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| Topic heading | Syllabus Ref | Idea cluster | Question 1 | Question 2 | Question 3 | Question 4 |
| Energy Changes | GCSE CEn(1) | Exothermic and Endothermic | A student carried out 4 investigations into temperature changes during reactions. The results are shown in the table.

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| Reaction | Start Temp | End Temp |
| X | 20 | 17 |
| Y | 21 | 25 |
| Z | 18 | 29 |
| W | 19 | 19 |

 Which statement is correct: 1. The maximum temperature change is 10oC
2. Reaction X is exothermic.
3. Reaction Y is exothermic.
4. Reaction W is endothermic.
 | Which statement is correct: 1. Bond making is endothermic
2. Bond making is exothermic
3. Bond breaking is exothermic
4. No energy transfer occurs in a reaction.
 | In the below reaction bonds are broken and made: H2 + Cl2 🡪 2HClUsing these bond energies calculate the overall energy change of the reaction.

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| --- | --- |
| H - H | 432kJ/mol |
| Cl - Cl | 240kJ/mol |
| H - Cl | 428kJ/mol |

1. +1528 KJ/mol
2. -1100 KJ/mol
3. +244 KJ/mol
4. -184 KJ/mol
 | Which statement is correct: BA1. This shows an endothermic reaction
2. This shows an exothermic reaction
3. Label A shows the overall energy change
4. Label B shows the activation energy.
 |
|  |  |  | C | B | D | B |
|  | GCSE CEn(1) | Exothermic and Endothermic | The diagram below shows how the energy of the chemicals in a reaction changes.Which statement is true about this reaction?AB1. A is the activation energy and B is the overall energy of the reaction. The reaction is exothermic.
2. A is the overall energy of the reaction and B is the activation energy. The reaction is exothermic.
3. A is the activation energy and B is the overall energy of the reaction. The reaction is endothermic
4. A is the overall energy of the reaction and B is the activation energy. The reaction is endothermic
 | Which statement best describes endothermic reactions?1. Energy is transferred from the surroundings to the system to break bonds.
2. Energy is transferred from the system to the surroundings, as bonds are broken.
3. Energy is transferred from the surroundings to the system to make bonds.
4. Energy is transferred from the system to the surroundings, as bonds are made.
 | Which statement best describes exothermic reactions?1. Energy is transferred from the surroundings to the system to break bonds.
2. Energy is transferred from the system to the surroundings, as bonds are broken.
3. Energy is transferred from the surroundings to the system to make bonds.
4. Energy is transferred from the system to the surroundings, as bonds are made.
 | Which of the following changes is most likely to be exothermic?1. CO2 (s) 🡪 CO2 (g)
2. CaO (s) + H2O (l) 🡪 Ca(OH)2 (s)
3. CaCO3 (s) 🡪 CaO (s) + CO2 (g)
4. 2 Li2O2 (s) 🡪 2 Li2O (s) + O2 (g)
 |
|  |  |  | A | A | D | B |
| Energy Changes | GCSE CEn(2) | Cells and batteries | Use the reactivity series below to predict which combination of metals would produce the highest cell voltage.1. Potassium and sodium
2. Platinum and gold
3. Zinc and iron
4. Potassium and gold
 | Which of these reactions shows a correct balanced oxidation reaction? 1. Cu2+ + 2e- 🡪 Cu
2. Mg 🡪 Mg2+ + 1e-
3. Cl- 🡪 Cl2 + e-
4. Zn 🡪 Zn2+ + 2e-

