

(Relative formula mass (M_r))

Q1. (2019)

(M_r of Al_2O_3 =) 102

$$\left(\frac{2\,000\,000}{102} = \right) 19\,608 \text{ (mol Al}_2\text{O}_3\text{)}$$

$$\left(19\,608 \times \frac{3}{2} = \right) 29\,412 \text{ (mol O}_2\text{)}$$

$$\left(\frac{29\,412 \times 32}{1000} = \right) 941 \text{ (kg)}$$

Q2. (2020)

(M_r citric acid =) 192

$$\begin{aligned} \text{(moles} &= \frac{250}{1000} \times 0.0500\text{)} \\ &= 0.0125 \end{aligned}$$

$$\text{(mass} = 0.0125 \times 192 =\text{)} 2.4 \text{ (g)}$$

Q3. (2022)

$$(M_r \text{ of SiO}_2 = 28 + (2 \times 16)) = 60$$

$$(\text{conversion } 1.2 \text{ kg} \Rightarrow) 1200 \text{ (g)}$$

$$\left(\text{number of moles of SiO}_2 = \frac{1200}{60} \right) = 20$$

$$\begin{aligned} &(\text{number of moles of Mg} \\ &= 20 \times 2) = 40 \end{aligned}$$

$$\begin{aligned} &(\text{mass of Mg} = 40 \times 24) \\ &= 960 \text{ (g)} \end{aligned}$$

Q4. (2023)

$$(M_r \text{ TiO}_2 \Rightarrow) 80$$

$$\begin{aligned} &(\text{conversion } 100 \text{ kg} \Rightarrow) 100\,000 \\ &(\text{g}) \end{aligned}$$

$$\left(\text{moles TiO}_2 = \frac{100\,000}{80} \right) = 1250$$

$$(\text{moles Cl}_2 = 1250 \times 2 \Rightarrow) 2500$$

$$(\text{volume Cl}_2 \Rightarrow) 2500 \times 24$$

$$= 60\,000 \text{ (dm}^3\text{)}$$

Q5. (2024)

 $(M_r \text{ Fe}_3\text{O}_4 =) 232$

$$(\% \text{ Fe} =) \frac{3 \times 56}{232} \times 100$$

$$= 72.4 (\%)$$

Q6. (2024)

 $(40.0 \text{ kg} =) 40\,000 \text{ (g)}$

$$(\text{moles Fe}_2\text{O}_3 = \frac{40\,000}{160} =) 250$$

$$(\text{moles CO}_2 = 250 \times \frac{3}{2} =) 375$$

$$(\text{volume of CO}_2 =) 375 \times 24$$

$$= 9000 \text{ (dm}^3\text{)}$$