

# MARK SCHEME

## GCSE CHEMISTRY

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### Empirical Formulae - 2

1. Find the empirical formula of each of the following substances.

a) N 82.4%, H 17.6%

N	H
82.4/14	17.6/1
5.89/5.89	17.6/5.89
1	3

Empirical formula =  $\text{NH}_3$

Answer:  $\text{NH}_3$

b) C 1.24 g H 0.26 g

C	H
1.24/12	0.26/1
0.103/0.103	0.26/0.103
1	2.52
2	5

Empirical formula =  $\text{C}_2\text{H}_5$

Answer:  $\text{C}_2\text{H}_5$

c) Al 52.9%, O 47.1%

Al	O
52.9/27	47.1/16
1.96/1.96	2.94/1.96
1	1.5
2	3

Empirical formula =  $\text{Al}_2\text{O}_3$

Answer:  $\text{Al}_2\text{O}_3$

d) Na 0.219 g, H 0.0095 g, C 0.114 g, O 0.457 g

Na	H	C	O
0.219/23	0.0095/1	0.114/12	0.457/16
0.00952/0.0095	0.0095/0.0095	0.0095/0.0095	0.0286/0.0095
1	1	1	3

Empirical formula =  $\text{NaHCO}_3$

Answer:  $\text{NaHCO}_3$

e) H 3.1%, P 31.6%, O 65.3%

H	P	O
3.1/1	31.6/31	65.3/16
3.1/1.02	1.02/1.02	4.08/1.02
3.04	1	4
3	1	4

Empirical formula =  $\text{H}_3\text{PO}_4$

Answer:  $\text{H}_3\text{PO}_4$

f) Na 0.167 g, C 0.0435 g, O 0.174 g

Na	C	O
0.167/23	0.0435/12	0.174/16
0.00726/0.003625	0.003625/0.003625	0.01088/0.003625
2	1	3

Empirical formula =  $\text{Na}_2\text{CO}_3$

Answer:  $\text{Na}_2\text{CO}_3$

2. 0.150 g of copper reacts with oxygen form 0.188 g of copper oxide. Find the empirical formula of copper oxide.

$$\text{Mass Cu} = 0.150 \text{ g}$$

$$\text{Mass O} = 0.188 - 0.150 = 0.038 \text{ g}$$

Cu	O
$0.150/63.5$	$0.038/16$
$0.00236/0.00236$	$0.002375/0.00236$
1	1

Empirical formula = CuO

Answer: CuO

3. 1.00 g of phosphorus reacts with fluorine form 2.84 g of phosphorus fluoride. Find the empirical formula of phosphorus fluoride.

$$\text{Mass P} = 1.00 \text{ g}$$

$$\text{Mass O} = 2.84 - 1.00 = 1.84 \text{ g}$$

P	F
$1.00/31$	$1.84/19$
$0.0323/0.0323$	$0.0968/0.0323$
1	3

Empirical formula = PF<sub>3</sub>

Answer: PF<sub>3</sub>