Week 5 Learning Check
Chemistry Foundation

Name: _____

Class: _____

Date: _____

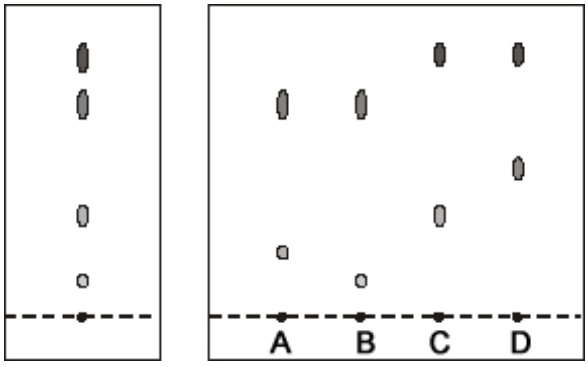
Time: **30 minutes**

Marks: **30 marks**

Comments:

Q1.

Chromatography was carried out on a sample of soft drinks to check that they contained only colours that were safe. This is the result.



Safe colours Colours from the soft drinks

What conclusions about the safety of the colours in the soft drinks **A, B, C** and **D** can be made from the results shown by chromatography?

_____

_____

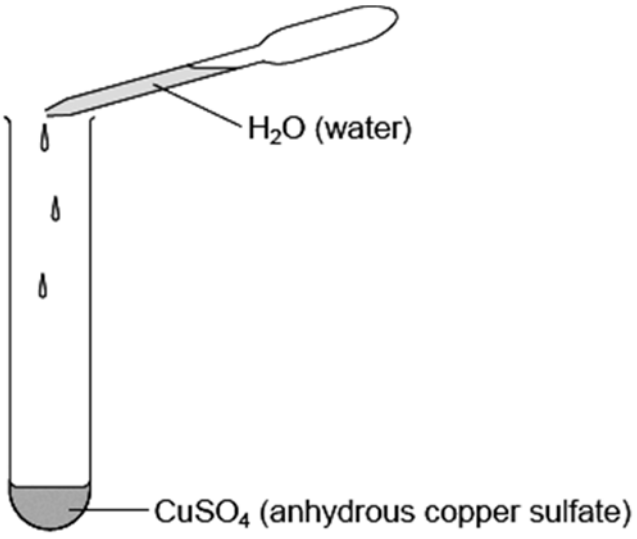
_____

_____

_____

(Total 2 marks)

Q2. The diagram shows how anhydrous copper sulfate can be used to test for water.



$CuSO_4$ + $5H_2O$ $\rightleftharpoons$ $CuSO_4.5H_2O$

white colourless blue

(a) What colour change will you see when water is added to the $CuSO_4$?

Colour changes from _____ to _____

(1)

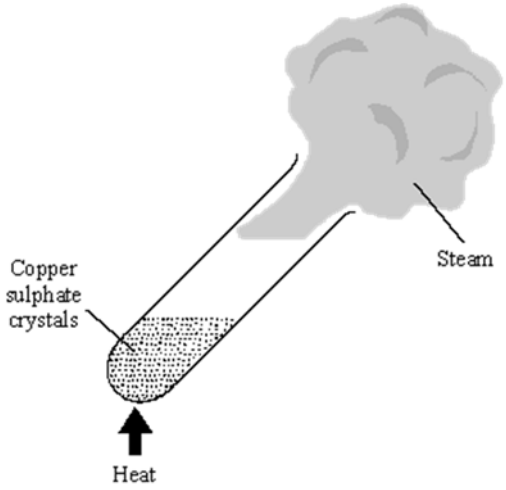
(b) Draw a ring around the meaning of the symbol ⇌

endothermic **exothermic** **reversible**

(1)

(Total 2 marks)

Q3. A student heated some blue copper sulphate crystals. The crystals turned into white copper sulphate.



(a) The blue copper sulphate had to be heated to change it into white copper sulphate.

State whether the reaction was exothermic or endothermic. _____

Explain your answer.

_____

_____

(1)

(b) The word equation for this reaction is shown below.

hydrated copper sulphate (blue) [+ heat energy] ⇌ anhydrous copper sulphate (white) + water

(i) What does the symbol ⇌ tell you about this reaction?

