each time they ioning an atom. Spontaneous radioactive emissions are not affected by external conditions like temperature and pressure. An unstable nucleus emits radiation in the form of alpha particles, beta particles or gamma rays. During radiactive decay, the parent nuclide is transformed into a more stable nucleus known as thedaughter nuclide. The time taken for an unstable radioactive nuclide to decay to half its original number is called the half-life. The half-life of the same radioactive element or nuclide is the same. Different nuclides have different decay rates, thus different nuclides have different half-life. What is atomic mass unit a. A nuclear fission is a nuclear reaction in which a heavy nucleus splits into split into two or more lighter nuclei which the release of energy. A chain reaction is a process in which at least one neutron produced in a fission induces a second fission. A neutron produced in the second fission induces a third fission, and the process is Nuclear fusion is the reaction nuclei of two light nuclides are fused together to form a single heavies nucleus with the release of energy. Advantages of using nuclear fusion as a power source are; i Hydrogen isotopes used as fuel are cheap and easily available. Two suitable conditions in the sun that allows nuclear fusion to take place are:

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Chapter 2 : EduMission: Physics Form 5: Chapter 5 - Radioactive Decay

Physics Form 5 Samura Physics Panel CHAPTER 5: RADIOACTIVITY Analysing Radioactive Decay Radioactivity 1. Radioactivity is the spontaneous disintegration of an unstable nucleus into a more stable nucleus accompanied by the emission of energetic particles (radioactive rays) or photons.

