

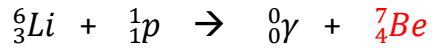
Transmutations Worksheet

Honors Chemistry

- ${}_{13}^{27}\text{Al} + {}_2^4\text{He} \rightarrow {}_{15}^{30}\text{P} + {}_0^1\text{n}$
- ${}_{20}^{44}\text{Ca} + {}_1^1\text{H} \rightarrow {}_{21}^{44}\text{Sc} + {}_0^1\text{n}$
- ${}_{29}^{63}\text{Cu} + {}_1^2\text{H} \rightarrow 2 {}_0^1\text{n} + {}_{30}^{63}\text{Zn}$
- ${}_4^9\text{Be} + {}_2^4\text{He} \rightarrow {}_6^{12}\text{C} + {}_0^1\text{n}$
- ${}_{15}^{31}\text{P} + {}_1^2\text{H} \rightarrow {}_{15}^{32}\text{P} + {}_1^1\text{H}$
- ${}_{17}^{37}\text{Cl} + {}_1^2\text{H} \rightarrow {}_{16}^{35}\text{S} + {}_2^4\text{He}$
- ${}_{15}^{30}\text{P} + {}_0^1\text{n} \rightarrow {}_{14}^{30}\text{Si} + {}_1^1\text{H}$
- ${}_{5}^{11}\text{B} + {}_2^4\text{He} \rightarrow {}_7^{14}\text{N} + {}_0^1\text{n}$
- ${}_{29}^{63}\text{Cu} + {}_1^2\text{D} \rightarrow {}_{30}^{64}\text{Zn} + {}_0^1\text{n}$
- ${}_1^2\text{H} + {}_0^0\gamma \rightarrow {}_1^1\text{H} + {}_0^1\text{n}$
- ${}_{15}^{31}\text{P} + {}_1^1\text{H} \rightarrow {}_{14}^{28}\text{Si} + {}_2^4\text{He}$
- ${}_{7}^{14}\text{N} + {}_2^4\text{He} \rightarrow {}_8^{17}\text{O} + {}_1^1\text{H}$
- ${}_{94}^{239}\text{Pu} + {}_2^4\text{He} \rightarrow {}_0^1\text{n} + {}_{96}^{242}\text{Cm}$
- ${}_{11}^{22}\text{Na} \rightarrow {}_{12}^{22}\text{Mg} + {}_{-1}^0\text{e}$
- ${}_{92}^{235}\text{U} + {}_0^1\text{n} \rightarrow {}_{42}^{95}\text{Mo} + 2 {}_0^1\text{n} + {}_{50}^{139}\text{Sn}$
- ${}_3^6\text{Li} + {}_1^2\text{H} \rightarrow {}_4^7\text{Be} + {}_0^1\text{n}$
- ${}_1^3\text{H} + {}_2^3\text{He} \rightarrow {}_4^6\text{Be} + {}_{-1}^0\text{e} -$
- ${}_3^6\text{Li} + {}_0^1\text{n} \rightarrow {}_2^4\text{He} + {}_3^3\text{H}$
- ${}_{51}^{121}\text{Sb} + {}_0^1\text{n} \rightarrow {}_{51}^{122}\text{Sb} + {}_0^0\gamma$
- ${}_{82}^{214}\text{Pb} \rightarrow {}_{-1}^0\text{e} - + {}_{83}^{214}\text{Bi}$
- ${}_{7}^{14}\text{N} + {}_0^1\text{n} \rightarrow {}_6^{14}\text{C} + {}_1^1\text{H}$
- ${}_3^6\text{Li} + {}_1^1\text{H} \rightarrow {}_2^4\text{He} + {}_3^3\text{He}$
- ${}_{95}^{241}\text{Am} \rightarrow {}_{93}^{237}\text{Np} + {}_2^4\text{He}$
- ${}_1^2\text{H} + {}_1^2\text{H} \rightarrow {}_2^3\text{He} + {}_0^1\text{n}$
- ${}_{14}^{28}\text{Si} + {}_1^2\text{H} \rightarrow {}_{14}^{29}\text{Si} + {}_1^1\text{p} + {}_0^0\gamma$
- ${}_4^9\text{Be} + {}_2^4\text{He} \rightarrow {}_3^6\text{Li} + {}_3^7\text{Li}$
- ${}_{27}^{59}\text{Co} + {}_0^1\text{n} \rightarrow {}_{27}^{60}\text{Co} + {}_0^0\gamma$
- ${}_{29}^{63}\text{Cu} + {}_1^2\text{H} \rightarrow {}_{28}^{61}\text{Ni} + {}_2^4\text{He}$
- ${}_{18}^{40}\text{Ar} + {}_1^2\text{H} \rightarrow {}_{18}^{41}\text{Ar} + {}_1^1\text{H}$
- ${}_{14}^{29}\text{Si} + {}_1^2\text{H} \rightarrow {}_0^1\text{n} + {}_{15}^{30}\text{P}$
- ${}_{5}^{10}\text{B} + {}_0^1\text{n} \rightarrow {}_3^7\text{Li} + {}_2^4\text{He}$
- ${}_{7}^{14}\text{N} + {}_2^4\text{He} \rightarrow {}_8^{18}\text{O} + {}_{+1}^0\text{e} +$
- ${}_{12}^{26}\text{Mg} + {}_0^1\text{n} \rightarrow {}_{+1}^0\text{e} + + {}_{11}^{27}\text{Na}$
- ${}_{84}^{208}\text{Po} \rightarrow {}_2^4\text{He} + {}_{82}^{204}\text{Pb}$
- ${}_{6}^{14}\text{C} \rightarrow {}_7^{14}\text{N} + {}_{-1}^0\text{e} +$
- ${}_{29}^{63}\text{Cu} + {}_1^1\text{p} \rightarrow {}_{17}^{38}\text{Cl} + {}_0^1\text{n} + {}_{13}^{25}\text{Al}$
- ${}_{21}^{45}\text{Sc} + {}_0^1\text{n} \rightarrow {}_{19}^{42}\text{K} + {}_2^4\text{He}$
- ${}_{29}^{66}\text{Cu} \rightarrow {}_{17}^{44}\text{Cl} - + {}_{12}^{22}\text{Mg}$
- ${}_{12}^{26}\text{Mg} + {}_0^1\text{n} \rightarrow {}_{+1}^0\text{e} + + {}_{11}^{27}\text{Na}$
- ${}_0^1\text{n} + {}_{92}^{235}\text{U} \rightarrow {}_{53}^{136}\text{I} + {}_{39}^{96}\text{Y} + 4 {}_0^1\text{n}$

