

Empirical Formula and Molecular Formula.

↓
Smallest ratio of elements
↓
actual ratio

Determine the empirical formula of a mineral with 28.59% O, 24.95% Fe and 46.46% Ca. What is its formula unit if the actual mass is 1316 g/mol.

① $28.59 + 24.95 + 46.46 = 100\%$

② Convert % to g e.g. 28.59% O \equiv 28.59g O

③ Convert g to mols

$$28.59 \text{ g O} \times \frac{1 \text{ mol O}}{16.00 \text{ g}} = 1.787 \text{ mol O}$$

$$24.95 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} = 0.447 \text{ mol Fe}$$

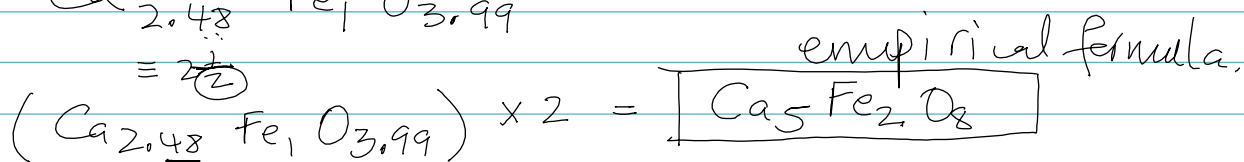
$$46.46 \text{ g Ca} \times \frac{1 \text{ mol Ca}}{40.08 \text{ g Ca}} = 1.159 \text{ mol Ca}$$

④

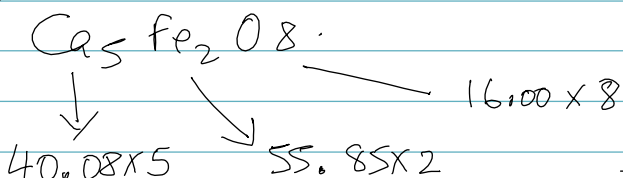
Ca $\frac{1.159}{1.159}$	Fe $\frac{0.447}{0.447}$	O $\frac{1.787}{0.447}$
1	1	4



≈ 2.5



⑤ Find formula unit. $n = \frac{\text{formula unit mass}}{\text{empirical formula mass}}$



$= 200.4 + 110.1 + 128 = \boxed{438.5 \text{ g/mol}}$
mass of emp. formul.

⑥ $\frac{1316 \text{ g/mol}}{438.5 \text{ g/mol}} = \underline{\underline{3}}$

