Nuclear Chemist Interview Questions And Answers Guide.

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Nuclear Chemist Job Interview Preparation Guide.

Question # 1

Explain Y rays?

Answer:-

These rays are similar to electromagnetic radiation and possess very short wavelength. The daughter nucleus formed generally exists in the excited state. While returning to the ground state they generally emit its excess energy as Y-ray photon. Here the atomic number and the mass number of the daughter nucleus remains the same as of the parent nucleus.

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Question # 2

What is loss of mass?

Answer:-

In the radioactive decay the mass of the parent nucleus is usually greater than that of the daughter nucleus and hence in radioactive decay loss of mass occurs. According to Einstein's equation the lost mass appears as an energy which is shared between the emitted particle and the daughter nucleus.

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Question # 3

Do you know the laws of Thermodynamics?

Answer:-

* a. Zeroth law: If any two systems are in thermal equilibrium with the third system, then they are also in thermal equilibrium with each other.
* b. First law: First law of thermodynamic states that energy can neither be created nor be destroyed but it can only be converted from one form to another.
* c. Second law: This law states that "all processes in nature tend to occur with an increase in entropy and the direction of change always lead to the increase in entropy."
* d. Third law: This law states that "The entropy of a perfect crystal of each element and a compound is zero at absolute zero."

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Question # 4

What is aufbau Principle?

Answer:-

According to this principle, In the ground state of an atom the electrons are added one by one to the various orbitals in order of their increasing energy starting with the orbitals of lowest energy. The order of increasing energies of various orbitals can be calculated by the (n+1) rule. However if the (n+1) value of two different orbitals are same then the orbitals with lower value of n has lower energy.

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Question # 5

Explain magnetic Quantum Number?

Answer:-

It is denoted by m. This quantum number explains us that when a source producing spectral lines are placed in a magnetic field, then each spectral line splits up into number of lines. This is also known as Zeeman Effect.

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Question # 6

Tell me the formula to calculate pH of a solution?

Answer:-

In order to calculate the pH of a solution you have to use the formula pH= -log [H+] or pH = -log [H3O+]

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Question # 7

Tell me what is the key product created from uranium?

Answer:-

The main useful isotope, and the one that has become controversial for reasons I'm not sure I totally understand, is plutonium.

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Question # 8

Tell me where does most natural radiation come from?

Answer:-

Well, the natural radiation is mainly cosmic rays interacting with the earth's atmosphere, and we get a good bit of radiation on the earth's surface. The closer you are to the cosmos, the more radiation you get. So that if you're up in an airplane, you'll get considerably more than on the Earth's surface. Or people living at 5,000 feet, as I do, will get more than people living at sea level. But it's a part of the human environment just as air is, or anything else. It's most unremarkable.

Read More Answers.

Question # 9

Tell me can a nuclear plant explode like a nuclear bomb?

Answer:-

Well, the worst that can happen in a modern nuclear plant is not even a fire. And it certainly isn't an explosion. It can't blow up like a weapon. It just can't. If I could make a comparison, your yule log in your fireplace versus gunpowder. I mean, you cannot blow up a nuclear plant like you can assemble uranium in a weapon to give you a tremendous explosion. It's just cannot happen. And those people that suggest that it can aren't doing the public much of a service.

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Question # 10

Tell me is the skin on your hand is enough to shield yourself from plutonium's radiation?

Answer:-

The skin on your hand is probably sufficient to stop most of it.

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Question # 11

Do you know what is iron ore consists of?

Answer:-

Iron ore is consists of Fe2O3

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Question # 12

Do you know what is the chemical composition of fat in human body?

Answer:-

Fat found in human body is mainly composed of
* Glycerides
* Glycerides+Phospholipids
* Glycolipids
* Phosphoinotisides
* Tocopherol

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Question # 13

Explain me what is mole?

Answer:-

Mole is the unit used to define the number of chemical substance present in a substance. It is the amount of substance which consists of the same number of chemical units as there are atoms in exactly 12 gram of pure carbon-12.

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Question # 14

What is spin Quantum Number?

Answer:-

The electron not only spins around the nucleus but also about its own axis. The direction of electron spin is clockwise or anti-clockwise. This quantum number helps to explain the magnetic properties of the substance.

Read More Answers.

Question # 15

Tell me quantum numbers and the different types of quantum numbers present?

