Chapter 18 & 22 – Problem Set 1 & 2

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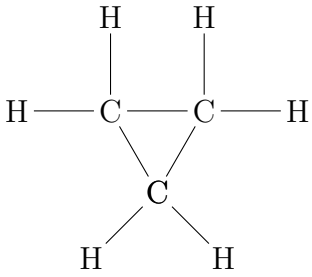
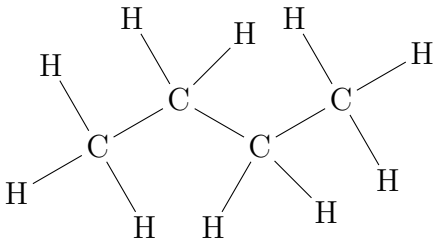
1. (a) Ether
   (b) Acid (top right) & Alcohol (bottom right)
   (c) Ketone
   (d) Acid
   (e) Aldehyde
   (f) Ester
   (g) Aldehyde
   (h) Alcohol
   (i) Halide

2. (a) Alkyne (Triple Bond)

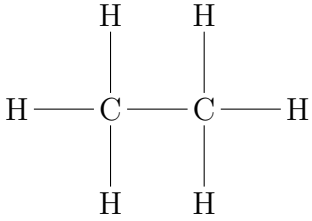
   (b) Alkane (Single Bond)



   (c) Alkane (Single Bond)



   (d) Alkane (Single Bond)

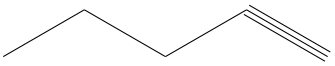
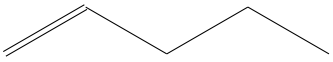
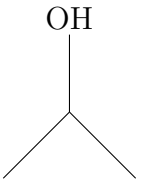


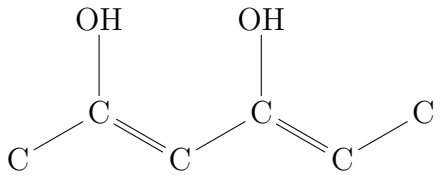
3. (a) ${}^{22}_{11}\mathrm{Na} \longrightarrow {}^{0}_{1}\mathrm{e} + {}^{22}_{10}\mathrm{Ne}$
   (b) ${}^{32}_{15}\mathrm{P} \longrightarrow {}^{0}_{-1}\mathrm{e} + {}^{32}_{16}\mathrm{S}$
   (c) ${}^{238}_{92}\mathrm{U} \longrightarrow {}^{234}_{90}\mathrm{Th} + {}^{4}_{2}\mathrm{He}$
   (d) ${}^{235}_{92}\mathrm{U} + {}^{1}_{0}\mathrm{n} \longrightarrow {}^{139}_{56}\mathrm{Ba} + {}^{94}_{36}\mathrm{Kr} + 3\,{}^{1}_{0}\mathrm{n}$
   (e) ${}^{230}_{90}\mathrm{Th} \longrightarrow {}^{4}_{2}\mathrm{He} + {}^{226}_{88}\mathrm{Ra}$
   (f) ${}^{60}_{27}\mathrm{Co} \longrightarrow {}^{60}_{28}\mathrm{Ni} + {}^{0}_{-1}\mathrm{e}$