Atomic Model has aâ€¦â€¦ A proton has a â€¦â€¦ A nuclide is an atom of a particle structure A Z X 1 2. Radioactive2 An atom of an element is represented by its symbol as above. A is for â€¦â€¦ Z is for â€¦â€¦ Carbon â€" 12, each nucleus contains 6 protons and 6 neutrons. Write the symbol for this nuclideâ€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦ What it meant by the isotopes? Isotopes are atoms of the same element with the same number of protons but different number ofâ€¦ â€¦neutronâ€¦ â€¦â€¦â€¦â€¦2. A nucleus contains protons and neutrons. Which of these particles experiences an electrostatic force? Gold Au has 79 protons and neutrons. Write the symbol for this nuclide â€¦ 3. An isotope of nitrogen can be represented by 15 N. How many of the following particles 7 does it have? An atom of element Y has a proton number 5 and a nucleon number Identify the element â€¦â€¦â€¦boronâ€¦â€¦â€¦Bâ€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦â€¦. What is meant by the radioactivity? The process is said to be spontaneous because â€¦ RadioactiveIt â€¦ is not influenced by any physical factors such as temperature, pressureetcâ€¦â€¦â€¦â€¦3. The emission of radioactive rays is random means that: When a radioactive nucleus decays, its nucleus breaks up, emits an alpha particle or betaparticle and energy, and form a new atoms of a different element The table shows the results of his measurements. Direction of the bend Direction of the bend indicates that it is indicates that it is positively charges positively chargedIonising Strongest Intermediate WeakestpowerPenetrating Low Intermediate HightpowerStopped by A thin sheet of paper A few millimeters of A few centimeters of aluminium lead or concreteRange in air A few centimetres A few metres A few hundred metres 5 6. Uranium 92 U emits an alpha particle and disintegrates into a thorium atom. State the nucleon number and proton number of the thorium isotope formed. Strontium 90 Sr decays to yttrium Photographic Films Cannot penetrare through the metal2. Alpha and beta Gold Leaf Electroscopes Strong ionising power 9 Alpha, beta and gamma Cloud Chambers Tracks of alpha thicks and straight. Beta â€" thin and twist Gamma â€" thinner than beta. Alpha, beta and gamma Geiger â€" Muller Tube G. M Alpha is positive charge, Tube unlike charge are attracted in a strong electric field between the two electrodes. Minimum intensity of a radiation. A radioactive of gamma rays has a half â€" life of 4 days. A Geiger counter placed 3 m fromthe source initially has a count â€" rate of per minute. After 8 days, the counter is movedback to a distance of 6 m from the source and its rate , in counts per minute is then. The number of radioactive nuclides in two different samples P and Q are initially 4 N and Nrespectively. If the half â€" life of P is t and that of Q is 3 t, the number of radioactive nuclides in Pwill be the same as the number of radioactive nuclides in Q after a time of â€¦ 3t3. A counter is placed near a very weak radioactive source which has a half â€" life of 2 hours. Radioisotopes are isotopes with radioactive properties. Radioisotope source Use in MechanismAmericium Smoke detector Alpha particle emitted from the source ionise air molecules. The ionized air molecules conduct electricity and a small current flow to the detector. Smoke absorb alpha particles, the current flow decrease and 12 Radioactive trigger the alarm. Beta - ray Thickness control A radioisotope sends radiation through the sheet material as it comes off the production line. A radiation detector on the other side of the sheet measures the intensity of the radiation passing through the sheet. The detector inform the machinery to adjust the thickness of the sheet automatically. A factory produces aluminium sheets of thickness 1 mm each. The thickness of the sheets ismonitored by a gauge. Radioactive b The count rate recorder should be around 90 count per second when the thickness of the aluminium sheets is 1 mm. On a certain day when the gauge is operating properly, the following data are recorded: In Medical field radioisotopes are use in a Sterilising b Radioactive tracer c Cancer treatmentExercise It is used inhospitals to test the kidneys of patients. During the test, an iodine â€” solution is injected intothe bloodstream of a patient. As the blood passes through the kidney , iodine will byabsorbed by the kidney and eventually excreted out of te body with the urine. If the kidney is notfunctioning properly, both the absorption and excretion rates of iodine will decrease. It is a constantvalue for the specific radioactive source ii For safety purpose, the activity of iodine â€” solution in the test should not 8 exceed 1. When an iodine solution is 8 prepared its activity is 6 x 10 disintegrations per second. How many days preparation would the solution be suitable for the test? Which if these two sources do you think is more preferable for use in the kidney test? Explain your answer Technetium â€” 99 m is preferable. It has a much shorter half- life and is relatively convenient to prepare, better in sense of less total radiation absorption 15 In Archaelogy and in the field of agriculturea Radioactive datingb Controlling pest The mass of an atom, nucleus and proton are measured in atomic mass unit a. Nuclear fission is triggered by other particles. For instance, when uranium â€” is bombedwithâ€¦slow neutron, the nucleus of uranium â€” may split into two piecesâ€¦â€¦.. In a nuclear reaction U- is bombarded by a neutron giving Cs â€” , Rb â€” 93 and 2neutrons and energy is released. From table below , determine the energy released when one Uâ€” atom undergoes such a nuclear reaction. Radioactive element Atomic mass unit, u U- Nuclear fusion is â€¦â€¦the combination of small atoms into a larger atom and with the releaseof heat. Hydrogen nuclei fuse together in the Sun. The nucleus of one isotope of hydrogen contains 1one proton and has the nuclide notation 1 H. Other isotopes of hydrogen have the nuclide 2 3notations 1 H and 1 H. Radioactive b Nuclei may fuse when they come together. Sun has very high temperature to give high kinetic energy A chain reaction is â€¦a self â€” sustaining reaction in which the products of a reaction caninitiate another similarreactionâ€¦â€¦â€¦â€¦â€¦. In a chain reaction uranium bombarbed by a neutron. The three neutron will bombard another three uranium atoms. The most common type of nuclear reactor in a nuclear plant is called the pressurized waterreactor PWR. Uranium is used as nuclear fuel. A lot of heat will be produced4. Nuclear fission can be controlled by moderators graphite5. Nuclear reaction can be controlled by the Boron and Cadmium as control rod, to absorb secondary neutron6. Carbon dioxide or water is used as a cooling agent , remove the heat of reaction to make steam for turbine generator7. The lead and concrete keep the radiation inside the reactor 19 Uranium â€” is used as â€¦ nuclear fuel. In the nuclear fission a lot of â€¦â€¦heatâ€¦.. The energy released from nuclear fission can be used to generate â€¦electricity Radioactive wastes are considered dangerous waste2. The negative effects of radioactive waste depend on.. Radioactive waste must be kept in a special thick barrel made of lead or concrete5. The barrel containing the radioactive waste then buried in unused mines or non residentialareas. Lead is used to block radioactive rays2. Use distance controller or tongs to move radioactive materials3. The uniform worn by workers in a nuclear plant must be kept in special bags4. Worker in radioactive energy station must wear badges to which the worker have beenexposed to radioactive rays can be determined. Nuclear reactor should be build on islands or areas far away from residents 20

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Chapter 3 : SPM Physics Notes & Exercise/Nota Fizik SPM

1. JPN Pahang Physics Module Form 5 Student's Copy Chapter Radioactive CHAPTER RADIOACTIVE Atomic Structure Atomic Model Electron Nucleus Proton number Nucleon number Isotopes 1 THE NUCLEUS OF AN ATOM The composition of the nucleus 1.

