

**Core questions – Chemistry unit 5 – Energy changes**

No.	Question	Answer
1	What is an exothermic reaction?	One that transfers energy to the surroundings (energy is given out)
2	What happens to the temperature of the surroundings in an exothermic reaction?	It increases
3	What types of chemical reactions are exothermic?	Combustion, oxidation reactions, neutralisation
4	What is an endothermic reaction?	One that takes in energy from the surroundings
5	What happens to the temperature of the surroundings in an endothermic reaction?	It decreases
6	What types of chemical reactions are endothermic?	Thermal decompositions. The reaction of citric acid and sodium hydrogencarbonate
7	Give two uses of exothermic reactions.	Self-heating cans, hand warmers
8	Give a use of endothermic reactions	Instant cold pack for sports injuries
9	How can the energy transfer in a chemical reaction be measured?	Using a thermometer to measure the temperature change
10	How can we avoid energy being lost to the surroundings when measuring the temperature change of a chemical reaction?	Use insulation (like cotton wool)
11	What is the activation energy of a reaction?	The minimum amount of energy that particles must have when they collide in order to react
12	What does the energy level diagram look like for an exothermic reaction?	
13	What does the energy level diagram look like for an endothermic reaction?	
14	What happens to the activation energy when a catalyst is used?	It is lower
15H	What is bond energy? <b>(HT only)</b>	The amount of energy that is needed to make or break a bond
16H	What sort of process is bond breaking? <b>(HT only)</b>	Endothermic
17H	What sort of process is bond making? <b>(HT only)</b>	Exothermic

18H	When would a reaction be exothermic, in terms of bond breaking and making? <b>(HT only)</b>	The energy released from forming new bonds is greater than the energy needed to break existing bonds
19H	Why would a reaction be endothermic, in terms of bond breaking and making? <b>(HT only)</b>	The energy needed to break existing bonds is greater than the energy released from forming new bonds
20H	How can we calculate the overall energy change for a reaction? <b>(HT only)</b>	The sum of the energies needed to break bonds in the reactants minus the energy released when the new bond are formed in the products
21T	What is an electrochemical cell? <b>(Triple only)</b>	A system made up of two different electrodes in contact with an electrolyte
22T	What is a charge difference and how is it created in a cell? <b>(Triple only)</b>	A potential difference (voltage). Created by the chemical reactions between the electrodes and the electrolyte
23T	What is the voltage produced by a cell dependent on? <b>(Triple only)</b>	The type of electrode and the electrolyte
24T	What is an electrolyte? <b>(Triple only)</b>	A liquid that contains ions which react with the electrodes
25T	What effect does the reactivity of the electrodes have on the voltage produced? <b>(Triple only)</b>	The bigger the difference in reactivity between the metals used as electrodes, the greater the voltage
26T	What is a battery? <b>(Triple only)</b>	Two or more cells connected together in series to provide a greater voltage
27T	Why do non-rechargeable cells stop working? <b>(Triple only)</b>	Because one of the reactants has been used up
28T	What type of batteries are non-rechargeable? <b>(Triple only)</b>	Alkaline batteries
29T	Why can rechargeable cells be recharged? <b>(Triple only)</b>	Because their reactions are reversible
30T	How are the reactions reversed in a rechargeable battery? <b>(Triple only)</b>	By connecting it to an electric current
31T	What is a fuel cell? <b>(Triple only)</b>	A cell where the chemical energy from a fuel is converted into electricity. The fuel is provided from an external source.
32T	How is a potential difference produced in a fuel cell? <b>(Triple only)</b>	When the fuel is oxidised electrochemically with the fuel cell
33T	What happens at the anode? <b>(Triple only)</b>	Hydrogen loses electrons to produce H <sup>+</sup> ions (oxidation). H <sup>+</sup> ions move to the cathode.
34T	What is the half equation to show what happens at the anode? <b>(Triple only)</b>	$2\text{H}_2 \rightarrow 4\text{H}^+ + 4\text{e}^-$
35T	What happens at the cathode? <b>(Triple only)</b>	Oxygen gains electrons from the cathode and reacts with H <sup>+</sup> ions to make water
36T	What is the half equation to show what happens at the cathode? <b>(Triple only)</b>	$\text{O}_2 + 4\text{H}^+ + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}$
37T	What is the overall reaction in a hydrogen fuel cell? <b>(Triple only)</b>	Hydrogen + Oxygen → Water
38T	What are the advantages of hydrogen fuel cells? <b>(Triple only)</b>	They have no moving parts to maintain, Very quiet in use, their only product is water
39T	What are the disadvantages of hydrogen fuel cells? <b>(Triple only)</b>	Hydrogen is difficult to store (could be explosive!), there is not yet a network of filling stations