KEY

Isotopes & Nuclear Reactions

Fill in all blanks.

	# Protons	# Neutrons	Mass #	Atomic #
1. $^{55}_{[\,]}Mn$	25	30	55	25
2. $^{113}_{[\,]}Cd$	48	65	113	48
3. $^{234}_{[\,]}U$	92	142	234	92
4. $^{52}_{[\,]}Cr$	24	28	52	24

α/β Decay

	Decay type name
5. $^{238}_{92}U \rightarrow (^{4}_{2}He) + ^{234}_{90}Th$	α
6. $(^{234}_{90}Th) \rightarrow ^{0}_{-1}e + ^{234}_{91}Pa$	β
7. $^{226}_{88}Ra \rightarrow ^{4}_{2}He + (^{222}_{86}Rn)$	α
8. $(^{218}_{83}Bi) \rightarrow ^{0}_{-1}e + ^{218}_{84}Po$	β
9. $^{234}_{90}Th \rightarrow ^{4}_{2}He + (^{230}_{88}Ra)$	α

Fill in the missing information in this *decay series*.

	Name of type of decay
10. $^{238}_{92}U \rightarrow (^{4}_{2}He) + ^{234}_{90}Th$	α
11. $(^{234}_{90}Th) \rightarrow ^{0}_{-1}e + ^{234}_{91}Pa$	β
12. $(^{234}_{91}Pa) \rightarrow (^{0}_{-1}e) + ^{234}_{92}U$	β
13. $^{234}_{92}U \rightarrow ^{4}_{2}He + (^{230}_{90}Th)$	α
14. $(^{230}_{90}Th) \rightarrow (^{4}_{2}He) + ^{226}_{88}Ra$	α
15. $^{226}_{88}Ra \rightarrow ^{4}_{2}He + (^{222}_{86}Rn)$	α
16. $(^{222}_{86}Rn) \rightarrow (^{4}_{2}He) + ^{218}_{84}Po$	α
17. $^{218}_{84}Po \rightarrow ^{0}_{-1}e + (^{218}_{85}At)$	β

Nuclear Reactions

1. Write the nuclear reaction for the alpha decay of $^{231}_{91}Pa$.

   $^{231}_{91}Pa \rightarrow ^{4}_{2}He + ^{227}_{89}Ac$

2. Write the nuclear reaction for the beta decay of $^{233}_{87}Fr$.

   $^{233}_{87}Fr \rightarrow ^{0}_{-1}e + ^{233}_{88}Ra$

3. Write the nuclear reaction for the alpha decay of $^{149}_{62}Sm$.

   $^{149}_{62}Sm \rightarrow ^{4}_{2}He + ^{145}_{60}Nd$

4. Write the nuclear reaction for the beta decay of $^{165}_{61}Pm$.

   $^{165}_{61}Pm \rightarrow ^{0}_{-1}e + ^{165}_{62}Sm$

5. Write the nuclear reaction of $^{146}_{62}Sm$ that undergoes 2 alpha decays.

   $^{146}_{62}Sm \rightarrow ^{4}_{2}He + ^{142}_{60}Nd$

   $^{142}_{60}Nd \rightarrow ^{4}_{2}He + ^{138}_{58}Ce$

6. Write the nuclear reaction of $^{198}_{85}At$ that undergoes 2 beta decays.

   $^{198}_{85}At \rightarrow ^{0}_{-1}e + ^{198}_{86}Rn$

   $^{198}_{86}Rn \rightarrow ^{0}_{-1}e + ^{198}_{87}Fr$

7. Write the nuclear reaction of $^{150}_{64}Gd$ that undergoes 1 alpha and 2 beta decays.

   $^{150}_{64}Gd \rightarrow ^{4}_{2}He + ^{146}_{62}Sm$

   $^{146}_{62}Sm \rightarrow ^{0}_{-1}e + ^{146}_{63}Eu$

   $^{146}_{63}Eu \rightarrow ^{0}_{-1}e + ^{146}_{64}Gd$

8. Write the nuclear reaction of $^{152}_{54}Xe$ that undergoes 2 alpha and 1 beta decay.

   $^{152}_{54}Xe \rightarrow ^{4}_{2}He + ^{148}_{52}Te$

   $^{148}_{52}Te \rightarrow ^{4}_{2}He + ^{144}_{50}Sn$

   $^{144}_{50}Sn \rightarrow ^{0}_{-1}e + ^{144}_{51}Sb$

9. If $^{120}_{55}Cs$ decays into $^{108}_{47}Ag$, then how many alpha decays has it undergone?

   ~~120~~ WON'T WORK

   $^{120}_{55}Cs \rightarrow ^{4}_{2}He + ^{116}_{53} \rightarrow ^{4}_{2}He + ^{112}_{51} \rightarrow ^{4}_{2}He + ^{108}_{49} \rightarrow ^{0}_{-1}e + ^{108}_{50}$