

Radioactive Decay Worksheet

Key - 1993

Alpha Decay - For each nuclide given, write a complete alpha decay equation.

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|---|---|---|--|--|---|---|
| 1. ${}_{84}^{208}\text{Po}$ | 2. ${}_{86}^{211}\text{Rn}$ | 3. ${}_{87}^{211}\text{Fr}$ | 4. ${}_{88}^{222}\text{Ra}$ | 5. ${}_{89}^{225}\text{Ac}$ | 6. ${}_{91}^{227}\text{Pa}$ | 7. ${}_{91}^{231}\text{Pa}$ |
| ${}_{82}^{204}\text{Pb}$ ${}_{82}^{82}\text{Pb}$ | ${}_{84}^{207}\text{Po}$ ${}_{84}^{84}\text{Po}$ | ${}_{85}^{207}\text{At}$ ${}_{85}^{85}\text{At}$ | ${}_{86}^{218}\text{Rn}$ ${}_{86}^{86}\text{Rn}$ | ${}_{87}^{221}\text{Fr}$ ${}_{87}^{87}\text{Fr}$ | ${}_{89}^{223}\text{Ac}$ ${}_{89}^{89}\text{Ac}$ | ${}_{89}^{227}\text{Ac}$ ${}_{89}^{89}\text{Ac}$ |
| 8. ${}_{92}^{233}\text{U}$ | 9. ${}_{93}^{237}\text{Np}$ | 10. ${}_{94}^{239}\text{Pu}$ | 11. ${}_{95}^{241}\text{Am}$ | 12. ${}_{96}^{240}\text{Cm}$ | 13. ${}_{97}^{247}\text{Bk}$ | 14. ${}_{98}^{251}\text{Cf}$ |
| ${}_{90}^{229}\text{Th}$ ${}_{90}^{90}\text{Th}$ | ${}_{91}^{233}\text{Pa}$ ${}_{91}^{91}\text{Pa}$ | ${}_{92}^{235}\text{U}$ ${}_{92}^{92}\text{U}$ | ${}_{93}^{237}\text{Np}$ ${}_{93}^{93}\text{Np}$ | ${}_{94}^{236}\text{Pu}$ ${}_{94}^{94}\text{Pu}$ | ${}_{95}^{243}\text{Am}$ ${}_{95}^{95}\text{Am}$ | ${}_{96}^{247}\text{Cm}$ ${}_{96}^{96}\text{Cm}$ |
| 15. ${}_{99}^{252}\text{Es}$ | 16. ${}_{100}^{257}\text{Fm}$ | 17. ${}_{101}^{255}\text{Md}$ | 18. ${}_{102}^{255}\text{No}$ | 19. ${}_{103}^{256}\text{Lr}$ | | |
| ${}_{97}^{248}\text{Bk}$ ${}_{97}^{97}\text{Bk}$ | ${}_{98}^{253}\text{Cf}$ ${}_{98}^{98}\text{Cf}$ | ${}_{99}^{251}\text{Es}$ ${}_{99}^{99}\text{Es}$ | ${}_{100}^{251}\text{Fm}$ ${}_{100}^{100}\text{Fm}$ | ${}_{101}^{252}\text{Md}$ ${}_{101}^{101}\text{Md}$ | | |

Beta Decay - For each nuclide given, write a complete beta decay equation.