Answer:-

Quantum numbers are defined as a set of four numbers with the help of which we can get complete information about all the electrons in an atom. Thus with the help

of these numbers we can get the information about the energy, location, type of orbital occupied, shape of that orbital etc. Mainly there are four types of quantum numbers. They are:
* a. Principal Quantum Number: It is denoted by n. It tells us about the energy level or shell in which the electron is present. The value of n can be 1,2,3,4.....etc. but it cannot be zero. It gives us the information about the average distance of electrons from the nucleus, determines the energy of electron in hydrogen atom and hydrogen like atoms. It also gives us the information about the maximum number of electrons that a shell can have by using the formula 2n2.
* b. Azimuthal Quantum Number: It is denoted by l. Through this quantum number we get to know the number of sub-shells present in the main shell. It also gives information about the shapes of various shells present within the same principal shell and also about the relative energies associated with these sub-shells.
* c. Magnetic Quantum Number: It is denoted by m. This quantum number explains us that when a source producing spectral lines are placed in a magnetic field, then each spectral line splits up into number of lines. This is also known as Zeeman Effect.
* d. Spin Quantum Number: The electron not only spins around the nucleus but also about its own axis. The direction of electron spin is clockwise or anti-clockwise. This quantum number helps to explain the magnetic properties of the substance.

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Question # 16

What is isolated system?

Answer:-

A system that can neither exchange matter nor heat with the surrounding is known as an isolated system. For example: Water placed in a vessel that is closed as well as insulated.

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Question # 17

Explain nature of path?

Answer:-

a - particles are more massive than the ß - particles. The a- particles generally travel in a straight line and on collision with gas molecules they are not scattered. The ß- particles follow a zigzag path and on collision with gas molecules they are scattered.

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Question # 18

Tell me what are isotopes?

Answer:-

These are the nuclei that belong to the same element and have the same number of protons. They occupy the same position in the periodic table and hence have the same atomic number. The isotopes of given element contains same number of electrons and hence have the same chemical properties, thus it is difficult to separate them from one another using chemical methods. However the Isotopes of given element differ in mass dependent physical properties like rate of diffusion and thus can be separated from one another using physical properties.

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Question # 19

Do you know what are isobars?

Answer:-

These are the nuclei of the neighbouring group having the same mass number but different atomic number. The isobaric nuclei belong to the different group and hence occupy different positions in the periodic table. They also differ in their chemical properties.

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Question # 20

Tell me what is Nuclear Chemistry?

Answer:-

* A nuclear reaction is different from a chemical reaction.
* In a chemical reaction, atoms of the reactants combine by a rearrangement of extra nuclear electrons but the nuclei of the atoms remain unchanged.
* In a nuclear reaction, however, it is the nucleus of the atom which is involved.
* The number of protons or neutrons in the nucleus changes to form a new element itself.
"A study of the nuclear changes in atoms is termed as Nuclear chemistry".

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Question # 21

Do you know what is C14 dating?

Answer:-

C14 dating technique is usually used to find the age of dead organism. In this technique generally the concentration ratio of C14 to C12 is used in order to determine ages upto 20,000 years. This is widely used in archaeology. C14 has a half-life period of 5700 years. When an organism dies the C14 content in them begins to decay with its characteristic to the half-life period. The concentration of C14 / C12 decreases and this decrease from the equilibrium is used as a measure of the age of the sample.
C14 emits a ß ray of low energy. In living samples , special counters with low background are used as the activity due to C14 is low in them.

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Question # 22

Explain ß rays?

Answer:-

These rays consist of electrons. When the conversion of a neutron into proton takes place then an electron is ejected out, along with electron another particle is also ejected out which is known as anti-neutron. The mass of this anti-neutron in negligible. When a ß ray is emitted by the parent element then the atomic number of the daughter is more by one unit than the parent element. However the mass number of both remains the same.

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Question # 23

What are isotones?

Answer:-

These are the nuclei that contain same number of neutrons but they differ in the number of protons and also in the mass number.

Read More Answers.

Question # 24

What is brain Tumour Location?

Answer:-

Dyes like fluorescein, rose Bengal are absorbed by cancerous cells, thus in order to locate the brain tumour location the dye labelled with I131 is given to the patient. Then the entire space around the skull is scanned by the help of special counters and the place where ever I131 is accumulated is found and thus it is possible to locate the brain tumour to some extent.