_____

(1)

(ii) How could the student turn the white powder back to blue?

_____ **(1)**

(Total 3 marks)

Q4.

Good quality water is needed for a healthy life.

In the United Kingdom, obtaining safe water for drinking is as simple as turning on a tap. The water is made safe to drink by water companies.

However, in many parts of Africa and Asia, water used for drinking is contaminated and untreated. It is estimated that 2.2 million people die each year as a result of drinking contaminated water.

DADA DANESHANANDA, Man with filtered water from the Mafi-Zongo water project. www.amurt.net/africa/ghana/2005

(a) Sea water is **not** used as drinking water.

Suggest why.

_____

_____

(1)

(b) Explain why water for drinking is filtered and then treated with chlorine.

_____

_____

_____

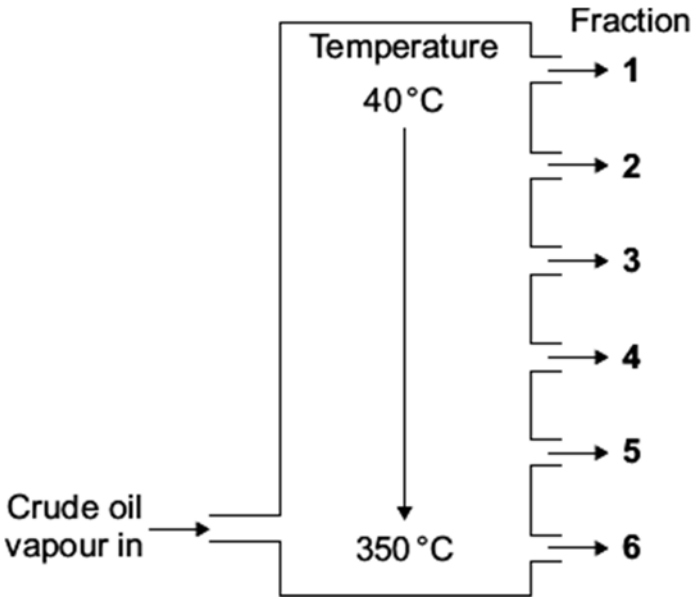
_____

(2)

(Total 3 marks)

Q5.

Crude oil is a mixture of hydrocarbons.
Crude oil can be separated into fractions.



(a) (i) Complete the sentence.

The process used to separate the crude oil into fractions is called

fractional _____ .

(1)

(ii) Why do the fractions separate at different temperatures?

_____

_____

(1)

(b) Tick (✓) **two** properties of fraction **6**.

Property	Tick (✓)
contains hydrocarbons	
has a small number of carbon atoms in each molecule	
is easy to ignite	
has a high boiling point	

(2)

(c) Fraction **1** contains hydrocarbons called alkanes.
The general formula of an alkane is: C_nH_{2n+2}

What is the formula of the alkane that has 5 carbon atoms in each molecule?

Draw a ring around the correct answer.

C_5H_9 **C_5H_{10}** **C_5H_{11}** **C_5H_{12}**

(1)
(Total 5 marks)

Q6. Large hydrocarbon molecules can be cracked to produce smaller, more useful molecules.

Alkanes and alkenes are produced when hydrocarbons are cracked.

(a) Give **two** conditions used for cracking.

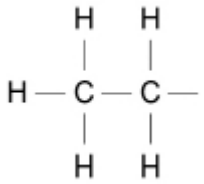
1 _____

2 _____ **(2)**

(b) Butane (C_4H_{10}) is an alkane.

The figure below shows part of the displayed structural formula of butane.

Complete the displayed structural formula of butane in the figure.



(1)

(c) Butane burns in oxygen.

Complete the word equation for the complete combustion of butane.

butane + oxygen → _____ + _____ **(2)**

(d) Ethene is an alkene.

Give a test for alkenes.

Give the result of the test if an alkene is present.

Test _____

Result _____

_____

(2)

(e) Each year many tonnes of crude oil are extracted from the Earth.

It took millions of years for the crude oil to be formed.

What do we call development that meets the needs of current generations without compromising the resources for future generations?

