**Separate Chemistry- Summer Work Year 10**

**Summer 2020**

**Review of term 5 and 6**

**Context:** Below are some **optional** activities that will help you to review and consolidate what you have learnt through home learning and importantly, give you the opportunity to apply your understanding to exam style questions.

The tasks below are levelled. Complete tasks that will help and challenge you.

**Essential**:

1. Continue to use Tassomai 3-4 times a week to complete your daily goal. Currently it is set up to test all of your science (biology, chemistry and physics) knowledge for paper 1.
2. Join the Seneca classroom by following this link <https://app.senecalearning.com/dashboard/join-class/1tnc3zzgcv> you may have to make an account. Use your school email.
3. Complete the ‘Y10 Chemistry Summer Work Assignment’ on Seneca.

**Challenge**:

For both the tasks below, you do not need to print these, just write your answers on paper – if you cannot do a question because of this, move on.

1. Complete the sample assessment paper for Separate chemistry:
   * Question Paper: <https://filestore.aqa.org.uk/resources/chemistry/AQA-84621H-SQP.PDF>
   * Mark scheme: <https://filestore.aqa.org.uk/resources/chemistry/AQA-84621H-SMS.PDF>
2. Complete the Year 10 Summer Work Grasp It questions on page 2. You do not need to print these off. Answer the questions onto paper or write the answers directly into the word document.
3. Use the Year 10 Summer Work Grasp It answers on page 4 to green pen your work. Review any areas that you didn’t understand using Seneca.

**Extend:**

1. Complete the 5 questions, 5 words, 5 answers activity on page 8

**Challenge**

1. **Energy Changes part 1 – Exothermic And Endothermic Reactions**
2. How do we describe energy conservation in reactions? (2)
3. What is an exothermic reaction? (2)
4. Give two examples of exothermic reactions. (2)
5. What is an endothermic reaction? (2)
6. Give one example of an endothermic reaction. (1)
7. **Extended response question:**

A student wishes to investigate which of three metals will give the largest exothermic reaction when they react with hydrochloric acid. Describe how she would carry out the experiment making sure it was a fair test. (6)

**B. Energy Changes part 2 – Reaction profiles**

1. What is activation energy? (1)
2. **Extended response question:**

The following reaction is exothermic:

H2 (g) + F2 (g)  2HF (g)

Draw a reaction profile to show this reaction, to include the relative energies of the reactants and products, the activation energy and the overall energy change. (6)

1. (HT only) Below is a balanced chemical reaction between nitrogen gas and oxygen gas to produce nitrogen monoxide. The bond energy between two nitrogen atoms is 942kJ/mol, between two oxygen atoms is 494 Kj/mol and between a nitrogen atom and an oxygen atom is 607kJ/mol.

Calculate the overall energy change for this reaction. (4)

N2 + O2  2NO

1. (HT only) Draw a reaction profile for the above reaction. (4)
2. Describe the energy release in an exothermic reaction in terms of bond energies. (2)
3. **Energy Changes part 3 – Cells, Batteries and Fuel Cells**
4. A student has a number of cells all with a potential difference of 1.5V. Explain how they could construct a battery with a potential difference of 12V. (2)
5. Below is a table of standard electrode potentials.

|  |  |
| --- | --- |
| Metal electrode | Standard electrode potential EO in volts |
| Calcium | -2.76 |
| Magnesium | -2.38 |
| Aluminium | -1.66 |
| Zinc | -0.76 |
| Iron | -0.41 |
| Lead | -0.13 |

When a cell contains an aluminium electrode and a zinc electrode the potential difference of the cell is 0.90 Volts.

Calculate the potential difference of a cell with magnesium and iron electrodes. (2)

1. How would you increase the potential difference of this cell? (1)
2. (HT only) Write the half equations for the electrode reactions in a hydrogen fuel cell.