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Question # 25

Explain physical and chemical changes?

Answer:-

The energy associated with a and ß particles are sufficient to break the bonds in the molecules of the medium which lead to the formation of free radicals. These free radicals initiate various chemical reactions. The passage of a and ß particles also produce some physical changes.

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Question # 26

Explain a rays?

Answer:-

These rays consist of particles which are positively charged. If an a particle is emitted by the radioactive parent element then formation of the daughter element takes place which have atomic number less by 2 units and mass number less by 4 units.

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Question # 27

Explain isomers?

Answer:-

These are the nuclei that contain same number of protons and neutrons and hence they have the same mass number but they differ in their energies. In order to reach the ground state these nuclei emit the excess energy as gamma ray photon. The unstable nucleus is said to be in metastable state which on emission of gamma rays becomes stable.

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Question # 28

Explain thyroidisis?

Answer:-

The iodine plays an important role in our well-being as it controls the growth and our metabolism. Most of the iodine that we intake from our food is stored in the thyroid gland. The thyroid gland in some people may become over-active or under-active. Both these conditions are considered to be critical. The condition of thyroid in patients are understood with the help of tracer as follows: about 10 uCi of I131 in the form of NaI is given to the patient through orange juice and the counting of the Y activity emitted is started immediately. The counting is taken for several hours and then the ratio of counts D/P (dummy/patients) are plotted as a function of time. The curve obtained is compared with the curve of the normal person and thus hypothyroidisis or hyperthyroidisis is detected.

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Question # 29

What is open system?

Answer:-

A system that can exchange both matter and energy with the surrounding is said to be an open system. For example: A reaction taking place in an open vessel exchanges both energy and matter with the surrounding.

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Question # 30

Explain me the relation between heat of reaction at constant pressure and that at constant volume?

Answer:-

We know that
Qp = deltaH and qv = deltaE
At constant pressure

deltaH = deltaE + PdeltaV ----------i
Where deltaV is the change in volume, thus above equation can be written as
deltaH = deltaE + P (V2 - V1)
=deltaE + (PV2 - PV1) ----------ii
Where V1 is the initial volume and V2 is the final volume of the system
For ideal gases:
PV = nRT
So we have
PV1 = n1RT
PV2 = n2RT
Here n1 is the number of moles of the gaseous reactants and n2 is the number of moles of the gaseous products.
Substituting these in equation ii, we get
deltaH = deltaE + (n2RT - n1RT)
=deltaE + (n2 - n1) RT
deltaH = deltaE + deltang RT
Where deltang = n2 - n1 is the difference between the number of moles of the gaseous products and those of the gaseous reactants.
Substituting the value of deltaE and deltaH the above equation becomes
qp = qv + deltang RT
The above equation gives us the relationship between heat of reaction at constant pressure and that at constant volume.

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Question # 31

Tell me the general characteristics of radioactive decay?

Answer:-

It is seen that a parent nucleus on emission loses its identity and gets converted into a daughter nucleus. This phenomenon is known as radioactive decay. The following characteristics are generally applied to natural radioactivity.
* a. Loss of mass: In the radioactive decay the mass of the parent nucleus is usually greater than that of the daughter nucleus and hence in radioactive decay loss of mass occurs. According to Einstein's equation the lost mass appears as an energy which is shared between the emitted particle and the daughter nucleus.
* b. Range and specific ionisation of the emitted particles: The radiations emitted by the radioactive nuclei are highly energetic and due to this the radiations can penetrate through the matter. The depth of these penetrations into the matter is proportional to the density of the matter. The distance covered by these radiations in the matter is called their range. The number of ion pairs per unit distance, the emitted particle covers in a medium is known as specific ionisation.
* c. Nature of path: a - particles are more massive than the ß - particles. The a- particles generally travel in a straight line and on collision with gas molecules they are not scattered. The ß- particles follow a zigzag path and on collision with gas molecules they are scattered.
* d. Physical and chemical changes: The energy associated with a and ß particles are sufficient to break the bonds in the molecules of the medium which lead to the formation of free radicals. These free radicals initiate various chemical reactions. The passage of a and ß particles also produce some physical changes.

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Question # 32

Explain the nuclides based on the number of protons and neutrons of the nuclei?