  | Which is the correct statement?1. An anode is the negative electrode.
2. A cathode is the positive electrode.
3. Anions are attracted to the anode
4. Anions are attracted to the negative electrode.
 | Which of the following is ***not*** an electrolyte?1. NaCl (l)
2. NaCl (s)
3. NaCl (aq)
4. CuCl2 (aq)
 |
|  |  |  | A | D | C | B |
| Energy Changes | GCSE CEn(3) | Hydrogen fuel cells | Which of the following statements accurately describes n advantage of hydrogen fuel cells over petrol as a fuel for cars?1. The cell itself does not produce any products that damage the environment.
2. They use water as their fuel and so they are very cheap.
3. They use hydrogen that requires no energy to produce.
4. They are currently more expensive than petrol.
 | Which statements from 1-3 are correct about hydrogen fuel cells? 1. Fuel cells only produce water.
2. Fuel cells use hydrogen and oxygen
3. Fuel cells are not rechargeable
4. 1 and 3 is correct
5. 2 is the only statement which is correct
6. 1 and 2 is correct
7. No statement is correct
 | Which is the correct balanced equation for a hydrogen fuel cell?1. H2 + O2 🡪 2H2O
2. 2H2 + O2 🡪 2H2O
3. H2 + O2 🡪 H2O
4. H2 + 2O2 🡪 2H2O
 | Most of the hydrogen used in hydrogen fuel cells is made by the electrolysis of water. Which of the following reactions ***does not*** occur during the electrolysis of water?1. 2H+ (aq) + 2e- 🡪 H2 (g)
2. 4OH-(aq) 🡪 O2 (g) + 4H2O(l) + 4e-
3. 4H++ 4OH- 🡪 2H2 + O2 + 4H2O
4. H2O (l) 🡪 H2 (g) + O2 (g)
 |
|  |  |  | A | C | B | D |
| Using Resources | 4.9 | Potable Water | All of these statements are correct. What order should the statements go on? 1. Chlorine or ozone is added to water.
2. Water is collected in lakes and rivers
3. Water is tested before pumping to home.
4. Filter out the solids.
5. 1 🡪 2 🡪 3 🡪4
6. 1 🡪 4 🡪 2 🡪 3
7. 2 🡪 4 🡪 3 🡪 1
8. 2 🡪 4 🡪 1 🡪 3
 | To get potable water from salt water you need to desalinate it. These are four statements about desalination. 1. This involves reverse osmosis.
2. This requires a lot of energy
3. Salt must be removed
4. The sea is excellent supply of potable water
5. Statement 1 only is correct
6. All the statements are correct
7. Statement 1, 2 and 4 only are correct
8. Statement 1, 2 and 3 only are correct.
 | Which of these methods can be used to treat sewage: 1. Filtration to remove grit
2. Add chemicals to sediment small particles
3. Use bacteria to digest sludge
4. Distillation of the liquid.

Which statements are correct? 1. Statement 1, 2 and 3 only
2. Statement 1, 2 and 4 only
3. Statement 3 and 4 only
4. Statement 1 and 2 only
 |  |
|  |  |  | D | D | A |  |
| Using Resources | 4.9 | Recycling | Which of these definitions is correct: 1. Electrolysis is the splitting of a substance using electricity
2. Displacement is using a less reactive to replace a more reactive metal
3. Phytomining is using bacteria to release a metal
4. Bioleaching is using bacteria to release a metal
 | These are some different statements about manufacturing a product.

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| A | High packaging cost | Difficult to extract | Very expensive |
| B | Easy to dispose of | Cheap raw materials | No pollution |
| C | High packaging cost | No pollution | Lasts a long time |
| D | Pollution produced | Expensive to produce | Low transport costs |

Which product is going to have the least environmental impact?  | Which one of these substances would it be most economic to recycle?

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| --- | --- | --- | --- | --- |
|  | Cost | Cost when sold | Use | Process of recycling |
| A | £70/kg | £65/kg | Water pipes and electricity | Melting at a high temperature and recasting |
| B | £50/kg | £55/kg | Toys, bottles and packaging | Separating, melting at a low temperature, reforming.  |
| C | £60/kg | £60/kg | Bottles and Jars | Separating, melting at a high temperature |
| D | £65/kg | £85/kg | Rare metal in mobile phones | Separating, melting at a high temperature and recasting.  |

 |  |
|  |  |  | A | B | D |  |
| Using Resources | 4.9 | Using Materials | A balanced symbol equation for the haber process is: 1. N2 + H2 🡪 NH3
2. 2N2 + H2 🡪 NH3
3. N2 + 3H2 🡪 2NH3
4. N2 + H2 🡪 2NH3
 | Which objects can be protected using the method listed. 1. A bridge - oiling
2. Bicycle spokes – sacrificial protection
3. Fishing trawler – electroplating
4. Drain pipe and bucket - galvanising
 | Which row of the table is correct:

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|  | Made from?  | Use |
| A: Bronze | Cu + Sn | Taps |
| B: Brass | Cu + Zn  | Cutlery |
| C: Low carbon steel | C + Fe | Car bodies |
| D: Stainless Steel | Cr and Fe  | Statues |

 | Which statement is correct: A: Borosillicate glass is made from sand and boron trioxideB: Soda lime glass is made from clay, limestone and sodium carbonateC: Soda lime glass melts at a higher temperatureD: Borosillicate glass is used for drinking bottles |
|  |  |  | C | D | C | A |
| Using Resources | 4.9 | Using Materials | Which statement is correct: A: Thermosoftening plastics do not meltB: Thermosetting plastics do meltC: LDP and HDP are formed from the same materials at the same temperature. D: Thermosetting plastics contain cross links | What is a correct statement about the use of ammonia:1. Fertiliser
2. Manufacturer of metal
3. Electroplating
4. Nitric acid
 |  |  |
|  |  |  | D | A |  |  |
|  |  |  |  |  |  |  |