

WKS 5-1 – Honors
Nuclear Decay Reactions
(Spontaneous Transmutation)

Name _____
Period _____ Date _____

Read pp. 705-707 in your text

Part I. Overview

1. Define nuclear radiation. What is radioactive decay? What is a radioactive nuclide?
2. List the 5 main kinds of nuclear decay and their properties:
3. When will a nucleus stop undergoing decay processes?

Part II. Complete the following nuclear decay (spontaneous transmutation) equations then identify each as its specific type of decay: α , β , β^+ , e^- capture, or γ

<u>Equation</u>	<u>Type</u>		<u>Equation</u>	<u>Type</u>
4. ${}_{84}^{214}\text{Po} \longrightarrow {}_{82}^{210}\text{Pb} + \underline{\hspace{2cm}}$	_____		11. ${}_{28}^{59}\text{Ni} + {}_{-1}^0\text{e} \longrightarrow \underline{\hspace{2cm}}$	_____
5. ${}_{86}^{222}\text{Rn} \longrightarrow \underline{\hspace{2cm}} + {}_2^4\text{He}$	_____		12. ${}_{27}^{60}\text{Co}^* \longrightarrow {}_{27}^{60}\text{Co} + \underline{\hspace{2cm}}$	_____
6. ${}_{82}^{214}\text{Pb} \longrightarrow {}_{83}^{214}\text{Bi} + \underline{\hspace{2cm}}$	_____		13. $\underline{\hspace{2cm}} \longrightarrow {}_{90}^{234}\text{Th} + {}_2^4\text{He}$	_____
7. ${}_{93}^{239}\text{Np} \longrightarrow \underline{\hspace{2cm}} + {}_{-1}^0\text{e}$	_____		14. $\underline{\hspace{2cm}} \longrightarrow {}_{21}^{45}\text{Sc} + {}_{+1}^0\text{e}$	_____
8. ${}_{19}^{37}\text{K} \longrightarrow \underline{\hspace{2cm}} + {}_{+1}^0\text{e}$	_____		15. $\underline{\hspace{2cm}} + {}_{-1}^0\text{e} \longrightarrow {}_{68}^{168}\text{Er}$	_____
9. ${}_{20}^{37}\text{Ca} \longrightarrow {}_{19}^{37}\text{K} + \underline{\hspace{2cm}}$	_____		16. $\underline{\hspace{2cm}} \longrightarrow {}_{84}^{214}\text{Po} + {}_{-1}^0\text{e}$	_____
10. ${}_{13}^{26}\text{Al} + \underline{\hspace{2cm}} \longrightarrow {}_{12}^{26}\text{Mg}$	_____		17. ${}_{26}^{50}\text{Fe} \longrightarrow {}_{27}^{50}\text{Co} + \underline{\hspace{2cm}}$	_____

Part III. For the following processes write the complete nuclear decay equation.

18. Write the equation for the alpha decay of americium-241.

19. Write the equation for the beta decay of uranium-237.

20. Write the equation for the positron emission from silicon-26.

21. Write the equation for the electron capture of sodium-22.

Part IV. For the following processes, write the complete nuclear decay equation and *indicate the decay type*.

22. Write out the equation for the transformation of uranium-238 into thorium-234.

23. What decay process can transform cobalt-60 into nickel-60? Write out the equation.

24. Write the *two* processes can transform oxygen-15 into nitrogen-15.