Marking scheme for Core Worksheet 1 – Chapter 1

1	**a**	0.10 mol	[1]
	b	0.010 mol	[1]
	c	0.062 mol	[1]
	d	1.6×10^{-3} mol	[1]
	e	0.14 mol	[1]
	f	0.024 mol	[1]
	g	0.0832 mol	[1]
	h	0.017 mol	[1]
	i	0.023 mol	[1]
2	**a**	120 g	[1]
	b	4.4 g	[1]
	c	63.8 g	[1]
	d	8006 g	[1]
	e	17 g	[1]
	f	291 g	[1]
	g	66.6 g	[1]
	h	192 g	[1]
	i	200 g	[1]
3	**a**	6.64×10^{-24} g	[1]
	b	2.66×10^{-23} g	[1]
	c	4.04×10^{-23} g	[1]
4	**a**	5.65×10^{-23} g	[1]
	b	7.65×10^{-23} g	[1]
5	**a**	3.34×10^{23}	[1]
	b	1.88×10^{23}	[1]
	c	1.36×10^{23}	[1]
6	**a**	5.96×10^{22}	[1]
	b	2.18×10^{23}	[1]
	c	8.37×10^{24}	[1]
7	**a**	56.0	[1]
	b	108	[1]
	c	254	[1]

8 **a** 27.3% [1]

b 79.9% [1]

c 58.5% [1]

d 80.0% [1]

9 **a** NH_2 [1]

b HCO_2 [1]

c C_3H_8NO [1]

10 **a** C_5H_{10} [1]

b H_2O_2 [1]

c $C_4H_{10}O_2$ [1]

11 **a** moles of $CO_2 = \frac{6.90}{44.01} = 0.157$ mol [1]

moles of $H_2O = \frac{2.83}{18.02} = 0.157$ mol [1]

moles of C = 0.157 mol

moles of H = $2 \times 0.157 = 0.304$ mol [1]

empirical formula = CH_2 [1]

b mass of C in $CO_2 = \frac{12.01}{44.01} \times 3.04 = 0.830$ g [1]

mass of H in $H_2O = \frac{2.02}{18.02} \times 1.24 = 0.139$ g [1]

mass of O = 1.52 – (0.830 + 0.139) = 0.551 g [1]

ratio of moles C : H : O is 0.0691 : 0.139 : 0.0344

whole number ratio is 2.01 : 4.04 : 1 [1]

empirical formula: C_2H_4O [1]

12 **a** $\mathbf{2}C_4H_{10} + \mathbf{13}O_2 \rightarrow \mathbf{8}CO_2 + \mathbf{10}H_2O$ [1]

b $Sb_2S_3 + \mathbf{6}HCl \rightarrow \mathbf{2}SbCl_3 + \mathbf{3}H_2S$ [1]

c $PbCl_4 + \mathbf{2}H_2O \rightarrow PbO_2 + \mathbf{4}HCl$ [1]

d $\mathbf{3}Ag + \mathbf{4}HNO_3 \rightarrow \mathbf{3}AgNO_3 + \mathbf{2}H_2O + NO$ [1]

e $Fe_2O_3 + \mathbf{3}CO \rightarrow \mathbf{2}Fe + \mathbf{3}CO_2$ [1]

13 **a** 0.1 mol [1]

b 1.0 mol [1]

c 0.2 mol [1]

d 9.0 mol [1]

14 **a** 0.089 mol [1]

b 0.0089 mol [1]

c 0.054 mol [1]

d 0.033 mol [1]

15 **a** number of moles of hydrogen = $\frac{20.0}{2.02}$ = 9.90 mol

moles of ammonia = $\frac{2}{3}$ × 9.90 = 6.60 mol

volume of ammonia = 6.60 × 22.4 = 148 dm^3 [1]

b number of moles of methane = $\frac{1.00}{16.05}$ = 0.0623 mol

moles of CO_2 = 0.0623 mol

volume of CO_2 = 0.0623 × 22.4 = 1.40 dm^3 [1]

16 **a** $n = \frac{PV}{RT}$; $n = \frac{2.00 \times 10^5 \times 150 \times 10^{-6}}{8.31 \times 300}$ [1]

n = 0.0120 mol [1]

b $n = \frac{PV}{RT}$; $n = \frac{1.10 \times 10^5 \times 200 \times 10^{-6}}{8.31 \times 298}$ [1]

$n = 8.88 \times 10^{-3}$ mol [1]

17 **a** Mg [1]

b C_3H_8 [1]

18 **a** HCl [1]

b CO [1]

19 **a** 0.0100 mol [1]

b 5.00×10^{-3} mol [1]

20 **a** $NaOH + HCl \rightarrow NaCl + H_2O$

moles of HCl = $\frac{20.0}{1000}$ × 0.200 = 4.00×10^{-3} mol [1]

moles of NaOH = 4.00×10^{-3} mol [1]

volume of NaOH = $\frac{4.00 \times 10^{-3}}{0.100}$ = 4.00×10^{-2} dm^3 = 40.0 cm^3 [1]

b $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$

moles of $HNO_3 = \frac{25.0}{1000} \times 0.125 = 3.13 \times 10^{-3}$ mol [1]

moles of $NaOH = 3.13 \times 10^{-3}$ mol [1]

volume of $NaOH = \frac{3.13 \times 10^{-3}}{0.100} = 3.13 \times 10^{-2}\ dm^3 = 31.3\ cm^3$ [1]

c $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

moles of $H_2SO_4 = \frac{30.0}{1000} \times 0.100 = 3.00 \times 10^{-3}$ mol [1]

moles of $NaOH = 3.00 \times 10^{-3} \times 2 = 6.00 \times 10^{-3}$ mol [1]

volume of $NaOH = \frac{6.00 \times 10^{-3}}{0.100} = 6.00 \times 10^{-2}\ dm^3 = 60.0\ cm^3$ [1]