Write out longhand and complete the following nuclear reactions.

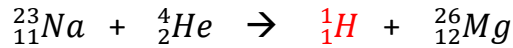
1. ${}^6\text{Li}$ (p, γ)



2. ${}^{14}\text{N}$ (n, p)



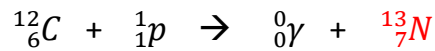
3. ${}^{23}\text{Na}$ (α ,) ${}^{26}\text{Mg}$



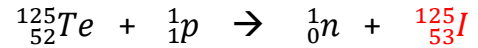
4. ${}^{54}\text{Cr}$ (, n) ${}^{54}\text{Mn}$



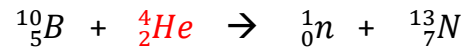
5. ${}^{12}\text{C}$ (p, γ)



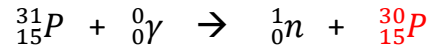
6. ${}^{125}\text{Te}$ (p, n)



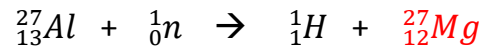
7. ${}^{10}\text{B}$ (, n) ${}^{13}\text{N}$



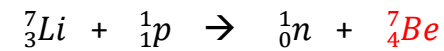
8. ${}^{31}\text{P}$ (γ , n)



9. ${}^{27}\text{Al}$ (n, p)



10. ${}^7\text{Li}$ (p, n)



Show how the following isotopes can be produced. (ip = incident particle; t = target nucleus).

1. ${}^{154}_{63}\text{Eu}$ (t = ${}^{152}_{62}\text{Sm}$)



2. ${}^{18}_9\text{F}$ (ip = p)



3. ${}^{46}_{21}\text{Sc}$ (ip = n)



4. ${}^{97}_{43}\text{Tc}$ (ip = α)



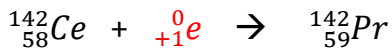
5. ${}^{95}_{41}\text{Nb}$ (t = ${}^{94}_{40}\text{Zr}$)



6. ${}^{85}_{36}\text{Kr}$ (ip = ${}^0_{+1}\text{e}$)



7. ${}^{142}_{59}\text{Pr}$ (t = ${}^{142}_{58}\text{Ce}$)



8. ${}^{90}_{39}\text{Y}$ (t = ${}^{88}_{38}\text{Sr}$)



9. ${}^{103}_{46}\text{Pd}$ (ip = α)

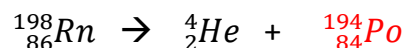


10. ${}^{199}_{79}\text{Au}$ (t = ${}^{195}_{78}\text{Pt}$)

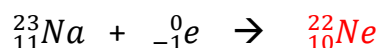


Write equation for the following processes.

1. Alpha decay of radon – 198



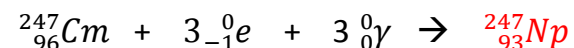
2. Sodium -22 undergoes electron capture



3. Plutonium – 244 disintegrates into α , β , and γ



4. Curium – 247 absorbs 3 beta and 3 gamma



5. Positron emission of silicon – 26

