

IB Physics
FA 30.1 - Radioactive Decay

Name _____

What you will miss least about TuHS _____

Show your work, circle your answers, and use sig figs to receive full credit.

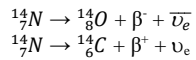
$1 \text{ u} = 1.6605 \times 10^{-27} \text{ kg} = 931.5 \text{ MeV}$, ${}^1_0\text{n} = 1.008665 \text{ u}$

1. Find the missing particle or nucleus in these decays: (These are fictitious - ignore neutrinos for now)

${}^{83}_{39}\text{Y} \rightarrow ?? + \alpha$	$?? \rightarrow {}^{49}_{22}\text{Ti} + \beta^-$	${}^{50}_{24}\text{Cr} \rightarrow {}^{50}_{23}\text{V} + ??$	${}^{54}_{26}\text{Fe} \rightarrow ?? + \gamma$
${}^{79}_{37}\text{Rb}$	${}^{49}_{21}\text{Sc}$	β^+	${}^{54}_{26}\text{Fe}$

2. What is the kinetic energy of the alpha particle that ${}^{208}\text{Po}$ ($m = 207.981222 \text{ u}$) gives off becoming ${}^{204}\text{Pb}$ ($m = 203.973020$) in MeV?

3. Imagine it is possible for ${}^{14}_7\text{N}$ undergo both β^- and β^+ decay. Write the complete decay equation below for each (complete with neutrino or anti-neutrino)



4. You have 24.0 grams of a radioactive substance with a half life of 14.0 minutes. In what time will you have 3.00 grams of it left?

5. The activity of a sample with a half-life of 23.5 minutes is initially 3.412×10^6 counts/second. What will it be in 6.00 hours?

If K-40 ($m = 39.964 \text{ u}$) had a half life of 14.0 hours, (It's actually stable) what would be the activity of 0.0240 grams of it?