

## CHEM 102 Answer Key: Review Guide on Chapter 4 RADIOACTIVITY

1. Radioactivity involves a change in the nucleus of the atom, whereas chemical reactions involve rearrangement of valence electrons (outside the nucleus).
2. The three forms of radiation are: alpha, beta and gamma rays.
3. Of the 3 forms of radiation alpha is the most ionizing but least penetrating (it can be blocked by thin clothing or even by our skin); gamma rays penetrates matter the most but is the least ionizing.
4. Of the 3 forms of radiation beta rays (so is alpha) can be blocked by thick clothing.
5. Rank the following in terms of increasing annual radiation exposure:

Lowest A person living near a nuclear power plant

Intermediate A person living in an average household in Massachusetts

Highest A person who had one gastro-intestinal x-ray

6. (a) Identify three benefits that we get from radiation.

- (b) Give an example for each benefit cited in (a).

- ✚ Food sterilization (Ex. meat - kills pathogens and increases shelf-life)
- ✚ Generation of electricity (Ex. nuclear power plants generating electricity from nuclear fission of uranium or plutonium)
- ✚ Medical imaging tool (Ex. CAT scans); medical diagnosis (Ex. Use of Iodine-131 to identify irregularities of the thyroid)

7. Give two examples of radioactive elements used as fuel in nuclear power plants. Uranium and plutonium

8. Give two reasons why a nuclear explosion (like that of an atomic bomb) is not possible in nuclear power plants. (See lecture notes)

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9. Give three uses of CAT scans.

- 1) Diagnose tumors, investigate internal bleeding, and check for other internal injuries or damages.
- 2) Check bone densities
- 3) Detecting and diagnosing cancer of the lungs and abdomen, heart disease, acute stroke, vascular diseases, and many more!