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| 20. ${}_{2}^{6}\text{He}$ | 21. ${}_{3}^{8}\text{Li}$ | 22. ${}_{4}^{10}\text{Be}$ | 23. ${}_{5}^{13}\text{B}$ | 24. ${}_{6}^{14}\text{C}$ | 25. ${}_{7}^{16}\text{N}$ | 26. ${}_{8}^{19}\text{O}$ |
| ${}_{3}^{6}\text{Li}$ ${}_{3}^{3}\text{Li}$ | ${}_{4}^{8}\text{Be}$ ${}_{4}^{4}\text{Be}$ | ${}_{5}^{10}\text{B}$ ${}_{5}^{5}\text{B}$ | ${}_{6}^{13}\text{C}$ ${}_{6}^{6}\text{C}$ | ${}_{7}^{14}\text{N}$ ${}_{7}^{7}\text{N}$ | ${}_{8}^{16}\text{O}$ ${}_{8}^{8}\text{O}$ | ${}_{9}^{19}\text{F}$ ${}_{9}^{9}\text{F}$ |
| 27. ${}_{9}^{20}\text{F}$ | 28. ${}_{11}^{24}\text{Na}$ | 29. ${}_{15}^{32}\text{P}$ | 30. ${}_{16}^{35}\text{S}$ | 31. ${}_{19}^{42}\text{K}$ | 32. ${}_{26}^{52}\text{Fe}$ | 33. ${}_{27}^{60}\text{Co}$ |
| ${}_{10}^{20}\text{Ne}$ ${}_{10}^{10}\text{Ne}$ | ${}_{12}^{24}\text{Mg}$ ${}_{12}^{12}\text{Mg}$ | ${}_{16}^{32}\text{S}$ ${}_{16}^{16}\text{S}$ | ${}_{17}^{35}\text{Cl}$ ${}_{17}^{17}\text{Cl}$ | ${}_{20}^{42}\text{Ca}$ ${}_{20}^{20}\text{Ca}$ | ${}_{27}^{52}\text{Co}$ ${}_{27}^{27}\text{Co}$ | ${}_{28}^{60}\text{Ni}$ ${}_{28}^{28}\text{Ni}$ |
| 34. ${}_{35}^{82}\text{Br}$ | 35. ${}_{38}^{90}\text{Sr}$ | 36. ${}_{43}^{99}\text{Tc}$ | 37. ${}_{53}^{131}\text{I}$ | 38. ${}_{55}^{137}\text{Cs}$ | 39. ${}_{77}^{192}\text{Ir}$ | 40. ${}_{79}^{201}\text{Au}$ |
| ${}_{36}^{82}\text{Kr}$ ${}_{36}^{36}\text{Kr}$ | ${}_{39}^{90}\text{Y}$ ${}_{39}^{39}\text{Y}$ | ${}_{44}^{99}\text{Ru}$ ${}_{44}^{44}\text{Ru}$ | ${}_{54}^{131}\text{Xe}$ ${}_{54}^{54}\text{Xe}$ | ${}_{56}^{137}\text{Ba}$ ${}_{56}^{56}\text{Ba}$ | ${}_{78}^{192}\text{Pt}$ ${}_{78}^{78}\text{Pt}$ | ${}_{80}^{201}\text{Hg}$ ${}_{80}^{80}\text{Hg}$ |

Electron Capture - For each nuclide given, write a complete electron capture equation.

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| 41. ${}_{18}^{37}\text{Ar}$ | 42. ${}_{23}^{50}\text{V}$ | 43. ${}_{24}^{51}\text{Cr}$ | 44. ${}_{27}^{57}\text{Co}$ | 45. ${}_{28}^{56}\text{Ni}$ | 46. ${}_{31}^{67}\text{Ga}$ | 47. ${}_{33}^{73}\text{As}$ |
| ${}_{17}^{37}\text{Cl}$ ${}_{17}^{17}\text{Cl}$ | ${}_{22}^{50}\text{Ti}$ ${}_{22}^{22}\text{Ti}$ | ${}_{23}^{51}\text{V}$ ${}_{23}^{23}\text{V}$ | ${}_{26}^{57}\text{Fe}$ ${}_{26}^{26}\text{Fe}$ | ${}_{27}^{56}\text{Co}$ ${}_{27}^{27}\text{Co}$ | ${}_{30}^{67}\text{Zn}$ ${}_{30}^{30}\text{Zn}$ | ${}_{32}^{73}\text{Ge}$ ${}_{32}^{32}\text{Ge}$ |
| 48. ${}_{36}^{81}\text{Kr}$ | 49. ${}_{38}^{80}\text{Sr}$ | 50. ${}_{41}^{91}\text{Nb}$ | 51. ${}_{44}^{97}\text{Ru}$ | 52. ${}_{53}^{125}\text{I}$ | 53. ${}_{56}^{128}\text{Ba}$ | 54. ${}_{62}^{145}\text{Sm}$ |
| ${}_{35}^{81}\text{Br}$ ${}_{35}^{35}\text{Br}$ | ${}_{37}^{80}\text{Rb}$ ${}_{37}^{37}\text{Rb}$ | ${}_{40}^{91}\text{Zr}$ ${}_{40}^{40}\text{Zr}$ | ${}_{43}^{97}\text{Tc}$ ${}_{43}^{43}\text{Tc}$ | ${}_{52}^{125}\text{Te}$ ${}_{52}^{52}\text{Te}$ | ${}_{55}^{128}\text{Cs}$ ${}_{55}^{55}\text{Cs}$ | ${}_{61}^{145}\text{Pm}$ ${}_{61}^{61}\text{Pm}$ |
| 55. ${}_{69}^{168}\text{Tm}$ | 56. ${}_{84}^{200}\text{Po}$ | 57. ${}_{94}^{235}\text{Pu}$ | 58. ${}_{96}^{239}\text{Cm}$ | 59. ${}_{97}^{244}\text{Bk}$ | 60. ${}_{99}^{247}\text{Es}$ | 61. ${}_{101}^{257}\text{Md}$ |
| ${}_{68}^{168}\text{Er}$ ${}_{68}^{68}\text{Er}$ | ${}_{83}^{200}\text{Bi}$ ${}_{83}^{83}\text{Bi}$ | ${}_{93}^{235}\text{Np}$ ${}_{93}^{93}\text{Np}$ | ${}_{95}^{239}\text{Am}$ ${}_{95}^{95}\text{Am}$ | ${}_{96}^{244}\text{Cm}$ ${}_{96}^{96}\text{Cm}$ | ${}_{98}^{247}\text{Cf}$ ${}_{98}^{98}\text{Cf}$ | ${}_{100}^{257}\text{Fm}$ ${}_{100}^{100}\text{Fm}$ |

Positron Decay - For each nuclide given, write a complete positron decay equation.

