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

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

This question is about 1-chloropropane.

(a) Define the term standard enthalpy of formation.

_____

_____

_____

_____

(2)

(b) The equation for a reaction used to manufacture 1-chloropropane is

$$3\ CH_3CH_2CH_2OH(l) + PCl_3(l) \rightarrow 3\ CH_3CH_2CH_2Cl(l) + H_3PO_3(s)$$

The enthalpy change for this reaction, ΔH, is –114 kJ mol^{-1}

The table contains some standard enthalpy of formation data.

Substance	$PCl_3(l)$	$CH_3CH_2CH_2Cl(l)$	$H_3PO_3(s)$
$\Delta f H^{\ominus}$ **/ kJ mol^{-1}**	–339	–130	–972

Calculate a value for the standard enthalpy of formation of propan-1-ol using the enthalpy change for the reaction and data from the table.

Standard enthalpy of formation _____ kJ mol^{-1}

(3)

(c) 1-chloropropane can also be produced by the reaction between propane and chlorine in the presence of ultraviolet light.

State why ultraviolet light is needed for this reaction to occur.

Downloaded from www.merit-minds.com

Give an equation for each propagation step in the formation of 1-chloropropane from propane.

Why ultraviolet light is needed _____

_____

_____

Propagation step 1 _____

_____

Propagation step 2 _____

_____

(3)

(d) The C–Cl bond in 1-chloropropane is polar because carbon and chlorine have different electronegativities.

Define the term electronegativity.

_____

_____

_____

(1)

(e) Ammonia reacts with 1-chloropropane to form propylamine.

Name and outline the mechanism for this reaction.

Name of mechanism _____

Outline of mechanism

(5)
(Total 14 marks)

Downloaded from www.merit-minds.com

Q2.

This question is about emissions of oxides of nitrogen from petrol and diesel engines.

(a) Explain how oxides of nitrogen are formed in engines.

_____

_____

_____

_____

(2)

(b) State why it is desirable to decrease emissions of oxides of nitrogen from vehicles.

_____

_____

_____

(1)

(c) Modern diesel vehicles use diesel exhaust fluids, such as AdBlue, to decrease emissions of oxides of nitrogen.

AdBlue reacts with water in the hot exhaust gases to form ammonia.
In the presence of a catalyst the ammonia reacts with oxides of nitrogen to form nitrogen and water.

Give the oxidation state of nitrogen in each of NO_2, NH_3 and N_2

Complete the equation for the reaction between NO_2 and NH_3

Oxidation state of nitrogen in

NO_2_____ NH_3_____ N_2_____

Equation

_____ NO_2 + _____ NH_3 → _____ N_2 + _____ H_2O

(2)

(d) Petrol vehicles have a catalytic converter which decreases emissions of oxides of nitrogen. Platinum in the catalytic converter acts as a heterogeneous catalyst.

State the meaning of the term heterogeneous catalyst.

_____

_____

_____

_____

(2)

(e) Some carbon particulates are also formed in both diesel and petrol vehicles.

Downloaded from www.merit-minds.com

Explain why carbon particulates are formed.

_____

_____

(1)

(Total 8 marks)

Downloaded from www.merit-minds.com