With radioactivity making news headlines, we look at what it is and what the risks are. It comes in three main types â€" named alpha, beta and gamma for the first three letters of the Greek alphabet. Alpha decay An alpha particle is identical to a helium nucleus, being made up of two protons and two neutrons bound together. It initially escapes from the nucleus of its parent atom, invariably one of the heaviest elements, by quantum mechanical processes and is repelled further from it by electromagnetism, as both the alpha particle and the nucleus are positively charged. The process changes the original atom from which the alpha particle is emitted into a different element. Its mass number decreases by four and its atomic number by two. For example, uranium will decay to thorium Sometimes one of these daughter nuclides will also be radioactive, usually decaying further by one of the other processes described below. Beta decay Beta decay itself comes in two kinds: Gamma decay After a nucleus undergoes alpha or beta decay, it is often left in an excited state with excess energy. Just as an electron can move to a lower energy state by emitting a photon somewhere in the ultraviolet to infrared range, an atomic nucleus loses energy by emitting a gamma ray. Gamma radiation is the most penetrating of the three, and will travel through several centimetres of lead. Beta particles will be absorbed by a few millimetres of aluminium, while alpha particles will be stopped in their tracks be a few centimetres of air, or a sheet of paper â€" although this type of radiation does the most damage to materials it hits. Half-lives and probability Radioactive decay is determined by quantum mechanics â€" which is inherently probabilistic. The half-life of a radioactive isotope is the time after which, on average, half of the original material will have decayed. After two half-lives, half of that will have decayed again and a quarter of the original material will remain, and so on. Uranium and plutonium are only weakly radioactive but have very long half-lives â€" in the case of uranium, around four billion years, roughly the same as the current age of the Earth, or the estimated remaining lifetime of the Sun. So half of the uranium around now will still be here when the Sun dies. Other radioisotopes of iodine are even shorter-lived. Caesium, however, sticks around for longer. It has a half-life of around 30 years, and, because of this and because it decays via the more hazardous beta process, is thought to be the greatest health risk if leaked into the environment. In the background There is a natural level of radiation all around us, which comes from several sources. Some gamma radiation comes from space as cosmic rays. Other radiation comes from sources in the atmosphere, such as radon gas and some of its decay products. There are also natural radioactive materials in the ground â€" and as well as the obvious elements such as uranium there are also radioactive isotopes of common substances such as potassium and carbon. To understand how much background radiation is around, it helps to distinguish between effects on normal matter and on the human body. The amount of radiation absorbed by non-biological matter is measured in grays, a unit equivalent to a joule of energy per kilogram of mass. For biological tissue, a dose equivalent is measured in sieverts Sv depending on the type of radiation involved and how much damage that radiation does to the particular cells affected. The average amount of radiation received from background sources in the UK is around 2â€"2. In some parts of the world, such as northern Iran, the background radiation is as high as 50 mSv per year. There are a variety of other natural and routine artificial causes of low doses of radiation. A dental x-ray will give you a dose of under 1 mSv; a full-body CT scan, 10 mSv. As fewer cosmic rays are stopped by the atmosphere the higher you go, the crew of a passenger jet flying between the US and Japan once a week for a year would receive an additional a dose of around 9 mSv. Under normal conditions, the dose limit for workers in the nuclear industry is 50 mSv per year. The effects on human health There are two main health effects caused by radiation, which act over the short- and long-term and also at shorter and greater distances. Radiation causes health problems by killing cells in the body, and the amount and type of damage done depends on the dose of radiation received and the time over which the dose is spread out. Between that upper limit and 1 Sv received within a single day, exposure is likely to cause some symptoms of radiation poisoning, such as nausea and damage to organs including bone marrow and the lymph nodes. Larger doses will, in addition to those symptoms above, cause haemorrhaging, sterility and skin to peel off; an untreated dose of more than 3. The radiation level decreases with the square of the distance from its source, so someone twice as far away from an external source will receive a quarter of the radiation. Receiving a high dose in a shorter time usually causes more acute damage, as greater doses kill more cells, while the body can have had time to repair some damage with more time having elapsed between doses. However radioactive material that is spread to a wider area can cause longer-term health effects via prolonged exposure, particularly if they enter the food chain or are inhaled or ingested directly. Taking radioactive materials into the body also presents the greatest danger from atoms that undergo alpha-decay, as alpha particles are not very penetrative and are easily absorbed by a few centimetres of air. It was alpha-emitting polonium that was used to murder Alexander Litvinenko in Radioactive isotopes of iodine, which undergo beta-decay, can build up in the thyroid gland and can cause thyroid cancer. Attempts to prevent this involve distributing pills that include nonradioactive iodine and which flood the thyroid, preventing uptake of radioactive iodine. However there is disagreement over whether very small doses comparable to the level of background radiation actually contribute to health effects.

Chapter 4 : SPM PHYSICS FORM 5 radioactivity - [PDF Document]

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Chapter 5 : What is radioactivity?| Explore | racedaydvl.com

Radioactivity is the spontaneous emission of alpha particles, beta particles and / or gamma rays by an unstable nucleus to become stable.

Chapter 6 : World of Physics CHAPTER 5 - RADIOACTIVITY

Physics Form 5: Chapter 5 - Radioactive Decay Radioactive decay is the breaking up of unstable nuclei into more stable nuclei with the emission of radioactive rays. There are three main types of radiation.

Chapter 7 : SPM Form 5 Physics Chapter 5 - Radioactivity | SPM Physics Form 4/Form 5 Revision Notes

SPM - Physics- Form 5 Chapter 5: Radioactivity - Expected learning outcomes.

Chapter 8 : SCIENCE STUDIES BLOG: RADIOACTIVITY PHYSICS FORM FOUR STUDY NOTES

Half-life. The half-life (T 1 2) of a quantity subject to exponential decay is the time required for the quantity (mass, number of atom or activity) to decay to half of its initial value.

Chapter 9 : EduMission: Physics Form 5: Chapter 5 - Radioactivity

Radioactivity is the spontaneous process of an unstable nucleus emitting radioactive emission in order to become more stable. This video is created by http:/.