Chemistry 2.4 (2.1) **Worksheet 2** Name _____

Question One- Complete the table below

Change in energy	Amount (mol)	Enthalpy ($kJmol^{-1}$)
5672 kJ released	0.21	-27000 $kJmol^{-1}$
111 kJ released	3.25	-34.2 $kJmol^{-1}$
1378 J absorbed	0.00174	793 $kJmol^{-1}$
13.7 kJ absorbed	1.75	7.83 $kJmol^{-1}$
34.9 kJ released	0.0257	-1357 $kJmol^{-1}$
678.2 kJ released	2.62	-258.5 $kJmol^{-1}$

Question Two

1) Julie-Ann added 5 g of magnesium to excess amount of hydrochloric acid. The reaction released 560 J of heat energy. Assuming all energy released is heat, what is the enthalpy of this reaction?

$$Mg + 2HCl \rightarrow MgCl_2 + H_2$$

Amount of magnesium = 5 g ÷ 24.3 $gmol^{-1}$ = 0.205761 mol

Mg : reaction 1 : 1 mole of reaction = 0.205761 mol

Energy released 560 J = 0.56 kJ

Energy change = 0.56 kJ ÷ 0.205761 mol = 2.7216 $kJmol^{-1}$

Since it is a exothermic reaction, therefore the enthalpy of this reaction is -2.72 $kJmol^{-1}$

2) Peter did the same reaction with 15 g of magnesium. Calculate the amount of heat energy released.

Amount of magnesium = 15 g ÷ 24.3 $gmol^{-1}$ = 0.617284 mol

Mg : reaction 1 : 1 mole of reaction = 0.617284 mol

Energy released = 0.617284 mol × 2.72 $kJmol^{-1}$ = 1.68 kJ

**Easier way- the amount of Mg is 3 times of Julie-Ann's reaction, therefore the amount of energy should be 3 x also. 0.56 kJ × 3 = 1.68 kJ*

3) Aroha (Mr Yung's imaginary Maori friend) then did the pop test with all of the hydrogen gas in the experiments above collected. This reaction has an enthalpy of -5600 $kJmol^{-1}$. Calculate how much energy was released.

The amount of hydrogen = 0.205761 mol + 0.617284 mol = 0.823045 mol

$$H_2 + ½\ O_2 \rightarrow H_2O \qquad -5600\ kJmol^{-1}$$

0.823045 mol × 5600 $kJmol^{-1}$ = 4609 kJ released