

Answer Key

Question 1

- Mass of Mg = $28.786 - 28.642 = 0.144$ g
- Mass of MgO = $28.881 - 28.642 = 0.239$ g
- Mass of O = $0.239 - 0.144 = 0.095$ g
- Moles of Mg = $0.144 \div 24.31 = 5.92 \times 10^{-3}$ mol
- Moles of O = $0.095 \div 16.00 = 5.94 \times 10^{-3}$ mol
- Ratio $\approx 1 : 1$
- Empirical formula = MgO

Question 2

- Mass of Zn = $31.577 - 31.250 = 0.327$ g
- Mass of ZnO = $31.657 - 31.250 = 0.407$ g
- Mass of O = $0.407 - 0.327 = 0.080$ g
- Moles of Zn = $0.327 \div 65.38 = 5.00 \times 10^{-3}$ mol
- Moles of O = $0.080 \div 16.00 = 5.00 \times 10^{-3}$ mol
- Ratio = $1 : 1$
- Empirical formula = ZnO

Question 3

- Mass of Fe = $29.736 - 29.400 = 0.336$ g
- Mass of oxide = $29.880 - 29.400 = 0.480$ g
- Mass of O = $0.480 - 0.336 = 0.144$ g
- Moles of Fe = $0.336 \div 55.85 = 6.02 \times 10^{-3}$ mol
- Moles of O = $0.144 \div 16.00 = 9.00 \times 10^{-3}$ mol
- Ratio Fe : O = $2 : 3$
- Empirical formula = Fe_2O_3

Question 4

- Mass of hydrated $\text{CuSO}_4 \cdot x\text{H}_2\text{O}$ = $45.377 - 42.880 = 2.497$ g
- Mass of anhydrous CuSO_4 = $44.473 - 42.880 = 1.593$ g
- Mass of water lost = $2.497 - 1.593 = 0.904$ g
- Moles of CuSO_4 = $1.593 \div 159.61 = 9.98 \times 10^{-3}$ mol
- Moles of H_2O = $0.904 \div 18.02 = 5.02 \times 10^{-2}$ mol
- Ratio $\text{CuSO}_4 : \text{H}_2\text{O} = 1 : 5$
- Formula of the hydrate = $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$