## Answer on Question \#40482-Chemistry - Other

## Question

Combining 0.400 mol of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ with excess carbon produced 14.3 g of Fe .

$$
\mathrm{Fe}_{2} \mathrm{O}_{3}+3 \mathrm{C} \rightarrow 2 \mathrm{Fe}+3 \mathrm{CO}
$$

1) What is the actual yield of Iron in moles?
2) What was the theoretical yield of iron in moles?
3) What was the percent yield?

Answer:

1) Number of moles equals:

$$
n=\frac{m}{M}
$$

$m$ - Mass of the Iron, $g$.
M - Molar mass of Iron, $\mathrm{M}(\mathrm{Fe})=55.85 \mathrm{~g} / \mathrm{mol}$.
Then number of moles of Iron produced by reaction is:

$$
n(F e)=\frac{m(F e)}{M(F e)}=\frac{14.3}{55.85}=0.256 \mathrm{~mol}
$$

So, the actual yield of Iron in moles equals 0.256 mol .
2) Make a proportion:

$$
\begin{aligned}
& 1 \text { mole of } \mathrm{Fe}_{2} \mathrm{O}_{3} \text { produces } 2 \mathrm{~mol} \text { of } \mathrm{Fe} \text { (Iron) } \\
& 0.400 \text { moles of } \mathrm{Fe}_{2} \mathrm{O}_{3}-x \mathrm{~mol} \text { of } \mathrm{Fe} \\
& x=\frac{0.400 \cdot 2}{1}=0.800 \mathrm{~mol} \text { of } \mathrm{Fe}
\end{aligned}
$$

So, the theoretical yield of Iron in moles equals 0.800 mol .
3) The percent yield is the actual yield divided by the theoretical yield:

$$
\% y i e l d=\frac{0.256}{0.800} \times 100 \%=32.0 \%
$$

Answer: 1) 0.256 mol
2) 0.800 mol
3) $32.0 \%$

