WKS – 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)

	Equation	Type
4.	$^{214}_{84}\text{Po} \longrightarrow {}^{210}_{82}\text{Pb} + $ _____	_____
5.	$^{222}_{86}\text{Rn} \longrightarrow$ _____ $+ {}^{4}_{2}\text{He}$	_____
6.	$^{214}_{82}\text{Pb} \longrightarrow {}^{214}_{83}\text{Bi} +$ _____	_____
7.	$^{239}_{93}\text{Np} \longrightarrow$ _____ $+ {}^{0}_{-1}\text{e}$	_____
8.	$^{37}_{19}\text{K} \longrightarrow$ _____ $+ {}^{0}_{+1}\text{e}$	_____
9.	$^{37}_{20}\text{Ca} \longrightarrow {}^{37}_{19}\text{K} +$ _____	_____
10.	$^{26}_{13}\text{Al} +$ _____ $\longrightarrow {}^{26}_{12}\text{Mg}$	_____

	Equation	Type
11.	$^{59}_{28}\text{Ni} + {}^{0}_{-1}\text{e} \longrightarrow$ _____	_____
12.	$^{60}_{27}\text{Co}^* \longrightarrow {}^{60}_{27}\text{Co} +$ _____	_____
13.	_____ $\longrightarrow {}^{234}_{90}\text{Th} + {}^{4}_{2}\text{He}$	_____
14.	_____ $\longrightarrow {}^{45}_{21}\text{Sc} + {}^{0}_{+1}\text{e}$	_____
15.	_____ $+ {}^{0}_{-1}\text{e} \longrightarrow {}^{168}_{68}\text{Er}$	_____
16.	_____ $\longrightarrow {}^{214}_{84}\text{Po} + {}^{0}_{-1}\text{e}$	_____
17.	$^{50}_{26}\text{Fe} \longrightarrow {}^{50}_{27}\text{Co} +$ _____	_____

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.

For more practice, go to http://www.chemteam.info/ChemTeamIndex.html and click on Radioactivity.