

1. This table contains information about hydrogen and methane as fuels.

<i>Fuel</i>	<i>Chemical formula</i>	<i>Energy produced when 1 mole burns completely in oxygen/kJ</i>
Hydrogen	H ₂	286
Methane	CH ₄	890

- (a) Using the data in the table and your knowledge of combustion, give one disadvantage and one advantage for using hydrogen rather than methane as a fuel.

Disadvantage: **Produces less energy per mole of fuel burnt.**

Advantage : **Does not cause pollution as the only product is water.**

- (b) Suggest two other factors that you should consider when deciding which fuel to use.

Portability (how easily it can be carried around) and cost

2. Sodium carbonate can react with sulfuric acid:



During this reaction, heat is liberated.

- (a) Which term describes a reaction in which heat is liberated?

Exothermic reaction

- (b) Provide an example of a change in which heat is liberated.

Combustion of fuel like petrol, rusting, reacting metals with water/acid

3. When coals burns, the products of combustion include the following: sulfur dioxide, carbon dioxide, ammonia, tar. Heat is also produced.

- (a) Which product of combustion would dissolve in water, thus giving a solution of pH 2?

sulfur dioxide

- (b) State the chemical term used to describe reactions which give out heat energy.

Exothermic reaction

4. When hydrogen combines with oxygen, water is formed. Heat is evolved.

- (a) Write the equation, including the state symbols, for this reaction.



- (b) In this reaction, the covalent bonds in the molecules of hydrogen and oxygen are broken.

- (i) Is the bond breaking process endothermic or exothermic?

endothermic

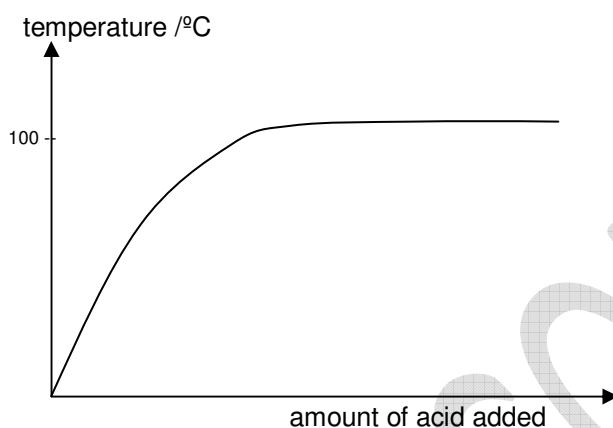
- (ii) Which bonds are formed in the reaction?

H-O bonds

5. (a) Explain the term 'endothermic reaction'. Give an example of a process which is endothermic.

Endothermic reactions are reactions that **absorb/take in heat** from the surroundings.

- (b) A student slowly added concentrated sulfuric acid to water while constantly stirring it. The temperature of the mixture was noted at regular intervals. The results of the experiment are shown in the graph below.



- (i) What can you infer from the graph?

The reaction is highly exothermic.

- (ii) Why should water never be added to concentrated sulfuric acid?

The heat energy produced during the reaction will cause the water to boil, producing steams that will cause the concentrated acid to spill.

~ The End ~