Eduqas Physics GCSE
Topic 9.3: Hazards and uses of radioactive emissions and of background radiation
Mark Schemes for Questions by topic

1.

Any four from:
Short half-life isotopes have a high dose in a short period of time and can sometimes cause fatality as well as severe illness (1)

Very long half-life isotopes will decay so slowly that they are not very hazardous at all (1)

Long half-life isotopes will remain radioactive for a very long period of time and so are difficult to store (1)

Short half-life isotopes will reach low levels of radioactivity quickly and so are not difficult to store compared to longer half-life isotopes (1)

However, some long half-life isotopes can release harmful decay products (just not rapidly) which can cause illness (1)

Many short half-life isotopes are readily absorbed into the human body making it easier for them to have harmful effects (1)

2.

(b) radiation damages our cells

accept radiation is dangerous / poisonous / harmful / toxic

accept radiation can cause cancer / kills cells / change DNA / cause mutations / harm health

accept so precautions can be taken

accept so they know they may be exposed to / harmed by radiation it refers to radiation (source)

to stop people being harmed is insufficient

1

(c) 3rd box, it can pass through the human body **1**

3.

(a) (both graphs show an initial) increase in count rate

accept both show an increase

1

(b) only the right kidney is working correctly

1

any **two** from:

*if incorrect box chosen maximum of **1** mark can be awarded*
reference to named kidney can be inferred from the tick box

- count-rate / level / line for right kidney decreases (rapidly)
  it decreases is insufficient
- count-rate / level / line for left kidney does not change
  it does not change is insufficient
- radiation is being passed out into urine – if referring to right kidney
- radiation is not being passed out – if referring to the left kidney
- left kidney does not initially absorb as much technetium-99

2

[4]

4.

(a) (i) it is random

*do **not** accept unpredictable*
*do **not** accept irregular*

1

(ii) source adds nothing **or** little to the count

1

continues to record background level

accept a clear explanation of background

1

(b) (i) an electron

accept $\frac{0}{-1}e$

1

(ii) electromagnetic wave with **high frequency** or short wavelength

*must have high frequency **or** short wavelength*

1

(iii) 15

*allow **1** mark for **3** iterative steps 584/2 292/2 146/2*
allow I mark for 45/3

3

(iv) [A] a safe level of radiation reached much quicker

could answer in terms of isotope but answer must be clear whether it refers to isotope or sodium-24

1

[B] long enough to obtain measurements

1

[10]

5.

(i) 7 **or** 8

1

correct data extracted from graph e.g. takes 8 days to drop from 50 to 25

allow appropriate annotation of graph

1

(ii) long enough to destroy cancer cells

do not accept dangerous unqualified

1

but short enough to minimise damage to surrounding tissues

1

[4]