

## Relative formula mass and percentage composition calculations

Answer these questions. Make sure you show your working out.

- Calculate the relative formula masses,  $M_r$ , of the following compounds.
  - Iron(II) sulfide, FeS
  - Copper(II) sulfate, CuSO<sub>4</sub>
  - Ammonium chloride, NH<sub>4</sub>Cl
  - Aluminium sulfate, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>
- Calculate the percentage by mass of one of the elements in the following compounds. Give your answers to an appropriate number of significant figures.
  - O in sodium hydroxide, NaOH  $M_r$  of NaOH = 40
  - N in ammonium nitrate, NH<sub>4</sub>NO<sub>3</sub>  $M_r$  of NH<sub>4</sub>NO<sub>3</sub> = 80
  - Cu in copper(II) hydroxide, Cu(OH)<sub>2</sub>  $M_r$  of Cu(OH)<sub>2</sub> = 97.5
  - Al in aluminium oxide, Al<sub>2</sub>O<sub>3</sub>  $M_r$  of Al<sub>2</sub>O<sub>3</sub> = 102

Use these relative atomic masses.

Element	H	N	O	Al	S	Cl	Fe	Cu
$A_r$	1	14	16	27	32	35.5	56	63.5

---

## Relative formula mass and percentage composition calculations

Answer these questions. Make sure you show your working out.

- Calculate the relative formula masses,  $M_r$ , of the following compounds.
  - Iron(II) sulfide, FeS
  - Copper(II) sulfate, CuSO<sub>4</sub>
  - Ammonium chloride, NH<sub>4</sub>Cl
  - Aluminium sulfate, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>
- Calculate the percentage by mass of one of the elements in the following compounds. Give your answers to an appropriate number of significant figures.
  - O in sodium hydroxide, NaOH  $M_r$  of NaOH = 40
  - N in ammonium nitrate, NH<sub>4</sub>NO<sub>3</sub>  $M_r$  of NH<sub>4</sub>NO<sub>3</sub> = 80
  - Cu in copper(II) hydroxide, Cu(OH)<sub>2</sub>  $M_r$  of Cu(OH)<sub>2</sub> = 97.5
  - Al in aluminium oxide, Al<sub>2</sub>O<sub>3</sub>  $M_r$  of Al<sub>2</sub>O<sub>3</sub> = 102

Use these relative atomic masses.

Element	H	N	O	Al	S	Cl	Fe	Cu
$A_r$	1	14	16	27	32	35.5	56	63.5

## Relative formula mass and percentage composition calculations

### ANSWERS

1. (a)  $56 + 32 = 88$

(b)  $63.5 + 32 + (4 \times 16) = 159.5$

(c)  $14 + (4 \times 1) + 35.5 = 53.5$

(d)  $M_r$  of  $\text{SO}_4 = 32 + (4 \times 16) = 96$

$$M_r \text{ of } \text{Al}_2(\text{SO}_4)_3 = (2 \times 27) + (96 \times 3) = 342$$

2. (a)  $\% \text{O} = \frac{16}{40} \times 100$

$$= 40\%$$

(b)  $\% \text{N} = \frac{(2 \times 14)}{80} \times 100$

$$= \frac{28}{80} \times 100$$

$$= 35\%$$

(c)  $\% \text{Cu} = \frac{63.5}{97.5} \times 100$

$$= 65.1\%$$

(d)  $\% \text{Al} = \frac{(2 \times 27)}{102} \times 100$

$$= \frac{54}{102} \times 100$$

$$= 53\% \text{ (52.9\%)}$$

## Relative formula mass and percentage composition calculations

### ANSWERS

1. (a)  $56 + 32 = 88$

(b)  $63.5 + 32 + (4 \times 16) = 159.5$

(c)  $14 + (4 \times 1) + 35.5 = 53.5$

(d)  $M_r$  of  $\text{SO}_4 = 32 + (4 \times 16) = 96$

$$M_r \text{ of } \text{Al}_2(\text{SO}_4)_3 = (2 \times 27) + (96 \times 3) = 342$$

2. (a)  $\% \text{O} = \frac{16}{40} \times 100$

$$= 40\%$$

(b)  $\% \text{N} = \frac{(2 \times 14)}{80} \times 100$

$$= \frac{28}{80} \times 100$$

$$= 35\%$$

(c)  $\% \text{Cu} = \frac{63.5}{97.5} \times 100$

$$= 65.1\%$$

(d)  $\% \text{Al} = \frac{(2 \times 27)}{102} \times 100$

$$= \frac{54}{102} \times 100$$

$$= 53\% \text{ (52.9\%)}$$