Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Some isotopes emit nuclear radiation.

(a) Carbon-14 and carbon-12 are isotopes of carbon.

Compare the structure of an atom of carbon-14 with the structure of an atom of carbon-12.

_____

_____

_____

_____

_____

_____

(3)

(b) Carbon-14 is a radioactive isotope.

Carbon-14 has a half-life of 5700 years.

What does 'a half-life of 5700 years' mean?

_____

_____

_____

(1)

The table below gives the half-life of some other radioactive isotopes.

Isotope	Half-life in seconds
Nitrogen-18	0.62
Nitrogen-17	4.17
Fluorine-17	64.37
Fluorine-18	6584.34

(c) A sample of fluorine-17 has an activity that is one quarter of its original activity.

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Calculate the age of the sample of fluorine-17.

_____

_____

_____

Age = _____ s

(2)

(d) All of the isotopes in the table above emit beta radiation.

Explain which isotope would cause the biggest risk to a person's health based only on the half-life of each isotope.

_____

_____

_____

_____

_____

_____

(3)

(e) People who work in the nuclear power industry need to be aware of irradiation and contamination.

Describe the difference between irradiation and contamination.

_____

_____

_____

_____

_____

(2)

(f) Give **one** health risk to a person working close to a source of nuclear radiation.

_____

(1)

(g) Workers in nuclear power stations are monitored to check the radiation they emit.

A worker stands 1 cm away from a radiation detector.

The amount of radiation the worker emits is recorded.

Explain why the worker needs to stand close to the radiation detector.

_____

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_____

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_____

(2)

(h) Workers in the nuclear power industry are exposed to nuclear radiation.

Pilots on aircraft are exposed to cosmic radiation from space.

daily dose caused by working in a nuclear power station = 0.00050 mSv

hourly dose from cosmic rays to a pilot while flying = 0.0030 mSv

Calculate the number of days it takes for a nuclear power station worker to receive the same dose as a pilot flying for 24 hours.

_____

_____

_____

_____

_____

Number of days = _____

(3)

(Total 17 marks)

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