

# P4 Quick Revision Questions

H = Higher tier only

SS = Separate science only

# Question 1

.... of 50

- What are the components of an atom, their location and their charge?

# Answer 1

.... of 50

Electron – outer shells – negative charge

Proton – nucleus – positive charge

Neutron – nucleus - neutral

# Question 2

.... of 50

A radium atom has 88 protons and 226 neutrons.  
How many electrons does it have?

# Answer 2

.... of 50

- 138

# Question 3

.... of 50

- What are isotopes?

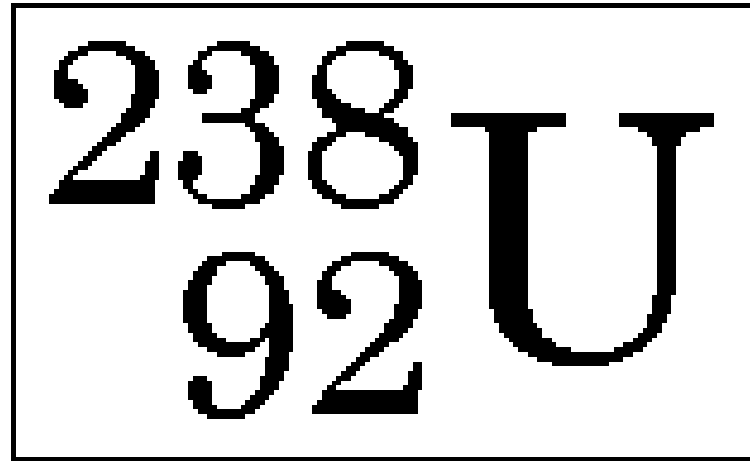
# Answer 3

.... of 50

Isotopes of an element have the same number of protons in them but different numbers of neutrons

Question 4

.... of 50



What are the two numbers?



# Answer 4

.... of 50

238 = mass number

92 = atomic number

# Question 5

.... of 50

- If an element has a mass number of 14 and an atomic number of 6. How many neutrons, protons and electrons does it have?

# Answer 5

.... of 50

- 6 electrons
- 6 protons
- 8 neutrons

# Question 6

.... of 50

- Define ionised

# Answer 6

.... of 50

When an atom gains or loses electrons

# Question 7

.... of 50

- Define radioisotope

Answer 7

.... of 50

An atom with an unstable nucleus

# Question 8

.... of 50

- What forms can nuclear radiation be emitted as?



Answer 8

.... of 50

Alpha particle, beta particle, gamma ray or  
neutron

# Question 9

.... of 50

- Describe an alpha particle

# Answer 9

.... of 50

A helium nucleus with 2 protons and 2 neutrons

# Question 10

.... of 50

- What happens when an alpha particle is emitted from a nucleus?

# Answer 10

.... of 50

- The nucleus has 2 fewer protons and 2 fewer neutrons, so the atomic number decreases by 2 and the mass number decreases by 4. A new element is formed

# Question 11

.... of 50

- What happens when a beta particle is emitted from the nucleus?

# Answer 11

.... of 50

The nucleus has one more proton and one less neutron, so the atomic number increases by one and the mass number is unchanged. A new element is formed.

# Question 12

.... of 50

- Define background radiation



# Answer 12

.... of 50

Ionising radiation that is around us all the time

# Question 13

.... of 50

- Give 4 sources of background radiation

# Answer 13

.... of 50

- Natural sources – rocks and cosmic rays from space
- Waste products – from hospitals, nuclear power stations and/or other industries
- Manufactured radioisotopes
- From the fallout from nuclear weapons testing and nuclear accidents

# Question 14

.... of 50

- List the three of nuclear radiation from greatest penetrating power to smallest

Answer 14

.... of 50

Gamma rays, beta particles, alpha particles

# Question 15

.... of 50

- Give two examples of the uses of radioactive sources

Answer 15

.... of 50

Smoke alarm

Monitoring the thickness of paper in  
manufacturing

# Question 16

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- What is the key difference between chemical and nuclear equations?

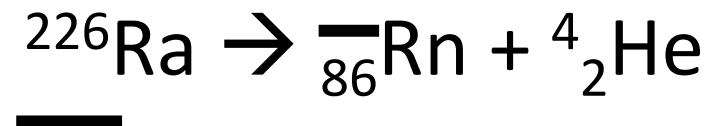


Nuclear equations show what happens when there are changes in the nucleus, chemical equations show what happens in a chemical reaction

# Question 17

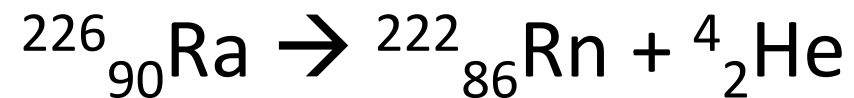
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- Complete this nuclear equation for alpha decay:



# Answer 17

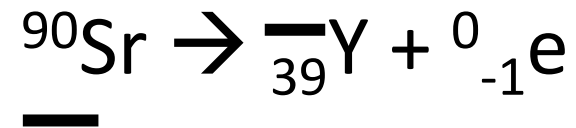
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# Question 18

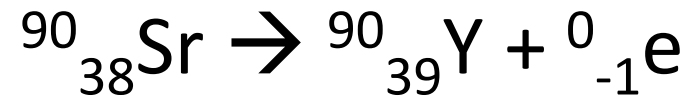
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- Complete this nuclear equation for beta decay:



# Answer 18

.... of 50



# Question 19

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- Define half life

# Answer 19

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The average time of it takes for half the nuclei present to decay or the time it takes for the activity to fall to half its initial level

# Question 20

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- How do we calculate half life?