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| 62. ${}_{7}^{13}\text{N}$ | 63. ${}_{8}^{15}\text{O}$ | 64. ${}_{9}^{18}\text{F}$ | 65. ${}_{10}^{19}\text{Ne}$ | 66. ${}_{11}^{21}\text{Na}$ | 67. ${}_{12}^{23}\text{Mg}$ | 68. ${}_{13}^{25}\text{Al}$ |
| ${}_{6}^{13}\text{C}$ ${}_{6}^{6}\text{C}$ | ${}_{7}^{15}\text{N}$ ${}_{7}^{7}\text{N}$ | ${}_{8}^{18}\text{O}$ ${}_{8}^{8}\text{O}$ | ${}_{9}^{19}\text{F}$ ${}_{9}^{9}\text{F}$ | ${}_{10}^{21}\text{Ne}$ ${}_{10}^{10}\text{Ne}$ | ${}_{11}^{23}\text{Na}$ ${}_{11}^{11}\text{Na}$ | ${}_{12}^{25}\text{Mg}$ ${}_{12}^{12}\text{Mg}$ |
| 69. ${}_{14}^{27}\text{Si}$ | 70. ${}_{15}^{30}\text{P}$ | 71. ${}_{16}^{30}\text{S}$ | 72. ${}_{19}^{37}\text{K}$ | 73. ${}_{20}^{39}\text{Ca}$ | 74. ${}_{21}^{42}\text{Sc}$ | 75. ${}_{22}^{45}\text{Ti}$ |
| ${}_{13}^{27}\text{Al}$ ${}_{13}^{13}\text{Al}$ | ${}_{14}^{30}\text{Si}$ ${}_{14}^{14}\text{Si}$ | ${}_{15}^{30}\text{P}$ ${}_{15}^{15}\text{P}$ | ${}_{18}^{37}\text{Ar}$ ${}_{18}^{18}\text{Ar}$ | ${}_{19}^{39}\text{K}$ ${}_{19}^{19}\text{K}$ | ${}_{20}^{42}\text{Ca}$ ${}_{20}^{20}\text{Ca}$ | ${}_{21}^{45}\text{Sc}$ ${}_{21}^{21}\text{Sc}$ |
| 76. ${}_{27}^{54}\text{Co}$ | 77. ${}_{29}^{60}\text{Cu}$ | 78. ${}_{30}^{61}\text{Zn}$ | 79. ${}_{38}^{83}\text{Sr}$ | 80. ${}_{31}^{68}\text{Ga}$ | 81. ${}_{35}^{75}\text{Br}$ | 82. ${}_{66}^{155}\text{Dy}$ |
| ${}_{26}^{54}\text{Fe}$ ${}_{26}^{26}\text{Fe}$ | ${}_{28}^{60}\text{Ni}$ ${}_{28}^{28}\text{Ni}$ | ${}_{29}^{61}\text{Cu}$ ${}_{29}^{29}\text{Cu}$ | ${}_{37}^{83}\text{Rb}$ ${}_{37}^{37}\text{Rb}$ | ${}_{30}^{68}\text{Zn}$ ${}_{30}^{30}\text{Zn}$ | ${}_{34}^{75}\text{Se}$ ${}_{34}^{34}\text{Se}$ | ${}_{65}^{155}\text{Tb}$ ${}_{65}^{65}\text{Tb}$ |

Sample Full Equations

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| <p>1. ${}_{84}^{208}\text{Po} \rightarrow {}_{82}^{204}\text{Pb} + {}_2^4\text{He}$</p> <p>10. ${}_{94}^{239}\text{Pu} \rightarrow {}_2^4\text{He} + {}_{92}^{235}\text{U}$</p> | <p>20. ${}_{2}^{6}\text{He} \rightarrow {}_{3}^{6}\text{Li} + {}_+^0\text{e} + {}_0^0\bar{\nu}$</p> <p>30. ${}_{16}^{35}\text{S} \rightarrow {}_+^0\text{e} + {}_0^0\bar{\nu} + {}_{17}^{35}\text{Cl}$</p> <p>41. ${}_{18}^{37}\text{Ar} + {}_+^0\text{e} \rightarrow {}_{17}^{37}\text{Cl}$</p> <p>51. ${}_{44}^{97}\text{Ru} + {}_+^0\text{e} \rightarrow {}_{43}^{97}\text{Tc}$</p> |
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