

Exercise 2.5

Radiation and Radioactivity

1. Nuclear reactions release a variety of different types of radiation, and many nuclear reactions release more than one type of radiation. Identify which type(s) of radiation match each description.
 - (a) positive charge
 - (b) negative charge
 - (c) no charge
 - (d) no mass
 - (e) low penetrating power
 - (f) high penetrating power
 - (g) can induce fission

2. Briefly explain the difference between an “absorbed dose” of radiation and an “equivalent dose” of radiation. What units are used to measure each?

3. According to the International Commission on Radiological Protection, the RBE (relative biological effectiveness) for alpha particles is 20.
 - (a) RBE compares the biological damage caused by the radiation of interest to the biological damage caused by what type of radiation?

 - (b) If a sample of blood cells is exposed to 0.001 Gy/min of alpha radiation for 3 hours, what is the absorbed dose?

 - (c) If a sample of blood cells is exposed to 0.001 Gy/min of alpha radiation for 3 hours, what is the equivalent dose?

 - (d) If the mass of a red blood cell is approximately 27 pg, with how much energy was the red blood cell irradiated when exposed to 0.001 Gy/min alpha radiation for 3 hours?