Answer:-

Nucleoside can be classified in four ways based on the number of protons and neutrons of the nuclei. These are:
* a. Isotopes: These are the nuclei that belong to the same element and have the same number of protons. They occupy the same position in the periodic table and hence have the same atomic number. The isotopes of given element contains same number of electrons and hence have the same chemical properties, thus it is difficult to separate them from one another using chemical methods. However the Isotopes of given element differ in mass dependent physical properties like rate of diffusion and thus can be separated from one another using physical properties.
* b. Isobars: These are the nuclei of the neighbouring group having the same mass number but different atomic number. The isobaric nuclei belong to the different group and hence occupy different positions in the periodic table. They also differ in their chemical properties.
* c. Isotones: These are the nuclei that contain same number of neutrons but they differ in the number of protons and also in the mass number.
* d. Isomers: These are the nuclei that contain same number of protons and neutrons and hence they have the same mass number but they differ in their energies. In order to reach the ground state these nuclei emit the excess energy as gamma ray photon. The unstable nucleus is said to be in metastable state which on emission of gamma rays becomes stable.

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Question # 33

Explain state the third law of thermodynamics. Give its limitations and importance?

Answer:-

The third law of thermodynamics states that:
"The entropy of a perfect crystal of each element and a compound is zero at absolute zero."
Limitations: If any disorder like impurity or imperfection is found in a substance then the entropy of such crystal is non-zero at 0 K. For example: The entropy of pure carbon dioxide and nitric oxide is zero at 0K. This shows that there exists disorder in the arrangement of such molecules.
This law is applicable only to pure compounds. Thus we can say that, this law is not applicable to glass which is a supercooled liquid. It is also not applicable to amorphous substance and supercooled solutions.
Importance:
a. With the help of this law Thermodynamic properties can be calculated and chemical affinity can be measured.
b. This law helps in explaining the behaviour of solids at very low temperature.

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Question # 34

Explain a short note on Gibbs Free Energy and derive the equation for the same?

Answer:-

This thermodynamic quantity states that the decrease in value during a process is equal to the useful work done by the system. It is denoted by G and the mathematical equation is:
G = H - TS

Where,
H = heat content
T = absolute temperature
S = entropy of the system
For isothermal process we have
G1 = H1 - TS1 for the initial state
G2 = H2 - TS2 for final stage
Therefore,
G2 - G1 = (H2 - H1) - T(S2 - S1)
Now,
deltaG = G2 - G1 is the change in Gibbs free energy
deltaH = H2 - H1 is the change in enthalpy of the system
deltaS = S2 - S1 Is the change in entropy of the system
Thus the above equation becomes:
deltaG = deltaH - TdeltaS is known as Gibbs-Helmoholtz equation.

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Question # 35

Do you know how to calculate how many moles of glucose present in 320 mL of 5.0 M of glucose solution?

Answer:-

First step: Convert the volume from millilitres to liters
320 X (1 litre/1000mL) = 0.320 L solution
Second use the formula = M x V
= 5.0 moles glucose/ litre solution X 0.320 L solution
= 1.6 moles of glucose present in 320mL of solution

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Question # 36

Tell me the use of radioisotopes in agriculture?

Answer:-

Radioisotopes have been used to determine the requirement of different elements in the plant. Some of these applications are as follows:
* a. Use of fertilizers: By the help of tracer Ca45 it has been found that the uptake of calcium by the plants in acidic soil is same for CaO and CaCO3 but is less for CaSO4. P32 is used to determine the rate of the uptake of phosphorous in the plants. Due to this technique it is found that it is good to add phosphorous fertilizer to the plants during its sowing period. During this period the uptake is more than 60% but if the fertilizer is added at the later stage then the uptake is only 35%.
* b. Irradiation of seeds: With the help of radioisotopes people have speed up the development of the plants. They have also increased the yield and quality of the crops. Exposing of seeds to the Y radiations are beneficial for the growth of the plant.
* c. Control of insects: Radioisotopes have also been used to gain information about the migration and breeding habits of predatory insects. This is done by the help of Phosphorous or Cobalt. Generally the insects are labelled with P32 or Co60. In order to label them with Co60 the insects are dipped in cobalt chloride solution where the cobalt is labelled as Co60. Each insect absorbs a radiation dose of 300 rads and this lasts for 6-8 months. Then the counting device is used to follow the migration and location of labelled insects. Now with the help of insecticide the predators are destroyed.

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Question # 37

Explain me what are tracers? Explain how Thyroidisis and Brain Tumour Location can be detected with the help of tracer I131.?

