AQA Additional Science - Exothermic and Endothermic reactions (30 marks)

- 1. A chemical reaction involves the transfer of: *(Circle the correct answer)*
 - A. Atoms
 - B. Energy
 - C. Chemicals
 - D. Mass

(1 mark)

2. Complete the sentences with the words in the box below. *The words may be used once, more than once or not at all.*

	reversible	endothermic	oxidation	energy							
	exothermic	corrosion	decomposition	irreversible							
When a chemical reaction releases energy we call it an reaction. An example of this type of reaction is reaction. An example of this type of reaction takes in energy we call it an reaction. An example of this type of reaction is thermal											

(4 marks)

3. Nitrogen and hydrogen gas react together to make ammonia, as shown in the following equation:

Nitrogen + hydrogen ammonia

a) Add the correct sign in the equation above to show that the reaction is reversible.

(1 mark)

b) The reaction between nitrogen and hydrogen gives out 50 kilojoules (kJ) of energy to produce ammonia, What can you say about the energy transfer in the reverse reaction?

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(1 mark)

 Cold packs are used to treat sports injuries. They usually contain ammonium nitrate and water and when the pack is shaken the ammonium nitrate dissolves in the water and gets cold.
Explain why the pack gets cold and how it works.



(2 marks)

5. QWC - In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

A group of students completed an experiment to find the change in temperature when different metal hydrogencarbonates reacted with hydrochloric acid. They used the following apparatus:



(Diagram relabeled from http://filestore.aqa.org.uk/subjects/AQA-CH2HP-QP-JUN13.PDF)

Write a plan the student could use. In your plan you should:

- Describe how you would carry out the investigation and make it a fair test
- Describe the measurements you would make.

(6 marks)

6. a) In some chemical reactions, the products can turn back into the reactants. This type of reaction is called:

	(Circle the correct answe	er)						
	A: Reversible	B: Exo	thermic	C: Irreversible	D : Endothermic	(1mark)		
b)	In this type of reaction, the amount of energy released in the forward direction compared to the energy absorbed in the opposite direction must be:							
	(Circle the correct answer)							
		A: Less	B: The same	C: More				
						(1mark)		

7. Hydrochloric acid and sodium hydroxide together in a neutralisation reaction, as represented below.

Hydrochloric acid + sodium hydroxide \rightarrow sodium chloride + water

Lisa adds 30 cm³ of hydrochloric acid to 30 cm³ of sodium hydroxide and records the temperature before and after the reaction in the following table:

Chemical substance	Temperature (°C)
Hydrochloric acid (before being mixed)	22
Sodium hydroxide (before being mixed)	22
Mixture (directly after being mixed)	48
Mixture (2 hours of after being mixed)	22

a) Is the neutralisation reaction exothermic or endothermic?

(1mark)

b) Explain how Lisa's results show the neutralisation reaction is exothermic or endothermic

(1mark)

8. When ammonium nitrate is added to water it dissolves. Kate adds the two reactants together and records the temperature of the solution every 30 seconds for three minutes. The results are recorded in the following table:

Time (s)	0	30	60	90	120	150	180	210	240	270	300	330	360
Temperature (°C)	20	19	18	17	17	20	16	15	13	12	10	10	10

a) What is the pattern to the results?

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	(1mark)
b) Which result is anomalous?	(IIIIai K)
c) What do you predict the temperature of the solution to be after an hour? Explain your answer.	(1mark)
	(1mark)
Explorers often use self heating cans or self heating foods on their journeys. One such product uses released when calcium oxide reacts with water. The reaction is as follows:	energy
Calcium oxide + water → calcium hydroxide	
a) Is the reaction exothermic or endothermic?	
	(1mark)

(1mark)

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b) Give one advantages of using these types of self heating cans/foods?

A group of students completed a displacement experiment. They added five different metals to copper chloride solution and measured the temperature change.

Write a plan the student could use to show which metal was the most reactive. In your plan you should:

- Describe how you would carry out the investigation and make it a fair test
- Describe the measurements you would make

(6 marks)