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| **Where is your learning at?** |
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| ***Can you answer the following questions?*** |
|  |
| What is a hydrocarbon? |
| Can you name some common hydrocarbons? |
| What type of Carbon/Carbon bond characterises the alkanes? |
| Can you name and draw the first 10 alkanes? |
| What is meant by a **saturated** compound? |
| What shape do the carbon atoms in the alkanes have? |
| The first 4 alkanes are gases, the next 12 are liquids and the higher members are waxy solids can you explain why? |
| Can you use 5 points to define the term **Homologous series**? |
| Define “Structural Isomer” |
| Can you draw the isomers of C4H10 and C5H12? |
| Give the systematic names of the compounds shown below  Butane-2D-flat.png  2-methyl-propane_2.gif  (a) (b)  33 dimethylpentane.gif  3ethylhexane.gif (c) (d) |
| Draw the structural formula for the following molecules   1. Propane 2. 3 methyl hexane 3. Cyclohexane 4. 2,4 dimethyl heptane 5. 3 ethyl butane 6. 2 propyl pentane |
| What type of Carbon/Carbon bond characterises the alkenes? |
| The alkenes are said to be **unsaturated** what does this mean? |
| Describe two tests to show that a compound is unsaturated |
| Can you name and draw the first 3 alkenes? |
| What shape do the carbon atoms in the C=C bond have? What bond angle is present here? |
| Can you draw the 3 isomers of C4H8? |
| propene_chem_struc.gifmethy pentene.jpgGive the systematic names of the compounds shown below    cyclohexene.jpg (a) (b)  (c) |
| **Experiment: To prepare Ethene and examine its properties**   1. **What is the balanced equation for the preparation of ethene?** 2. **Why is the reaction also known as a dehydration/condensation/elimination reaction?** 3. **What is the dehydrating agent used in this reaction?** 4. **Can you describe the appearance of this dehydrating agent?** 5. **Why is the glass wool necessary?** 6. **Can you describe 4 safety precautions that are especially important in this procedure?** 7. **What is meant by suckback and how can it be avoided?** 8. **Can you draw a labelled diagram of the apparatus you used in this experiment?** 9. **What are the physical properties of the ethane?**   **10.What kind of flame does the gas burn with?**  **11.Describe a test to show carbon dioxide is produced by**  **the combustion of the gas and write an equation for**  **this**  **12.Describe two tests you can carry out to show the gas**  **is unsaturated, describe the positive result and**  **briefly explain why this happens**  **13. Describe an important commercial use of ethane gas** |
| What type of Carbon/Carbon bond characterises the alkynes? |
| Can you name and draw the first 3 alkynes? |
| Are the alkynes saturated or unsaturated? |
| **Experiment: To prepare Ethyne and examine its properties**   1. **What is the balanced equation for the preparation of ethyne?** 2. **What two chemicals react to prduce ethyne gas?** 3. **What is the purpose of the acidified copper(II) sulphate solution?** 4. **Is the reaction exothermic or endothermic explain** 5. **Can you name two contaminants that might be present in the ethyne if the acidified copper(II) sulphate solution was not used?** 6. **Can you describe a safety precaution that is especially important in this procedure?** 7. **What is meant by suckback and how can it be avoided?** 8. **Can you draw a labelled diagram of the apparatus you used in this experiment?** 9. **What are the physical properties of the ethyne?**   **10.What kind of flame does the gas burn with?**  **11.Describe a test to show carbon dioxide is produced by**  **the combustion of the gas and write an equation for**  **this**  **12.Describe two tests you can carry out to show the gas**  **is unsaturated, describe the positive result and**  **briefly explain why this happens**  **13. Describe an important commercial use of ethyne gas** |
| What is an aliphatic compound? |
| What are aromatic compounds? |
| What is the chemical formula for benzene |
| Draw the full structure of a benzene ring and draw the “common” symbol of a benzene ring? |
| Can you describe the bonding that takes place in a benzene ring and hence explain why a ring is used to show the bonding that takes place? |
| Why is benzene surprisingly unreactive despite having 3 double bonds? |
| Why are benzene and cyclohexene very different? |
| Can you draw (i) Methylbenzene and (ii) Ethyl benzene? |
| Why is methyl benzene used in the laboratory rather than pure benzene? |
| Would you expect methylbenzene to be soluble in water or cyclohexane? Explain your answer |
| **Oil Refining and its products** |
| What is crude oil and in what kind of places is it found? |
| What process is carried out on crude oil to separate it into its useful components? |
| Can you describe in 5 clear points the process of fractional distillation from start to finish? |
| Why do different fractions condense at different temperatures? |
| Draw a simple diagram to show the fractional distillation process and label each fraction from top to bottom |
| Describe a use for each of the 8 fractions |
| What are the lenghts of the carbon cahins in each of the fractions you have named? Eg. Refinery Gas contains C1 –C4 carbon chains |
| Which fraction are metacarptants added to and why? |
| What is meant by the residue fractions? |
| What is meant by the Octane number of a fuel? |
| What is meant by ”knocking” or “auto ignition”? |
| What is the hydrocarbon assigned an ocatne number of 100 called? |
| What is the hydrocarbon assigned an ocatne number of 0 called? NB these are the two **reference** hydrocarbons for assigning ocatne numbers to all other fuels and must be known! |
