Chapter 1

(5) a. $5.4\ Pg \left| \frac{10^{12}\ kg}{1\ Pg} \right| = \boxed{5.4 \times 10^{12}\ kg\ C/yr}$

b. $5.4 \times 10^{12}\ kg\ C \left| \frac{44.01\ g\ CO_2}{12.01\ g\ C} \right| = \boxed{2.0 \times 10^{13}\ kg\ CO_2/yr}$

c. $2.0 \times 10^{13}\ kg\ CO_2 \left| \frac{1\ metric\ ton}{1000\ kg} \right| = \boxed{2.0 \times 10^{10}\ metric\ tons\ of\ CO_2}$

$\frac{2.0 \times 10^{10}\ tons}{5 \times 10^{9}\ people} = \boxed{4.0\ tons/person}$

(7) a. $\frac{2.2 \times 10^{3}\ kcal}{day \cdot 120\ lb} \left| \frac{1\ day}{24\ hr} \right| \left| \frac{1\ hr}{60\ min} \right| \left| \frac{1\ min}{60\ sec} \right| \left| \frac{1\ lb}{0.454\ kg} \right| \left| \frac{1000\ cal}{1\ kcal} \right| \left| \frac{4.184\ J}{1\ cal} \right|$

$= \boxed{2.0\ w/kg}$

$\frac{3.4 \times 10^{3}\ kcal}{day \cdot 120\ lbs} \rightarrow \boxed{3.0\ w/kg}$

b. $2.0 \frac{w}{kg} \left(120\ lbs \left| \frac{0.454\ kg}{1\ lb} \right| \right) = 1.1 \times 10^{2}\ w > 100\ w$

the offica worker consumes more power

(9) $37.6\ g \left| \frac{70.5\ g\ HClO_4}{100\ g} \right| = \boxed{26.5\ g\ HClO_4}$

$37.6\ g$
$-\ 26.5\ g$
$\boxed{11.1\ g\ H_2O}$

(20) a. $1{,}000\,L \left| \frac{1600\,mL}{1\,L} \right| \left| \frac{1.67\,g}{1\,mL} \right| = \boxed{1.67 \times 10^3\,g}$

b. $1.67 \times 10^3\,g\,(0.705) = \boxed{1.18 \times 10^3\,g\ HClO_4}$

c. $1.18 \times 10^3\,g\,HClO_4 \left| \frac{mol\ HClO_4}{100.45\,g\,HClO_4} \right| = \boxed{11.7\,mol\ HClO_4}$

(28) $2.00\,L \left| \frac{0.0500\ moles}{1\,L} \right| \left| \frac{61.81\,g}{1\,mol} \right| = \boxed{6.18\,g\ of\ boric\ acid}$

use a 2L volumetric flask

(35) $25.0\,mL \left| \frac{L}{1000\,mL} \right| \left| \frac{0.0236\,mol\ Th^{4+}}{1\,L} \right| \left| \frac{4\,mol\ F^-}{1\,mol\ Th^{4+}} \right| = 2.36 \times 10^{-3}\ moles\ F^-$

$\times 1.5$ (50% excess)

$= 3.54 \times 10^{-3}\ moles\ F^-$

$3.54 \times 10^{-3}\ moles\ F^- \left| \frac{1\,mol\ HF}{1\,mol\ F^-} \right| \left| \frac{20.01\,g\,HF}{1\,mol\ HF} \right| = 7.08 \times 10^{-2}\,g\,HF$

$7.08 \times 10^{-2} = (0.00491)\,x$

$x = \boxed{14.4\,g\ solution}$

Chapter 3

(1) a. 5

b. 4

c. 3

(2) a. 1.237 b. 1.238 c. 0.135 d. 2.1 e. 2.00

(3) a. 0.217

b. 0.216

c. 0.217