Tick (✓) **one** box.

Finite development ☐

Global development ☐

Natural development ☐

Sustainable development ☐

(1)

(Total 8 marks)

Q7.

Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows a comparison of the atmospheres of the Earth and Venus today.

	Percentage composition of atmosphere	
Name of gas	**Earth today**	**Venus today**
Nitrogen	78	3.5
Oxygen	21	a trace
Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Average surface temperature	20 ºC	460 ºC

(a) Use the names of gases from the table to complete the sentences.

(i) In the Earth's atmosphere today, the main gas is _____ .

(1)

(ii) In the Earth's atmosphere billions of years ago, the main gas was

_____. **(1)**

(b) (i) Scientists do **not** know the accurate composition of the Earth's early atmosphere. Suggest why.

_____

_____

(1)

(ii) Use information from the table to answer this question.

Water vapour is present in the atmospheres of the Earth and Venus today. The Earth's surface is mainly covered by water.

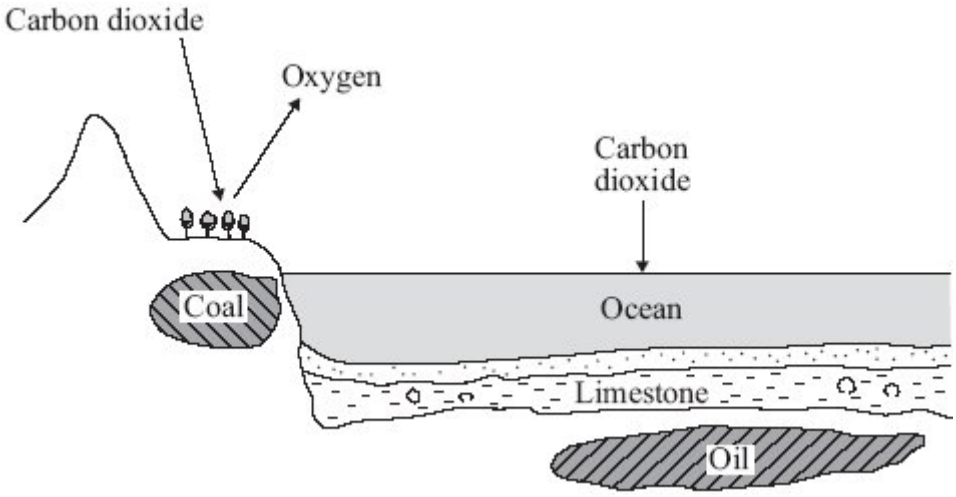
Suggest why there is no water on the surface of Venus.

_____

_____

(1)

(c) The diagram shows how carbon dioxide is removed from the Earth's atmosphere.



Describe what happened to the carbon dioxide in the Earth's early atmosphere. Use the diagram to help you.

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 7 marks)

Q1.

drinks / colours B **and** C are safe

1

drinks / colours A **and** D are not safe

*accept a pair of one safe colour **and** one not safe colour identified for **1** mark*

*accept A, B, C and D all contain one safe colour for **1** mark*

ignore references to shading

1

[2]

Q2.

(a) white to blue

accept colourless to blue

1

(b) reversible

1

[2]

Q3.

(a) endothermic **and** because it takes in heat / energy

***both** for one mark*

1

(b) (i) reversible reaction (or explanation)

1

(ii) add water

*do **not** accept cooling **or** reverse the reaction*

1

[3]

Q4.

(a) contains (large amounts of) dissolved solids / difficult to remove dissolved solids

allow salty / too much salt

allow sea water makes you thirsty / vomit

allow polluted / untreated / contaminated

1

(b) filtered: removes solids / removes insoluble material / dirt

ignore large objects

1

chlorine: kills/destroy bacteria/microbes/ germs etc

*allow disinfect / sterilise **or** gets rid of bacteria*

ignore purify / clean

1

[3]

Q5.

(a) (i) distillation

1

(ii) condense (at different temperatures)

accept they / fractions / hydrocarbons have different boiling points

ignore melting point / size of molecule

1

(b) contains hydrocarbons

1

has a high boiling point

1

(c) C_5H_{12}

1

[5]

Q6.

