Chemistry 2.4 (2.1) **Worksheet 1** Name _____

Question One

Sulfur (S_8) is used in gun powder. It reacts with oxygen in an exothermic reaction.

$$S_8 + 8O_2 \rightarrow 8SO_2$$

a) 11872 J is released when 1.28 g of sulfur (S_8) is being burnt. Calculate the enthaphy (in $kJmol^{-1}$) of the combustion reaction above.

molar mass for sulfur (S_8) = 256.8 $gmol^{-1}$

Amount of sulfur (S_8) = 1.28 g ÷ 256.8 $gmol^{-1}$ = 0.004984 mol

S_8 : reaction = 1 : 1

Energy released 11.872 kJ

Energy change = 11.872 kJ ÷ 0.004984 mol = 2381.82 $kJmol^{-1}$

Since energy is releasing, therefore the enthalpy is <u>-2380 $kJmol^{-1}$ (3 s.f.)</u>

b) Using the answers above, calculate how much energy released when:

a. 15 g of sulfur is burnt

15 g ÷ 256.8 $gmol^{-1}$ = 0.058411 mol

S_8 : reaction = 1 : 1 mole of reaction = 0.058411 mol

0.058411 mol × 2380 $kJmol^{-1}$ = 139.125 kJ

Therefore <u>139 kJ</u> is released when 15 g of sulfur is burnt

b. 250 g of sulfur dioxide formed

250 g ÷ 64.1 $gmol^{-1}$ = 3.900156 mol

SO_2 : reaction = 8 : 1 mole of reaction = 3.900156 mol ÷ 8 = 0.48752 mol

Energy change = 0.48752 mol × 2380 $kJmol^{-1}$ = 1160.296 kJ

Threrefore 1160 kJ is released when 250 g of sulfur dioxide formed.

Question Two

Complete the table below. The first row is the example

$$2SO_2 + O_2 \rightarrow 2SO_3 \qquad \Delta H = -1456\ kJmol^{-1}$$

Amount of SO_2	Mass of SO_2	Amount of O_2	Mass of O_2	Amount of SO_3	Mass of SO_3	Amount of equation	Energy released
2	128.2 g	1	32.0 g	2	160.2 g	1	1456 kJ
0.0877 mol	5.62g	0.0438 mol	1.41 g	0.0877 mol	7.02 g	0.0438 mol	63.8 kJ
3.98 mol	255 g	1.99 mol	63.7g	3.98 mol	319 g	1.99 mol	2898 kJ
0.00441 mol	0.283 g	0.00221 mol	0.0705 g	0.00441 mol	0.353 g	0.00221 mol	3.21 kJ