SOLUCIÓN PROBLEMAS E EXERCICIOS REPASO FÍSICA 2º BAC

1- a) $\lambda = 0{,}24nm = 2{,}4.10^{-10}\,m$

$\lambda' - \lambda = \frac{h}{m\cdot c}(1-\cos\alpha)$; $\lambda' = \lambda + \frac{h}{m\cdot c}(1-\cos\alpha)$;

$\lambda' = 2{,}4.10^{-10}\,m + \frac{6{,}63.10^{-34}}{9{,}1.10^{-31}\cdot 3.10^{8}}(1-\cos 60^{o})$; $\lambda^{'} = 2{,}52.10^{-10}\,m = 0{,}252\ nm$

b) $E_{rad\ dispersada} = h.f^{'} = h.\frac{c}{\lambda^{'}} = 6{,}63.10^{-34}.\frac{3.10^{8}}{2{,}52.10^{-10}} = 7{,}893.10^{-16}\ J$

c) E rad incidente = E rad dispersada + Ec electróns

$E_{rad\ incidente} = h.f = h.\frac{c}{\lambda} = 6{,}63.10^{-34}.\frac{3.10^{8}}{2{,}4.10^{-10}} = 8{,}288.10^{-16}\ J$

Ec $_{elec}$ = E $_{incidente}$ - E $_{dispersada}$ = $8{,}288.10^{-16}\ J$ - $7{,}893.10^{-16}\ J$ = $3{,}95.10^{-17}\ J$

2- a) Refírese a lonxitude de onda asociada: $\lambda = \frac{h}{m\cdot v}$

$\lambda = \frac{6{,}63.10^{-34}}{9{,}1.10^{-31}\cdot 10^{5}} = 7{,}29.10^{-9}\ m = 7{,}29\ nm$

b) $E = h\frac{c}{\lambda} = 6{,}63.10^{-34}\ \frac{3.10^{8}}{7{,}29.10^{-9}} = 2{,}73.10^{-17}\,J.\frac{1\,eV}{1{,}6.10^{-19}\,J} = 170{,}52\ eV$

3- a) $q.\Delta V = Ec - Ec_0$; neste caso $Ec_0 = 0$ polo que:

$Ec = q.\Delta V = 1{,}6.10^{-19}.10 = 1{,}6.10^{-18}\ J.\frac{1\,eV}{1{,}6.10^{-19}\,J} = 10\ eV$

$1{,}6.10^{-18}\ J = \frac{1}{2}1{,}67.10^{-27}.V^{2}$; $V = 4{,}38.10^{4}\,m/s$

b) $\lambda = \frac{6{,}63.10^{-34}}{1{,}67.10^{-27}\cdot 4{,}38.10^{4}} = 9{,}1.10^{-12}\ m = 9{,}1.10^{-3}\ nm$

4- a) $\Delta t = \frac{\Delta t^{'}}{\sqrt{1-\frac{u^{2}}{c^{2}}}}$; $\Delta t = \frac{d}{u} = \frac{26.365.24.3600.c}{u} = \frac{819936000.c}{u}$; Entón:

$$\frac{819936000.c}{u} = \frac{10.365.24.3600}{\sqrt{1-\frac{u^{2}}{c^{2}}}} = \frac{315360000}{\sqrt{1-\frac{u^{2}}{c^{2}}}};$$

$$\frac{672295044096000000.c^{2}}{u^{2}} = \frac{99451929600000000.c^{2}}{c^{2}-u^{2}}$$

$\frac{c^{2}}{u^{2}} - 1 = 0{,}148$; $u^{2} = \frac{c^{2}}{1{,}148}$; $u = \frac{c}{\sqrt{1{,}148}} = 0{,}93\,c$

b) $\Delta t = \frac{819936000.c}{u} = \frac{819936000}{0{,}93} = 881651612{,}9s = 27{,}96\ anos$

5- $m = \frac{m_0}{\sqrt{1-\frac{u^2}{c^2}}} = \frac{400}{\sqrt{1-\frac{0{,}36.c^2}{c^2}}} = \frac{400}{\sqrt{0{,}64}} = 500g$; Δm= 100g; $\%\,\Delta m = \frac{100}{400}.100 = 25\%$

$P_0 = 0$; atópase en repouso; $P = m.u = 500.0{,}6c = 300.10^{-3}.3.10^8 = 9.10^7\ kg.\frac{m}{s}$

$Esub = Ec = m.c^2 - m_0.c^2 = (m - m_0).c^2 = 100.10^{-3}.9.10^{16} = 9.10^{15}\ J$

6- c) *E* é a enerxía equivalente a unha determinada masa.

7- a) $m = \frac{m_0}{\sqrt{1-\frac{u^2}{c^2}}} = \frac{1}{\sqrt{1-\frac{0{,}36.c^2}{c^2}}} = \frac{1}{\sqrt{0{,}64}} = 1.25\ g$ cada partícula.

b) $E_T = m.c^2 + m.c^2 = 1{,}25.10^{-3}.9.10^{16} + 1{,}25.10^{-3}.9.10^{16} = 2{,}25.10^{14}\ J$

c) $E_{T1} = E_{T2}$; $2{,}25.10^{14}\ J = M_0.c^2$; $M_0 = \frac{2{,}25.10^{14}}{9.10^{16}} = 2{,}5.10^{-3}\ kg = 2{,}5\ g$

8- O dato que precisamos é a masa do electrón e non a carga!!! O dato da enerxía en repouso non serve para nada !! Desculpas!!

a) $m = \frac{9{,}1.10^{-31}}{\sqrt{1-\frac{0{,}64.c^2}{c^2}}} = 1{,}52.10^{-30}\ kg$

b) $E = m.c^2 = 1{,}52.10^{-30}.9.10^{16} = 1{,}37.10^{-13}\ J$

9- Unha partícula de 1 mg de masa é acelerada desde o repouso ata que acada unha velocidade: v = 0,6 *c*, sendo *c* a velocidade da luz no baleiro. Determina:

a) $m = \frac{1}{\sqrt{1-\frac{0{,}36.c^2}{c^2}}} = 1{,}25\ mg = 1{,}25.10^{-6}\ kg$

b) $Esub = Ec = m.c^2 - m_0.c^2 = (m - m_0).c^2 = 0{,}25.10^{-6}.9.10^{16} = 1{,}25.10^{10}\ J$