Answer:-

The element which is labelled is called as a Tracer element. In the series of chemical reactions the path of the element or a compound containing the element can be traced using the tracer element.
* a. Thyroidisis: The iodine plays an important role in our well-being as it controls the growth and our metabolism. Most of the iodine that we intake from our food is stored in the thyroid gland. The thyroid gland in some people may become over-active or under-active. Both these conditions are considered to be critical. The condition of thyroid in patients are understood with the help of tracer as follows: about 10 uCi of I131 in the form of NaI is given to the patient through orange juice and the counting of the Y activity emitted is started immediately. The counting is taken for several hours and then the ratio of counts D/P (dummy/patients) are plotted as a function of time. The curve obtained is compared with the curve of the normal person and thus hypothyroidisis or hyperthyroidisis is detected.
* b. Brain Tumour Location: Dyes like fluorescein, rose Bengal are absorbed by cancerous cells, thus in order to locate the brain tumour location the dye labelled with I131 is given to the patient. Then the entire space around the skull is scanned by the help of special counters and the place where ever I131 is accumulated is found and thus it is possible to locate the brain tumour to some extent.

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Question # 38

Tell me how buffer works?

Answer:-

In buffer when hydrogen ion is added, it will neutralized by the base in buffer. Hydroxide ion will be neutralized by the acid. On the overall pH of the buffer solution, these neutralization reactions will not show much effect.
While when you select an acid as a buffer solution, try to use an acid acid that has a pH closed to your desired pH. This will help your buffer to achieve nearly equivalent amount of acid and conjugate base, so that it will enable to neutralize as much as H+ and OH -.

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Question # 39

Explain me what is the formula you will use to calculate how many millilitres of 5.5 M NaOH are required to prepare 400 mL of 1.5M NaOH?

Answer:-

To know the amount or volume of NaOH to prepare 400 mL of 1.5 M NaOH, we use formula
M1 X V1 = M2 X V2

V1 = M2 X V2/ M1
But before that we will convert 400 mL into litre = 0.4 L
5.5 X V1 = 1.5 M x 0.4 L
V1 = 1.5 M X 0.4L/ 5.5
V1= 0.10 L
V1 = 100mL
So, you need 100mL of 5.5 NaOH

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Question # 40

Tell me what happens after a reactor's run for 18 months, with these uranium pellets? What are you left with?

Answer:-

Well, the uranium is in the form of pellets, and typically, what you have of the original fuel that you put in there is only a very small percentage of it has been used up, perhaps one, two, three percent after a year. And the fissioning process has made that fuel rod very radioactive. Much of that radioactivity goes away within minutes, some after hours, and some after days. But you're left with a considerable residual amount of radioactivity. Now, some of those materials could be reused. Some of the radioactive materials could be reused if you recycle the fuel. For today in the U.S., the policy is no recycling. And so you're left with whatever's there.

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Question # 41

As you know most of the uranium that you get out of the ground doesn't have this magic fission property?

Answer:-

Correct. The amount of fissionable uranium is 0.7 percent of all natural uranium. In all the uranium in the earth's crust, only about 0.7 percent of it is fissionable.

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Question # 42

Explain me what is the nature of radiation? Is it that people have no way to experience it?

Answer:-

No, it isn't. And radiation, of course, to most who work with it is a very workaday kind of thing. The nature of radiation is that it requires a good bit of it to do you any harm. The nature of radiation is that you can detect absolutely insignificant amounts of it, extremely easily. The nature of radiation is that if you don't choose to detect it, you have it falling on you from everywhere you are on the earth's surface, in amounts that are probably 100 times or 1,000 times more than you would ever get from living near a nuclear plant.

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Question # 43

Tell me is it fair to compare American reactors to the one at Chernobyl?

Answer:-

It's completely unfair. It's like comparing the Stanley steamer that's going along at 150 miles an hour to a present day car with all the safety features a modern car has. And that Chernobyl plant was a very crude plant, was operating badly. It had the worst possible accident. And yet the number of identifiable deaths from it are really only a handful. And even the children who were affected by it, some few dozen, those could have been avoided with iodine tablets.

Read More Answers.

Question # 44

Tell me do you think basically the safety record for nuclear power plants is good or bad?

Answer:-

I think the safety record is wonderful. If you look at reactors in this country, no one has been killed from the nuclear part of the nuclear plant in this country, ever.

