

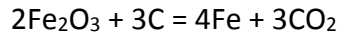
Answer on Question #42645 - Chemistry - Other

Question:

Iron is produced by heating iron(III) oxide with carbon (in form of coke) to give iron and carbon dioxide. Calculate the mass of coke needed to react completely with 1kg iron(III) oxide?

Answer:

The reaction is:



Molar mass of Fe_2O_3 equals:

$$M(\text{Fe}_2\text{O}_3) = 2M(\text{Fe}) + 3M(\text{O}) = 2 \cdot 56 + 3 \cdot 16 = 160 \frac{\text{g}}{\text{mole}}$$

Therefore, mass of 2 moles of Fe_2O_3 equals 320 g.

Molar mass of coke (C) equals 12 g/mole. Therefore, mass of 3 moles of C equals 36 g.

Then we make a proportion:

320 g of Fe_2O_3 reacts with 36 g of C

1000 g of Fe_2O_3 – x g of C

$$x = \frac{1000 \cdot 36}{320} = 112.5\text{g}$$

So, the mass of coke needed to react completely with 1kg iron(III) oxide equals 112.5 g.

Answer: $m(\text{C}) = 112.5 \text{ g}$.