

TSOKOS READING ACTIVITY

Section 7-1B

1. Essential Idea: In the microscopic world energy is discrete.
2. Nature Of Science: Accidental discovery: Radioactivity was discovered by accident when Becquerel developed photographic film that had accidentally been exposed to radiation from radioactive rocks. The marks on the photographic film seen by Becquerel probably would not lead to anything further for most people. What Becquerel did was to correlate the presence of the marks with the presence of the radioactive rocks and investigate the situation further.
3. International-Mindedness: The geopolitics of the past 60+ years have been greatly influenced by the existence of nuclear weapons
4. Understandings:
 - a. Radioactive decay
 - b. Alpha particles, beta particles and gamma rays
 - c. Half-life
 - d. Absorption characteristics of decay particles
 - e. Background radiation
5. Applications And Skills:
 - a. Completing decay equations for alpha and beta decay
 - b. Determining the half-life of a nuclide from a decay curve
 - c. Investigating half-life experimentally (or by simulation)
 - d. Completing decay equations for alpha and beta decay
 - e. Determining the half-life of a nuclide from a decay curve
 - f. Investigating half-life experimentally (or by simulation)
6. Guidance:
 - a. Students will be required to solve problems on radioactive decay involving only integral numbers of half-lives
 - b. Students will be expected to include the neutrino and antineutrino in beta decay equations
7. Data Booklet Reference:
 - a. $E = hf$
 - b. $\lambda = \frac{hc}{E}$
8. Utilization:

- a. Knowledge of radioactivity, radioactive substances and the radioactive decay law are crucial in modern nuclear medicine
 - b. How to deal with the radioactive output of nuclear decay is important in the debate over nuclear power stations (see Physics sub-topic 8.1)
 - c. Carbon dating is used in providing evidence for evolution (see Biology sub-topic 5.1)
 - d. Exponential functions (see Mathematical studies SL sub-topic 6.4; Mathematics HL sub-topic 2.4)
9. Aims:
- a. Aim 8: the use of radioactive materials poses environmental dangers that must be addressed at all stages of research
 - b. Aim 9: the use of radioactive materials requires the development of safe experimental practices and methods for handling radioactive materials
10. Read the second half of section 7-1, pgs 275 - 283 in your textbook.
11. Write a definition for each of the terms listed below.
- a. Radioactivity _____

 - b. Ionizing power _____

 - c. Penetrating power _____

 - d. Alpha decay _____

 - e. Alpha particle _____

 - f. Beta particle _____

 - g. Beta minus decay _____

 - h. Beta plus decay _____

 - i. Positron _____

 - j. Gamma decay _____

 - k. Gamma particle _____

l. Decay series _____

m. Law of radioactive decay _____

n. Half-life _____

o. Activity (not the CAS kind, even though they both lead to decay) _____

p. Background radiation _____

q. List and define the four fundamental forces.

i. _____

ii. _____

iii. _____

iv. _____

r. Electroweak interaction _____

s. Serendipitous _____

12. Why was Becquerel's busted experiment serendipitous? _____

13. Answers may be typed or neatly printed. Drawings may be freehand, but try to make use of the 'Shapes' or 'Insert Clipart' functions of MS Word. If you submit this assignment electronically, the filename must be in the following format, "LastnameFirstinitialPerXReadActX-X".