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Question # 45

Explain us through the principal ways this energy's been harnessed, both in bomb making and in a controlled reaction?

Answer:-

In a controlled reaction you assemble uranium in a way that allows a very stable, very steady reaction. The heat gets produced, then is used to boil water and produce steam, and that steam then produces electricity through turbines, same as any other electrical generating plant. There's nothing very exotic really about it. The trick in all of it is to assemble that uranium in a manner that is the safest possible, and uses the resource most efficiently. And you want to see the waste from it minimized and be as safe as possible.

Read More Answers.

Question # 46

Tell me how many millilitre is equal to 1 litre and how many microliter is equal to litre?

Answer:-

1 millilitre = 0.0001 litre
1 microliter = 0.0000001 litre

Read More Answers.

Question # 47

Explain different rules used for filling of orbitals in atoms?

Answer:-

* a. Aufbau Principle: According to this principle, In the ground state of an atom the electrons are added one by one to the various orbitals in order of their increasing energy starting with the orbitals of lowest energy. The order of increasing energies of various orbitals can be calculated by the (n+1) rule. However if the (n+1) value of two different orbitals are same then the orbitals with lower value of n has lower energy.
* b. Pauli Exclusion Principle: This principle states that an orbital can have maximum two electrons and these must have opposite spins.
* c. Hund's rule of maximum multiplicity: Electron pairing in p, d and f orbitals cannot occur until each orbital of a given subshell contains one electron or is singly occupied. This happens because electrons being identical in charge repel each other when present at the same orbital.

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Question # 48

Explain me radioactivity? Explain a, ß and Y rays?

Answer:-

* a. The emission of radiation by uranium and its compound is an atomic phenomenon. It is independent of the chemical and physical state of the element. Such phenomenon is known as radioactivity and such elements are said to be radioactive.
* b. a rays: These rays consist of particles which are positively charged. If an a particle is emitted by the radioactive parent element then formation of the daughter element takes place which have atomic number less by 2 units and mass number less by 4 units.
* c. ß rays: These rays consist of electrons. When the conversion of a neutron into proton takes place then an electron is ejected out, along with electron another particle is also ejected out which is known as anti-neutron. The mass of this anti-neutron in negligible. When a ß ray is emitted by the parent element then the atomic number of the daughter is more by one unit than the parent element. However the mass number of both remains the same.
* d. Y rays: These rays are similar to electromagnetic radiation and possess very short wavelength. The daughter nucleus formed generally exists in the excited state. While returning to the ground state they generally emit its excess energy as Y-ray photon. Here the atomic number and the mass number of the daughter nucleus remains the same as of the parent nucleus.

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Question # 49

Explain heinsenberg's uncertainty principle?

Answer:-

This principle states that it is impossible to measure simultaneously the position and momentum of a small particle with absolute accuracy or certainty. If an attempt is made to measure any one of these two quantities with higher accuracy, then the other becomes less accurate. The product of uncertainty in the position and uncertainty in momentum is always constant and is equal to or greater than h/4p i.e.
deltax. deltap = h/4Ï€
Where,
h is the Planks constant
deltax is the uncertainty in position
deltap is the uncertainty in momentum

Read More Answers.

Question # 50

Please explain what is the difference between fractionation and distillation?

Answer:-

Both methods are used to separate the components present in the solution based on the melting points
* Distillation : This technique is used when boiling point of chemicals are different in the mixtures
* Fractionation : This technique is used when boiling point of chemicals are close to each other in the mixtures

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Question # 51

Explain me what is oxidation and reduction reaction?

Answer:-

Oxidation = When there is a loss of hydrogen or electrons, OR gain of oxygen is known as Oxidation reaction.
Reduction = When there is a gain of hydrogen or electron OR loss of oxygen is known as reduction reaction
Example of oxidation-reduction reaction is observed in human body, when an electron is transferred into the cell and oxidation of glucose take place from which we get the energy.

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Question # 52

Tell me how is the isotopic form unsuitable for weapons?