Cathode (2)

Anode (2)

1. Hydrogen fuel cells are used on space craft to produce electricity. Give an advantage and a disadvantage of using hydrogen fuel cells on a space craft. (2)
2. **Energy Changes part 1 – Exothermic and Endothermic Reactions**
3. How do we describe energy conservation in reactions? (2)

***Amount of energy in the Universe at the end of a reaction [1]***

***Is the same as before the reaction takes place [1]***

1. What is an exothermic reaction? (2)

***One that transfers energy to the surroundings [1]***

***The temperature of the surroundings increases [1]***

1. Give two examples of exothermic reactions (2)

***Any two from combustion/oxidation/neutralisation (accept examples e.g. hydrochloric acid and sodium hydroxide) [2]***

1. What is an endothermic reaction? (2)

***One that takes in energy from the surroundings [1]***

***The temperature of the surroundings decreases [1]***

1. Give one example of an endothermic reaction. (1)

***Any one from thermal decompositions/sports injury packs (accept examples e.g. citric acid and sodium hydrogen carbonate) [1]***

1. **Extended response question:**

A student wishes to investigate which of three metals will give the largest exothermic reaction when they react with hydrochloric acid. Describe how she would carry out the experiment making sure it was a fair test. (6)

* ***Level 3 (5-6 marks)***

***Complete description of experiment and fair test***

* ***Level 2 (3-4 marks)***

***Partial description of experiment and fair test***

* ***Level 1 (1-2 marks)***

***Limited description of experiment and fair test***

***The reaction will be exothermic therefore the rise in temperature will be measured [1] the greatest rise in temperature signifies the most exothermic [1]***

***Mass of metal/surface area must be the same [1]***

***Temperature of acid must be the same [1]***

***Concentration of acid must be the same [1]***

***Mention of agitation or stirring [1]***

**B. Energy Changes part 2 – Reaction profiles**

1. What is activation energy? (1)

***The energy needed for a reaction to occur [1]***

1. **Extended response question:**

The following reaction is exothermic:

H2 (g) + F2 (g)  2HF (g)

Draw a reaction profile to show this reaction, including the relative energies of the reactants and products, the activation energy and the overall energy change (6)

A close up of a person

Description automatically generated

1. (HT only) Below is a balanced chemical reaction between nitrogen gas and oxygen gas to produce nitrogen monoxide. The bond energy between two nitrogen atoms is 942kJ/mol, between two oxygen atoms is 494 Kj/mol and between a nitrogen atom and an oxygen atom is 607kJ/mol.

Calculate the overall energy change for this reaction. (4)

N2 + O2  2NO

***Bond energies for the reactants 1,436 kJ/mol [1]***

***Bond energies for the products 1,214 kJ/mol [1]***

***Answer = + [1] 222kJ/mol [1]***

1. (HT only) Draw a reaction profile for the above reaction. (4)

***Correctly labelled axes [1] energy of products above reactants [1] both reactants and products labelled on correct lines [1] curved line showing activation energy [1]***

1. Describe the energy release in an exothermic reaction in terms of bond energies. (2)

***Energy released from forming bonds is greater [1] than energy needed to break bonds [1]***

1. **Energy Changes part 3 – Cells, Batteries and Fuel Cells**
2. A student has a number of cells all with a potential difference of 1.5V. Explain how they could construct a battery with a potential difference of 12V (2)

***8 cells [1] All cells in series [1]***

1. Below is a table of standard electrode potentials

|  |  |
| --- | --- |
| Metal electrode | Standard electrode potential EO in volts |
| Calcium | -2.76 |
| Magnesium | -2.38 |
| Aluminium | -1.66 |
| Zinc | -0.76 |
| Iron | -0.41 |
| Lead | -0.13 |

When a cell contains an aluminium electrode and a zinc electrode the potential difference of the cell is 0.90 Volts.

