

- 5 A material called granite is used as a work surface in a kitchen.



(Source: Ksana\_uk/Shutterstock)

- (a) Granite is formed naturally and contains radioactive isotopes.

The granite work surface contributes to the background radiation in the kitchen.

Give another naturally occurring source of background radiation.

(1)

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(b) Granite contains the isotope thorium-232 ( $^{232}_{90}\text{Th}$ ).

Thorium-232 decays by a sequence of alpha decays and beta decays to form radon-220 ( $^{220}_{86}\text{Rn}$ ).

(i) State two differences between alpha radiation and beta radiation.

(2)

1 .....

2 .....

(ii) The incomplete nuclear decay equation summarises the decay sequence of thorium-232 into radon-220.



Calculate the number of alpha particles and the number of beta particles emitted in this decay sequence.

(3)

number of alpha particles = .....

number of beta particles = .....



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(c) Thorium-232 is a solid and remains in the work surface.

Radon-220 is a gas and is emitted from the work surface.

Thorium-232 and radon-220 both emit alpha radiation.

Discuss the hazards due to the granite work surface when a person is working in the kitchen.

Refer to contamination and irradiation in your answer.

(3)

(Total for Question 5 = 9 marks)