Answer:-

Yes. Plutonium is different from uranium. Uranium has really those two isotopes. And let me call them by their names, uranium-235 and uranium-238. That's simply two different isotopes of the same metal. 235 is fissionable. Plutonium, when it's produced in a reactor, the first isotope you get is plutonium-239. That comes from the uranium-238. Almost immediately after that isotope will absorb another neutron and become plutonium-240. At least, some fraction of it will. And that is a highly unsatisfactory isotope to the weapons designer, because that gives off a lot of neutrons itself, and makes it very difficult to trigger any kind of an explosion effectively. But it goes right on. It goes to plutonium-241, to plutonium-242, and that whole mixture of isotopes of plutonium is exactly what the bomb designer does not want. He wants pure plutonium-239. That comes from reactors that are specially set up to produce the isotope plutonium-239, and not all of the mixture of isotopes that come out of the nuclear reactor.

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Question # 53

Explain me was Chernobyl a serious accident?

Answer:-

Chernobyl was the most serious accident, in my view, that a reactor could possibly have. It was a very large plant. It had been operating long enough that it had a large inventory of radioactive material and, it blew up. It was opened to the atmosphere for days. Fire, plumes of material, radioactive materials. The people who were asked to deal with the fire obviously had to be subjected to, in the crude way that the authorities responded to it, killing amounts of radiation. Some 30 or 40 of them did that, at an awful price. But contrary to the common knowledge that is simply not so. There have been very few, or in fact, only one identifiable source of deaths from that Chernobyl accident. And they are thyroids in children.

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Question # 54

Tell me what is range and specific ionisation of the emitted particles?

Answer:-

The radiations emitted by the radioactive nuclei are highly energetic and due to this the radiations can penetrate through the matter. The depth of these penetrations into the matter is proportional to the density of the matter. The distance covered by these radiations in the matter is called their range. The number of ion pairs per unit distance, the emitted particle covers in a medium is known as specific ionisation.

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Question # 55

What is principal Quantum Number?

Answer:-

It is denoted by n. It tells us about the energy level or shell in which the electron is present. The value of n can be 1,2,3,4.....etc. but it cannot be zero. It gives us the information about the average distance of electrons from the nucleus, determines the energy of electron in hydrogen atom and hydrogen like atoms. It also gives us the information about the maximum number of electrons that a shell can have by using the formula 2n2.

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Question # 56

Do you know what is the metal used to extract copper from the solution of copper sulphate?

Answer:-

Fe or ferrous is the metal that is used to extract copper from the solution of copper sulphate.

Read More Answers.

Question # 57

What is uranium, and where does it come from?

Answer:-

Uranium is simply a metal. It's found everywhere in the earth's surface. It's found at two parts per billion in the oceans. It's concentrated, like all the metals, in deposits here and there all over the earth. It looks something like lead. It's heavy like lead. It has a mild amount of radioactivity associated with it, but nothing like radium, for example, which is also scattered throughout the earth's crust.

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Question # 58

Tell me what is a half-life of plutonium?

Answer:-

Well, plutonium-239 has, for example, a roughly 25,000-year half-life. That is to say, half of it will have decayed to something else after 25,000 years, approximately. And that's a good long time. And the other isotopes that are similar to that, some have longer half-lives, some of them shorter. The point is that they are the most toxic elements in the waste. And paradoxically, they are also the most useful, because they are all fissionable. So they can be used to produce energy. But if they are there in the waste, they represent a long-term hazard that people can legitimately be concerned about. And those states that are being asked to accept the nuclear waste can legitimately be concerned about that. You know, I think again it's a handle-able problem, but it's a problem that needn't be there, for if you recycle, you separate out exactly those elements and use them in your reactor. You produce energy with them and they're gone. And the nuclear waste that is then put in the ground has a life of perhaps a few hundred years, and all of the really toxic materials are gone. So it totally changes the character of the nuclear waste problem.

Read More Answers.

Question # 59

Explain me what is dextro-rotatory and levo-rotatory?

Answer:-

Levorotation and Dextrorotation is referred to the properties of plane polarized light, when light rotates clockwise when it approaches the observer is then known as dextro-rotation and when the light rotates anti-clockwise then it is referred as levo-rotation.
A compound which exhibits a dextro-rotation is referred as dextro-rotatory and which exhibits levo-rotation is referred as levo-rotatory.

Read More Answers.

Question # 60

Tell us what is the monomer of polyethene?

Answer:-

The monomer of polyethene is ethylene

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Question # 61

Tell me what is the basic material or fuel that makes nuclear energy possible?

Answer:-

It's always uranium. It's the fission of uranium.

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Question # 62

Tell us what is molality?

