CHAPTER 7

Practice AP Question

NOTE: "PART (a)" is from chapter 2.

(a)(i) let x = the decimal % of Ne-20.

$\therefore (1-x)$ = the decimal % of Ne-22.

From the Periodic Table, we see that Ne has a mass of 20.18 amu or 20.18 g/mol.

THE SET-UP:

$$(19.99\text{ amu})(x) + (21.99)(1-x) = 20.18\text{ amu}(1)$$

solve for x

$x = 0.905 =$ **90.5% Ne-20 & 9.50% Ne-22**

(ii) $12.55\text{ g Ne} \times \frac{1\text{ mol Ne}}{20.18\text{ g}} \times \frac{6.02\times10^{23}\text{ atoms Ne}}{1\text{ mole Ne}} = 3.74\times10^{23}\text{ atom}$

9.50% of 3.74×10^{23} atoms Ne $= 3.5564\times10^{22}$ atom Ne-22

$= 3.56\times10^{22}$ atom Ne22

Ch 7 → (b) $\nu = 4.34\times10^{14}\ s^{-1}$

$$\lambda = \frac{c}{\nu} = \frac{3.00\times10^{8}\ m\cdot s^{-1}}{4.34\times10^{14}\ s^{-1}} = 6.912\times10^{-7}\text{ m}$$

$$6.912\times10^{-7}\text{ m} \times \frac{10^{9}\text{ nm}}{\text{m}} = 691\text{ nm}$$

answer continued on next page

(c)(i) $\nu = 1.00 \times 10^{15}\ s^{-1}$

$E = h\nu = (6.626 \times 10^{-34}\ J \cdot s)(1.00 \times 10^{15}\ s^{-1})$

$= \boxed{6.63 \times 10^{-19}\ J/\text{photon}}$

(ii) Change above answer to kJ/mol

$$6.63 \times 10^{-19}\ \frac{J}{\text{photon}} \times \frac{6.02 \times 10^{23}\ \text{photons}}{1\ \text{mole}} \times \frac{1\ kJ}{10^3\ J} = 399\ kJ/mol$$

$399\ kJ/mol > 387\ kJ/mol$ (minimum energy needed to break the ozone's O-O bond)

So the photon in (c)(i) will break the bond.