What is isotopes? Give some examples ?

An isotope is an element whose atoms have a common number of protons and electrons (i.e. have the same atomic number, n) but which vary in the number of neutrons in their nucleus. For

Example,hydrogen exists in three isotopic forms,1H1(one proton,no neutron),1H2(deuterium,one proton,one neutron),and 1H3(tritium,one proton, two neutrons). In nature, there are 300 isotopes but only 92 elements. There are hundreds of artificial isotopes. Of greatest significance in radiometric surveying are isotopes of uranium, thorium and potassium.

What is Compton effect explain ??

Compton Effect A photon does not necessarily give all of its energy to an electron; if only part of the energy is given to the electron it leads to the scattering of E.M. waves by the charged particles of the target material. This type of quantum scattering is known as the Compton Effect or Compton Scattering.

In the photoelectric effect, it was assumed that the incident photon was completely stopped and therefore anihilated, so that only conservation of energy was considered. For the Compton effect the impact is examined in the light of an elastic collision so that the conservation of momentum must be considered, If hc/L is the energy and h/L is the momentum of the photon striking a stationary electron, eo' and sufficient energy is transferred to exceed the binding energy, the electron 1s set in motion as a photo-electron (or recoil electron) . From the equations of conservation of energy and momentum we ean predict

(1) that the diverted photon must have a different energy from the incident photon and therefore must have a different frequency.

(2) the angles of scattering of both the scattered photon and the photo-electron; these latter predictions are of little interest to the exploration Geophysicist.

There are complications in this simple picture sinee the electrons are, in. general, neither at rest nor free, but it is usually the electrons in the outer shells, that is those with the lowest binding energies, that carry the brunt of the bombardment.

The important point is that frequency and direction of motion of the scattered photon depends on many things; in one sense the process can be regarded as the instantaneous destruction of one photon of a given energy, and the creation of a new photon of lower energy, the energy difference being imparted to the recoil electron.

What is photo electric effect explain in details ??

Photo Electric Effect Each gamma-ray (photon) has an energy E which depends only on its frequency (v) or wavelength (L) and is given by E = hv = h(c/L) where h is Planck's constant and c is the velocity of light. A single photon can interact only with a single electron in the atom it hits. Since photons have no rest mass and travel with the speed of light their energy is entirely kinetic. If on collision with an electron the photon is completely stopped, it must cease to exist and, since energy must be conserved, all the photon energy is transferred to the electron it hits. If the energy exceeds the binding energy of the electron, the electron is ejected with a kinetic energy (K.E.) equal to the excess of the photon energy over the binding energy. The re fore , for any given y-ray energy (or, from 9.13, frequency), there is a weil defined K.E. for the photo-electron. If the K.E. of the electron is measured, and the original binding energy is known, the energy of the incident y-ray can be found. Fortunately, the converse effect holds. Loses K.E. it When an electron can create a photon; if it can be arranged that this photon has an energy which corresponds to an E.M. frequency in the visible range, a flash of light would be observed (assuming the photon density is great enough for the eye to detect). In practice there are usually not sufficient photons for visual detection and an amplifier with associated electronics can be designed which essentially counts the number of photons. This is the principle of the photomultiplier and Thallium activated Sodium Iodide (NaI[Ti]) crystal detector much used in exploration work.

What is semi-conductor Detectors principles in radiometry ?

A p–n junction has a depletion layer that behaves as an insulator. Any charges created in the depletion layer are readily swept by the potential barrier across the depletion layer. A reverse biased p–n junction has a very small reverse saturation current that strongly depends on temperature. If a radiation passing through the depletion layer of the junction, ionizes the atoms of the depletion layer releasing electron–hole pairs the reverse saturation current will suddenly increase. The current pulse formed by the passage of the radiation through the depletion region may be used to identify the particle and to determine its energy. As such, a p–n junction in principle may be used as a radiation detector.

What are the principles of counters??

Instruments: All the three radiations, viz., alpha,beta and gamma, are capable of ionizing the air or gas through which they pass, and in doing so they render air or gas electrically conducting. Besides this, these radiati-ons are also capable of producing small flashes of light (scintillations) when they impinge on certain crystals.

These are the two effects by which

Radioactive radiations are detected. Based on

These two effects, two types of prospecting Instruments are in use. These are:

i) Geiger-Muller Counter and
ii) Scintillation Counter.