Answer:-

Molality is the number of solute that is present in 1 kg of a solvent.

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Question # 63

Explain pauli Exclusion Principle?

Answer:-

This principle states that an orbital can have maximum two electrons and these must have opposite spins.

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Question # 64

Please explain why graphite rod is used in nuclear reactor?

Answer:-

Graphite rod is used in nuclear reactor to convert fast moving neutrons into thermal neutrons.

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Question # 65

Tell me do you think most people trust the DOE nuclear physicists, the utilities?

Answer:-

No. Of course they don't. And that, I think, is somewhat understandable. But why the anti-nuclear folks, who say such extreme things that on the face of it one would question, even one who knew nothing about the subject, why they would have credibility, that does puzzle me.

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Question # 66

Do you know what is Valency?

Answer:-

A valency is a property of a groups or atoms, equal to the number of atoms of hydrogen that the group or atom could combine with or displace it in forming compounds.

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Question # 67

What is closed system?

Answer:-

A system that exchanges only energy and not matter with the surrounding is said to be a closed system. For example: A reaction taking place in a closed metallic vessel.

Read More Answers.

Question # 68

Tell me what is buffer?

Answer:-

A buffer is an aqueous solution which has highly stable pH. It is a blend of a weak acid and its conjugate base or vice versa. On adding small amount of base or acid to buffer, its pH hardly changes.

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Question # 69

Tell me how can plutonium harm you?

Answer:-

You have to eat it in order to harm yourself with it. It is radioactive, naturally. Radioactive, but much less so than radium, for example, which is scattered again all over the earth's crust. So it's not a very frightening material.

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Question # 70

What is hund's rule of maximum multiplicity?

Answer:-

Electron pairing in p, d and f orbitals cannot occur until each orbital of a given subshell contains one electron or is singly occupied. This happens because electrons

being identical in charge repel each other when present at the same orbital.

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Question # 71

Tell me what is Avogadro's law?

Answer:-

According to Avogadro's law, at same temperature and pressure equal volume of gases contains the same number or molecules regardless of the chemical nature and physical properties.
Avogadro's number = 6.023 X 10 (-23)

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Question # 72

Tell us was Chernobyl as bad as it could get?

Answer:-

That's as bad an accident as you can get from a nuclear plant. And worse than any accident in a modern nuclear plant could possibly be. The point is that that reactor was on fire for days and days and days, with radioactive material going up into the air. But it was the crudest kind of reactor, which the Soviets thankfully have stopped building.

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Question # 73

Tell me what is plutonium? Is it a metal like uranium?

Answer:-

Plutonium is, in fact, a metal very like uranium. If you hold it [in] your hand (and I've held tons of it my hand, a pound or two at a time), it's heavy, like lead. It's toxic, like lead or arsenic, but not much more so.

Read More Answers.

Question # 74

Do you know the term Aliquot and Diluent?

Answer:-

Aliquot : It is a measured sub-volume of original sample
Diluent: Material with which sample is diluted

Read More Answers.

Question # 75

Tell me what makes a molecule into organic molecule?

Answer:-

In a molecule when hydrogen atom is less than the ratio of carbon atom, then such molecules are referred as an organic molecule.

Read More Answers.

Question # 76

Tell me what is plutonium? Does it occur naturally?

Answer:-

Plutonium is simply a material that is very like uranium, being produced from uranium. It's produced by the absorption of a neutron in uranium, and you get this new metal which has been called plutonium. Its properties are not dissimilar to one of the isotopes of one of the kinds of uranium that exist in the earth's crust. It is fissionable, like the fissionable isotope of uranium. That is to say, you could make a reactor out of it, out of plutonium.

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Question # 77

Explain azimuthal Quantum Number?

Answer:-

It is denoted by l. Through this quantum number we get to know the number of sub-shells present in the main shell. It also gives information about the shapes of various shells present within the same principal shell and also about the relative energies associated with these sub-shells.

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Question # 78

Tell me what is the special property it has?

Answer:-

Well, the special property is that if it is bombarded with neutrons, then the uranium nucleus will split in two, and with that a large amount of energy is released in the form of heat. And this is called fission.

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Question # 79

Tell me what is titration?

Answer:-

Titration is a process to determine the molarity of a base or an acid. In this process a reaction is carried out between the known volumes of a solution with a known concentration, against the known volume of a solution with an unknown concentration.

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