Calculate the potential difference of a cell with magnesium and iron electrodes. (2)

***Idea of 2.38V – 0.41V [1]***

***1.97 V [2]***

1. How would you increase the potential difference of this cell? (1)

***Change the magnesium electrode for a calcium electrode/change the iron electrode for a lead electrode [1]***

1. (HT) Write the half equations for the electrode reactions in a hydrogen fuel cell

Cathode (2)

***2H2 (g)  4H+ (aq) + 4e- correct chemicals including electrons [1] balanced [1]***

Anode (2)

***4H+ (aq) + O2 (g) + 4e-  2H2O (g) correct chemicals including electrons [1]balanced [1]***

1. Hydrogen fuel cells are used on space craft to produce electricity. Give an advantage and a disadvantage of using hydrogen fuel cells on a space craft. (2)

***One advantage – no pollution/ water can be drunk by astronauts [1]***

***One disadvantage – hydrogen fuel takes a lot of space/explosive [1]***

Extend

# 5 questions, 5 sentences, 5 words

# GCSE Chemistry – Energy changes

## INSTRUCTIONS

* **For each statement, use either the suggested website or your own text book to write a 5-point summary. In examinations, answers frequently require more than 1 key word for the mark, so aim to include a few key words.**
* **It is important to stick to 5 sentences. It is the process of selecting the most relevant information and summarizing it that will help you remember it.**
* **Write concisely and do not elaborate unnecessarily, it is harder to remember and revise facts from a big long paragraph.**
* **Finally, identify 5 key words that you may have difficulty remembering and include a brief definition. You might like to include a clip art style picture to help you remember it.**

**Example:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QUESTION:** | **Explain the difference between endothermic and exothermic reactions.** | | | | |
| **Sources:** | **Website –**   1. [http://www.bbc.co.uk/schools/gcsebitesize/science/add\_aqa\_pre\_2011/chemreac/energychangesrev1.](http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa_pre_2011/chemreac/energychangesrev1.shtml)   [shtml](http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa_pre_2011/chemreac/energychangesrev1.shtml)   1. <https://www.youtube.com/watch?v=znsPa1BSaIM> | | | | |
| 1. **Exothermic reactions give out heat as it takes more energy to break the bonds than make new bonds.** 2. **Endothermic reactions take in heat as it takes more energy to make new bonds than it does break old ones.** 3. **Surplus energy given out causes the temperature to rise.** 4. **Energy taken in from the surroundings causes the temperature to fall.** 5. **Exothermic reactions are ones such as combustion, endothermic reactions are ice packs.** | | | | | |
| **endothermic** | | **exothermic** | **heat** | **energy** | **bonds** |

1. **Draw/Describe an energy profile for an exothermic reaction and identifying the various**

**components.**

**Website –**

[http://www.bbc.co.uk/schools/gcsebitesize/science/add\_aqa/exothermic/exothermic\_endothermicrev1**.shtml**](http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/exothermic/exothermic_endothermicrev1.shtml)

<http://www.sciencemadesimple.co.uk/curriculum-blogs/chemistry-blogs/exothermic-and-endothermic-reactions>

1. **Draw/Describe an energy profile for an endothermic reaction and identifying the various**

**components.**

**Website –**

[http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel\_pre\_2011/chemicalreactions/preparinggasesrev4.shtm l](http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel_pre_2011/chemicalreactions/preparinggasesrev4.shtml)

<https://www.youtube.com/watch?v=LiAvDpl5aJA>

1. **Describe the composition of crude oil and the dependence of humans on the commodity.**

**Website –**

<http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway_pre_2011/carbon_chem/4_crude_oil1.shtml>

<https://www.youtube.com/watch?v=JZdvsQzOKuk>

1. **Evaluate the advantages and disadvantages of the hydrogen/oxygen fuel cell .**

**Website –**

[http://www.bbc.co.uk/schools/gcsebitesize/science/triple\_ocr\_gateway/chemistry\_out\_there/energy\_transfers/revisi on/1/](http://www.bbc.co.uk/schools/gcsebitesize/science/triple_ocr_gateway/chemistry_out_there/energy_transfers/revision/1/)

<http://www.altenergy.org/renewables/fuel_cells.html>

1. **Describe how a hydrogen/oxygen fuel cell works.**

**Website –**

<http://auto.howstuffworks.com/fuel-efficiency/alternative-fuels/fuel-cell.html>

<https://www.youtube.com/watch?v=Tk_iIzOUjTU>