

WKS
Nuclear Decay Reactions
(Spontaneous Transmutation)

Name _____
Period _____ Date _____

For problems 1-8, fill in the blanks to complete the equations. Use a periodic table to identify elements by atomic number. Indicate the decay type at right.

1. ${}^{214}_{84}\text{Po} \longrightarrow {}^{210}_{82}\text{Pb} + \underline{\hspace{2cm}}$ Decay type: _____
2. ${}^{222}_{86}\text{Rn} \longrightarrow \underline{\hspace{2cm}} + {}^4_2\text{He}$ Decay type: _____
3. ${}^{214}_{82}\text{Pb} \longrightarrow {}^{214}_{83}\text{Bi} + \underline{\hspace{2cm}}$ Decay type: _____
4. ${}^{239}_{93}\text{Np} \longrightarrow \underline{\hspace{2cm}} + {}^0_{-1}\text{e}$ Decay type: _____
5. ${}^{37}_{19}\text{K} \longrightarrow \underline{\hspace{2cm}} + {}^0_{+1}\text{e}$ Decay type: _____
6. ${}^{37}_{20}\text{Ca} \longrightarrow {}^{37}_{19}\text{K} + \underline{\hspace{2cm}}$ Decay type: _____
7. ${}^{26}_{13}\text{Al} + \underline{\hspace{1cm}} \longrightarrow {}^{26}_{12}\text{Mg}$ Decay type: _____
8. ${}^{59}_{28}\text{Ni} + {}^0_{-1}\text{e} \longrightarrow \underline{\hspace{2cm}}$ Decay type: _____

For problems 9-12, write the complete nuclear decay equation and determine the product isotope for the indicated decay mechanism starting with the given isotope.

9. Write the equation for the alpha decay of americium-241. What are there too many of in the nucleus?

10. Write the equation for the beta decay of uranium-237. What are there too many of in the nucleus?

11. Write the equation for the positron emission from silicon-26. What are there too many of in the nucleus?

12. Write the equation for the electron capture of sodium-22. What are there too many of in the nucleus?

For questions 13-16, write the complete nuclear decay equation and indicate the decay type for the transmutation of the starting isotope into the product isotope.

13. Write out the equation that transforms uranium-238, which has too many nucleons, into thorium-234. What decay process is this?

14. Write out the equation for the transformation of cobalt-60, which has too many neutrons (n^0/p^+ too high), into nickel-60. What decay process is this?

15. Write out the equation for the *emission* process that transforms oxygen-15, which has too many protons (n^0/p^+ too low), into nitrogen-15. What decay process is this?

16. Write out the equation for the *capture* process that transforms calcium-41, which has too many protons (n^0/p^+ too low), into potassium-41. What decay process is this?