

# Stoichiometry I

## Question 1 (2015 - Section B - Question 4 - Part (e) )

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(e) DEDUCE: **Cu<sub>3</sub>N** (6)

$$\frac{19.05}{63.5} = 0.300 = \mathbf{0.3} \text{ moles}; \quad \frac{1.4}{14} = 0.10 = \mathbf{0.1} \text{ moles} \Rightarrow \mathbf{3 : 1} \quad (3)$$

$$\Rightarrow \mathbf{Cu_3N} \quad (3)$$

## Question 2 (2014 - Section B - Question 11 - Part (b) )

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(b) (i) HOW MANY: **0.05 mol** (6)

$$M_r = 252 \quad (3) \quad \frac{12.6}{252} = \mathbf{0.05} \text{ mol} \quad (3)$$

(ii) MASS: **7.6 g** (6)

$$\mathbf{0.05} \text{ mol} \rightarrow \mathbf{0.05} \text{ mol} \quad (3) \quad 0.05 \times 152 = \mathbf{7.6} \text{ g} \quad (3)$$

(iii) VOLUME: **1.12 l / 1120 cm<sup>3</sup> / 1.12 × 10<sup>-3</sup> m<sup>3</sup>** (6)

$$\mathbf{0.05} \text{ mol} \rightarrow \mathbf{0.05} \text{ mol} \quad (3)$$

$$0.05 \times 22.4 = \mathbf{1.12} \text{ l} / 0.05 \times 22,400 = \mathbf{1,120} \text{ cm}^3 \quad (3)$$

(iv) NUMBER: **1.2 × 10<sup>23</sup>** (4)

$$\mathbf{0.05} \text{ mol} \rightarrow \mathbf{0.2} \text{ mol} \quad (2) \quad 0.2 \times 6 \times 10^{23} = \mathbf{1.2} \times 10^{23} \quad (2)$$

HOW MANY: **3.6 × 10<sup>23</sup>** (3)

$$3 \times 1.2 \times 10^{23} = \mathbf{3.6} \times 10^{23} \quad (3)$$

## Question 3 (2014 - Section B - Question 4 - Part (g) )

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(g) FIND: **SO<sub>3</sub>** (6)

$$\frac{40}{32} = 1.25; \quad \frac{60}{16} = 3.75 / 1 : 3 \quad (3)$$

$$\Rightarrow \mathbf{SO_3} \quad (3)$$

Question 4 (2014 - Section B - Question 4 - Part (h) )

(h) CALCULATE: **0.196 – 0.199** mg (6)

$\frac{0.15}{127} / 0.00118 / 0.0012 //$	$\frac{166}{127} = 1.31 //$	$\frac{127}{166} \times 100 = 76.51\% //$	(3)
$\times 166 = 0.196$	$\times 0.15 = 0.196$	$0.15 \div 0.7651 = 0.196$	(3)

[Unit 'mg' not required.][Accept **1.96 – 1.99 × 10<sup>-4</sup> g** but deduct 1 mark if unit omitted.]

Question 5 (2013 - Section B - Question 4 - Part (e) )

(e) WHEN: **CuO** (6)

mass of copper = 1.27 g; mass of oxygen = 1.59 – 1.27 = 0.32	
$\frac{1.27}{63.5} = 0.02$ ; $\frac{0.32}{16} = 0.02$	(3)
⇒ empirical formula = CuO	(3)

Question 6 (2010 - Section B - Question 4 - Part (d) )

(d) GIVE: **2.6 × 10<sup>19</sup>** (6)

$0.0024 \div 56 = 4.29 \times 10^{-5}$ moles of iron (3)
$4.29 \times 10^{-5} \times 6 \times 10^{23} = 2.6 \times 10^{19}$ atoms (3)

Question 7 (2007 - Section B - Question 4 - Part (e) )

(e) INTAKE: **1.5 × 10<sup>20</sup>** (6)

$0.014 \div 56 = 0.00025$ (3)	$\times 6 \times 10^{23} = 1.5 \times 10^{20}$ (3)	$\times 2$ (-3)
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Question 8 (2007 - Section B - Question 4 - Part (h) )

(h) CALC: **4.3** (6)

$\frac{21.5}{500}$ (3)	$\times 100 = 4.3$ (3)
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Question 9 (2005 - Section B - Question 4 - Part (h) )

(h) **CuCl<sub>2</sub>** (6)

$\text{Cu} = 3.175 \div 63.5 = 0.05$ ; $\text{Cl} = (6.725 - 3.175) \div 35.5 = 0.1$ (3)
Ratio Cu : Cl = 0.05 : 0.1 = 1 : 2 (3)

Question 10 (2005 - Section B - Question 4 - Part (j) )

(j) **C<sub>2</sub>H<sub>5</sub>OH + Na → C<sub>2</sub>H<sub>5</sub>ONa + ½H<sub>2</sub> / 2C<sub>2</sub>H<sub>5</sub>OH + 2Na → 2C<sub>2</sub>H<sub>5</sub>ONa + H<sub>2</sub>** FORM: (3) BAL: (3)  
 [Allow 3 marks for correct formula for the organic product]

Question 11 (2004 - Section B - Question 4 - Part (h) )

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(h) 70 % [No penalty incurred if A, values from Periodic Table used] (6)

$$\frac{112}{160} \quad (3) \quad \times \quad 100 \quad = \quad 70 \quad (3)$$

Question 12 (2003 - Section B - Question 4 - Part (g) )

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(g) 35 % (6)

$$\text{formula mass} = 80 \quad \text{mass of nitrogen} = 28 \quad \frac{28 \times 100}{80} \quad (3) \quad = \quad 35 \quad (3)$$