4. (a) ${}^{210}_{84}\mathrm{Po} \longrightarrow {}^{4}_{2}\mathrm{He} + {}^{0}_{1}\mathrm{e} + {}^{206}_{81}\mathrm{Tl}$
   (b) ${}^{237}_{93}\mathrm{Np} \longrightarrow 4\,{}^{0}_{-1}\mathrm{e} + {}^{237}_{97}\mathrm{Bk}$ **OR** ${}^{237}_{93}\mathrm{Np} \longrightarrow 4\,{}^{0}_{1}\mathrm{e} + {}^{237}_{89}\mathrm{Ac}$
   (c) ${}^{230}_{90}\mathrm{Th} \longrightarrow 2\,{}^{4}_{2}\mathrm{He} + 3\,{}^{0}_{1}\mathrm{e} + {}^{222}_{83}\mathrm{Bi}$
   (d) ${}^{238}_{92}\mathrm{U} \longrightarrow 4\,{}^{0}_{0}\gamma^{+}\,3\,{}^{1}_{0}\mathrm{n} + {}^{235}_{92}\mathrm{U}$
   (e) ${}^{3}_{1}\mathrm{H} \longrightarrow {}^{0}_{-1}\mathrm{e} + {}^{3}_{2}\mathrm{He}$ **OR** ${}^{3}_{1}\mathrm{H} \longrightarrow {}^{0}_{1}\mathrm{e} + 3\,{}^{1}_{0}\mathrm{n}$
   (f) ${}^{60}_{27}\mathrm{Co} \longrightarrow 2\,{}^{0}_{-1}\mathrm{e} + 5\,{}^{0}_{1}\mathrm{e} + {}^{60}_{24}\mathrm{Cr}$ **OR** ${}^{60}_{27}\mathrm{Co} \longrightarrow 7\,{}^{0}_{1}\mathrm{e} + {}^{60}_{20}\mathrm{Ca}$
   (g) ${}^{99}_{42} \longrightarrow 5\,{}^{4}_{2}\mathrm{He} + {}^{79}_{32}\mathrm{Ge}$
   (h) ${}^{32}_{15}\mathrm{P} \longrightarrow 2\,{}^{4}_{2}\mathrm{He} + 2\,{}^{0}_{-1}\mathrm{e} + 3\,{}^{1}_{0}\mathrm{n} + {}^{21}_{13}\mathrm{Al}$ **OR** ${}^{32}_{15}\mathrm{P} \longrightarrow 2\,{}^{4}_{2}\mathrm{He} + 2\,{}^{0}_{1}\mathrm{e} + 3\,{}^{1}_{0}\mathrm{n} + {}^{21}_{9}\mathrm{F}$

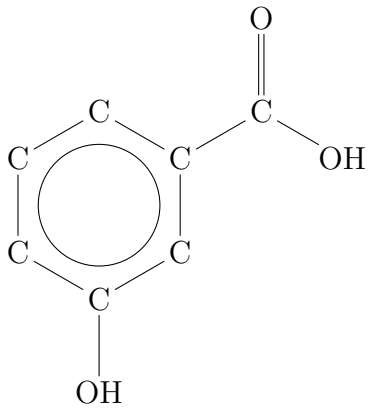
5.
$$\begin{aligned} \frac{30}{2.5} &= 12 \\ \frac{50}{2^{12}} &= .01221[\mathrm{g}] \end{aligned} \tag{1}$$

6.
$$\begin{aligned} \frac{225}{2^{\frac{x}{42}}} &= 7 \\ 225 &= 7\left(2^{\frac{x}{42}}\right) \\ 42\log_2\left(\frac{225}{7}\right) &= x \\ x &= 210.27[\mathrm{days}] \end{aligned} \tag{2}$$

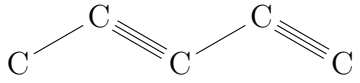
7. (a) 
   (b) 
   (c) 

8. (a) 

(b)

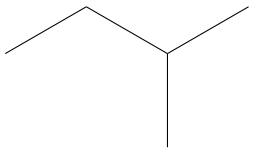


(c)

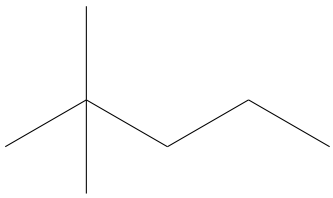


9. (a) 2-methylbutane
   (b) 2-propanol
   (c) 2-bromo,4-cloropentane
   (d) 2-bromo,3-methylbutane
   (e) 2,3-butanol
   (f) 3-ethylpentane

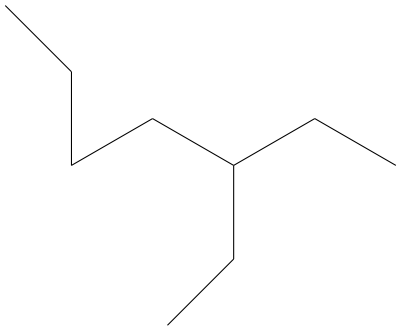
10. (a)



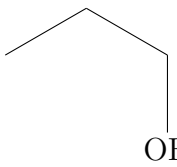
(b)



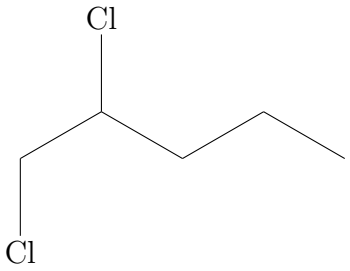
(c)



(d)



(e)



(f)