Practice Question Set For A-Level
**Subject : Chemistry**
**Paper-2 Topic: Alkanes**

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**Name of the Student**:_____
**Max. Marks : 23 Marks** **Time : 23 Minutes**

Q1.

(a) State what is meant by the term *homogeneous* as applied to a catalyst.

_____

**(1)**

(b) (i) State what is meant by the term *autocatalysis*.

_____

_____

(ii) Identify the species which acts as an autocatalyst in the reaction between ethanedioate ions and manganate(VII) ions in acidic solution.

_____

**(2)**

(c) When petrol is burned in a car engine, carbon monoxide, carbon dioxide, oxides of nitrogen and water are produced. Catalytic converters are used as part of car exhaust systems so that the emission of toxic gases is greatly reduced.

(i) Write an equation for a reaction which occurs in a catalytic converter between two of the toxic gases. Identify the reducing agent in this reaction.

*Equation* _____

_____

*Reducing agent* _____

(ii) Identify a transition metal used in catalytic converters and state how the converter is constructed to maximise the effect of the catalyst.

*Transition metal* _____

*How effect is maximised* _____

_____

**(5)**

(d) The strength of the adsorption of reactants and products onto the surface of a transition metal helps to determine its activity as a heterogeneous catalyst.

(i) Explain why transition metals which adsorb strongly are not usually good catalysts.

_____

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(ii) Explain why transition metals which adsorb weakly are not usually good catalysts.

_____

**(2)**

**(Total 10 marks)**

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Q2.

(a) Chloromethane can be made by the reaction of chlorine with methane.

(i) Give **one** essential condition for this reaction.

_____

(ii) Name the mechanism for this reaction.

_____

(iii) Further substitution can occur during this reaction. Identify the main organic product when a large excess of chlorine is used in this reaction.

_____

**(3)**

(b) Ethanenitrile can be made by reacting chloromethane with potassium cyanide.

(i) Write an equation for this reaction.

_____

(ii) Name the mechanism for this reaction.

_____

(iii) Explain, in terms of bond enthalpies, why bromomethane reacts faster than chloromethane with potassium cyanide.

_____

_____

_____

**(3)**

(c) Ethanenitrile can be hydrolysed to a carboxylic acid by heating it under reflux with a dilute acid. Identify the carboxylic acid formed in this reaction.

_____

**(1)**

(d) Chloromethane can react with ammonia to produce a primary amine.

(i) What feature of the chloromethane molecule makes it susceptible to attack by an ammonia molecule?

_____

(ii) Name the amine produced in this reaction.

_____

(iii) Outline a mechanism for this reaction.

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**(6)**
**(Total 13 marks)**

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