| Good quality petrol should have an octane number of ………….??? |
| HL How does carbon chain length affect the ocatne number of a fuel? |
| HL How does the degree of branching in a hydrocarbon affect the octane number of a fuel? |
| HL How do staright chain versus cyclic structure affect the octane number of a fuel? |
| HL Which of the following would you expect to have the higher ocatne number?   1. Hexane or butane 2. 3 methyl hexane or 2,3 dimethyl pentane 3. Hexane or cyclo hexane? |
| Why was tetra ethyl lead added to petrol and why has its use been phased out in Ireland since 2000? |
| Describe 4 ways to increase the ocatne number of a fuel and briefly describe how each of the methods you have described can improve the ocatne number NB OL only need to know methods |
| Hydrogen is another type of fuel can you describe two methods by which it may be manufactured? |
| **Thermochemistry** |
| What is meant by an **Exothermic reaction**? |
| Can you name some common exothermic reactions? |
| What is meant by an **Endothermic reaction**? |
| Can you name some common endothermic reactions? |
| Draw the symbol used to indicate the haet change of a reaction |
| Can you state what the following equation means in words  H2(g) + 1/2O2(g)  H2O(g) ΔH = -242 kJ/mol |
| What does a positive value for ΔH indicate? What does a negative value for ΔH indicate? |
| What is the exact definition for the heat of reaction? |
| What is the exact definition for heat of combustion? |
| If you afre given the following thermochemical equation calculate the heat of combustion for the reaction  2C 4H10(g) + 13 O2(g) 8CO2(g) + 10H2OΔH = -5720 kJ/mol-1 |
| What instrument can be used to find the haet of combustion of a reaction? |
| Draw a simple diagram of this instrument and describe in 4 points how it works |
| Can you write a balanced combustion reaction for butane? |
| Define kilogram calorific value |
| HL Define Bond energy |
| HLDoes forming bonds require or release energy? |
| HLWhat is the source of energy for exothermic reactions? (bond breaking or bond formation?) |
| HLWhy are bond energy values usually given as average? |
| What is meant by a neutralisation reaction? |
| Define **heat of neutralisation** |
| What value is usually obtained for the heat of neutralisation between a strong base and strong acid? |
| Why is this value roughly the same even if different strong acids and strong ases are used? |
| If a weak acid or a weak base is used a lower heat of neutralisation value is obtained why is this? |
| **Experiment To determine the heat of Reaction (Heat of Neutarlisation) of hydrochloric acid with sodium hydroxide**   1. **List 3 safety precautions that should be taken in this experiment** 2. **How do you ensure that both solutions are at the same temperature before the raection is started?** 3. **What instruemnt do you juse to maesure the volume of the solutions?** 4. **Why are the solutions mixed in a plastic cup?** 5. **Why is continuous stirring necessary?** 6. **What is the purpose of the lid?** 7. **How do you know the maximum temperature has been reached?** 8. **What equation do you use to calculate the heat of neutralisation?** 9. **What do all the symbols in this equation reresent?**   **10.What units should each quantity be given in?**  **11.If you know the volume and molarity of a solution**  **how do you calculate how many moles are present?**  **12. How do you convert from grams to kilograms?**  **13. If the acid is diprotic such as H2SO4 What do you**  **need to do?** |
| What is meant by (a) Specific heat capacity and (b) negligible? |
| A student carried out an experiment to maesure the haet of neutralisation of nitric acid by sodium hydroxide in a container made of palstic of negligible specific heat capacity. He used 100cm3 of 1.0M nitic acid and 100cm3 of 1.0M sodium hydroxide. The initial tempearture of the solutions was 15.6⁰C and the final temperature of the solution was 22.4⁰C.  Given that the specific heat capacity of the solution is 4080j/kg/K, calculate the heat of neutralisation. (Assume the density of the solution is 1g/cm3) |
| HL Define the **heat of formation** of a substance |
| HL Why is it important to give the physical sates of the reactants in heat of formation equations? |
| HL If two moles of a product is given in an equation such as this example 2H 2(g) + O2(g) 2H2O(l) ΔH = -571.6 kJ/mol-1  What needs to be done to get the haet of formation? |
| HL Practice writing the formation equations for the following compounds make sure they are balanced and there is only 1 mole of product formed   1. C2H 2(g) 2. NH 3(g) 3. HCN (g) 4. C3H3N(g) |
| HL What does Hess’s Law state? |
| HL Show Hess’s law by means of a diagram |
| HL State the law of conservation of energy |
| HL Using the letters C, F and R indicate which of the following equations represent Combustion, Formation or “Reaction” equations   1. H2(g) + 1/2O2(g) H2O(g) ΔH = -242 kJ/mol 2. C 4H10(g) + 6½ O2(g) 4CO2(g) + 5H2OΔH = -2860 kJ/mol-1 3. 2H2S(g) + SO 2(g) 3S(s) + 2H2O(l) ΔH = -233kJ/mol-1 4. H 2(g) + S(s) H2S(g) ΔH = -21kJ/mol-1 |
| HL  The combustion of methane is described by the following balanced equation.  **CH4(g) + 2O2(g) CO2(g) + 2H2O(l)** Δ***H* =** − **890.4 kJ mol-1**  The standard heats of formation of carbon dioxide and water are −394 and −286 kJ mol-1 respectively.  Calculate the heat of formation of methane. |
| HL  The combustion of liquid benzene is described by the following equation:  **2C6H6(l) + 15O2(g)** → **12CO2(g) + 6H2O(l)**  Given that the heats of formation of carbon dioxide gas, liquid water and liquid benzene are –394,–286 and 49 kJ mol–1 respectively.  Calculate the heat of combustion of liquid benzene. |