# Answer 20

.... of 50

- Plot a graph of rate detected against time
- Subtract background count from each reading before plotting
  - Draw a curve through the points
- Use the curve to see how long it takes for the rate to decrease by half

# Question 21

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- How much can half lives vary?

# Answer 21

.... of 50

- Radioactive isotope half lives can vary from a fraction of a second to millions of years

# Question 22

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- Define radioactive contamination

# Answer 22

.... of 50

- The unwanted presence of materials containing radioactive atoms

# Question 23

.... of 50

- Why is contamination a hazard

# Answer 23

.... of 50

- It can be absorbed through the skin or enter the body via an open wound and could cause cancer or mutations of genes.

# Question 24

.... of 50

- What affects the level of contamination?



# Answer 24

.... of 50

- Penetrating power of the radiation
  - Ionising power
  - Half life of the isotope

# Question 25

.... of 50

- What can a tracer be used for?

# Answer 25

.... of 50

- Monitor functioning of internal organs
- Checking for blockage of a blood vessel

# Question 26

.... of 50

- Define irradiation

# Answer 26

.... of 50

- Where an object is exposed to nuclear radiation

# Question 27

.... of 50

- Give some sources of irradiation

# Answer 27

.... of 50

- From the sky – cosmic rays
- From the air – radioactive gases
- From food – potassium-40 atoms
- From soil and building materials – gamma rays

# Question 28

.... of 50

- Define mutation



# Answer 28

.... of 50

- A change in DNA sequence

# Question 29

.... of 50

- What are the 3 possible effects of irradiation on human body cells in order of increasing harm

# Answer 29

.... of 50

- Damage to the nucleus can lead to:
  - Cell death
  - Repair: accurate or misrepair

# Question 30

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- What must radioisotopes used in medicine have?

# Answer 30

.... of 50

- Emit gamma rays
- Have a suitable half life
- Not be toxic to humans

# Question 31

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- Define radiotherapy

# Answer 31

.... of 50

- The destruction of cancer cells by exposing the affected area of the body to extremely large amounts of radiation

# Question 32

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- Why are Xrays preferred to gamma rays?



# Answer 32

.... of 50

- Xrays are only produced when needed
- The rate of production of Xrays can be controlled
- The energy of the Xrays can be changed
- You can't change the rate of production or energy of the gamma rays emitted from a particular source

# Question 33

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- What is brachytherapy?

# Answer 33

.... of 50

- A small sealed radioactive source, or seed, is placed in the tumour itself, to give a high dose of radiotherapy directly to the tumour but a much lower dose to the surrounding tissues

# Question 34

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- What isotope can be used to investigate thyroid problems?

# Answer 34

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- Iodine-123

# Question 35

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- Give two side effects of using nuclear radiation to kill cancer cells

- Vomiting
- Reddening and pain in the skin (similar to sunburn)
  - Greater risk of infection
  - Tiredness

# Question 36

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- What is the unit given for a radiation dose?



# Answer 36

.... of 50

- mSv (millisieverts)

# Question 37

.... of 50

- Why is the beam of radiation rotated around the tumour?

# Answer 37

.... of 50

- To ensure the healthy cells around a tumour only receive a small amount of radiation but the tumour receives radiation all the time

# Question 38

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- What is nuclear fission?

# Answer 38

.... of 50

- When a large and unstable nucleus e.g. uranium or plutonium, splits with the release of a lot of energy

# Question 39

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- What two isotopes does natural uranium consist of?

# Answer 39

.... of 50 **SS**

- Uranium-235
- Uranium-238

# Question 40

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- What do control rods do?



# Answer 40

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- They are placed between the fuel rods in a reactor and absorb neutrons so fewer neutrons are available to split more uranium nuclei

# Question 41

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- What does a moderator do?

# Answer 41

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- A moderator e.g. graphite slows down the fast-moving neutrons emitted during fission

# Question 42

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- Define nuclear fusion

# Answer 42

.... of 50

- The joining of small light nuclei e.g. hydrogen and helium to form a heavier nucleus

# Question 43

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- Compare fission and fusion

# Answer 43

.... of 50

- Fission = splitting a large nucleus e.g. uranium
- Fusion = joining two small nuclei e.g. hydrogen

# Question 44

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- Why do scientists want to achieve fusion on earth?



# Answer 44

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- There is plenty of hydrogen for fusion e.g. in sea water and the waste products (mainly helium) aren't radioactive

# Question 45

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- How are fusion bombs started?

# Answer 45

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- With a fission reaction

# Question 46

.... of 50

- Describe the plum pudding model of the atom

# Answer 46

.... of 50

- Electrons are surrounded by positive charge

# Question 47

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- What happened when Geiger and Marsden aimed a beam of alpha particles at a thin foil of metal?

# Answer 47

.... of 50

- Some passed straight through
- Others bounced off the foil in all directions

# Question 48

.... of 50

- What and when did Ernest Rutherford propose?



# Answer 48

.... of 50

- The nuclear model with a small central nucleus containing most of the mass and charged electrons orbiting it. 1911

# Question 49

.... of 50

- What was the problem with the nuclear model?

# Answer 49

.... of 50

- Classical mechanics showed the electrons wouldn't stay stable in orbits and would spiral into the nucleus

# Question 50

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- Who and when discovered the proton and the neutron?

# Answer 50

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- Proton – Rutherford, 1920
- Neutron – Chadwick, 1932