(a) any **two** from:

- high temperature

  ignore heat / hot

  allow a temperature between 400 °C and 900 °C

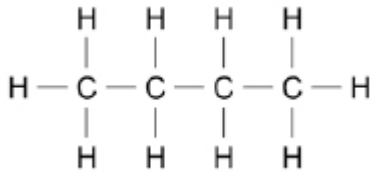
- catalyst

  allow aluminium oxide, alumina, porous pot, zeolites

- steam
- high pressure
- low oxygen atmosphere

2

(b)



all bonds and atoms must be present

1

(c) carbon dioxide

allow CO_2

1

water

allow H_2O

1

(d) bromine (water)

*do **not** accept bromide*

1

turns (from orange / brown / yellow to) colourless

MP2 is dependent on MP1
allow decolourises
ignore clear

1

(e) sustainable development

1

[8]

Q7.

(a) (i) nitrogen / N_2

1

(ii) carbon dioxide / CO_2

1

(b) (i) humans / scientists had not evolved

accept it was billions / millions of years ago
allow too long ago

1

(ii) temperature is above 100°C **or** any water would evaporate / boil

accept Venus is too hot

1

(c) any **three** from:

- used by plants
- used for photosynthesis

*accept plants take in carbon dioxide and give out oxygen for the first two bullet points ie **2** marks*

- dissolves in oceans / seas

allow absorbs into oceans / seas

- used to form the shells / skeletons of marine organisms
- locked up as limestone / carbonates
- locked up as fossil fuels / oil / coal

3

[7]

Q1.

Too many candidates failed to understand what the chromatogram indicated and thought that safe colours were either the ones that had the greatest depth of colour or those which reached the greatest height. Candidates often incorrectly stated that all colours from the soft drinks were safe. Only a small number were able to link the colours from the soft drinks with the safe colours shown.

Q2.

This question was designed to give candidates a gentle start to the paper and the vast majority of the candidates were able to attempt the question and to gain marks.

(a) Tested the ability of the candidates to interpret information given in a simple equation. Most candidates gave the correct response, although a number reversed the colours and gave, from blue to white. A few candidates gave vague responses such as clear or transparent instead of white. Examiners have noted for a number of years that students do not appreciate the difference in meaning of the terms clear and colourless.

(b) The vast majority of candidates identified that the symbol means reversible. The most common incorrect response was exothermic.

Q3.

Foundation Tier

(a) Candidates found this section difficult. Many gave exothermic and those who gave endothermic often found difficulty in explaining their answer.

(b) (i) Most candidates answered this part correctly.

(ii) This part was poorly answered with many candidates choosing to continue heating rather than to add water.

Q4.

The majority of the candidates were able to gain full marks.

Quite a few candidates were unable to gain the filter mark for part (b) as they were talking in terms of filtering large objects. Some even thought that it removes the salt. There were some candidates who gave the correct answers but did not mention which answer referred to which process.

Q5.

(a) (i) Most candidates gained the mark. The word ‘distillation’ presented many candidates with a spelling problem.

(ii) The word ‘condense’ was not well known, so most candidates who gained the mark here did so for mentioning that the fractions have different boiling points. Many candidates stated incorrectly that the fractions ‘have different melting points’, ‘have different reactivities’, ‘burn at different temperatures’, or ‘heat at

different rates'.

(b) A few candidates ticked only one property. Generally this part was well answered. Almost half of the candidates correctly ticked both 'contains hydrocarbons' and 'has a high boiling point'. The majority of candidates gained at least one mark.

(c) A slight majority of candidates were able to use the general formula C_nH_{2n+2} to identify that the correct formula of the alkane with five carbon atoms is C_5H_{12}.

Q6.

(a) Conditions for cracking were not well known, with only around 5% of students gaining both marks, usually for stating 'high temperature' and 'catalyst'. Nearly 63% of students were unable to give any required conditions. Responses commonly included descriptions of the purpose of cracking or the outcome of cracking.

Responses which were insufficient for credit included 'heat', 'temperature', and 'pressure'.

(b) The displayed structural formula for butane was clearly drawn by about 40% of students. However, 25% of students gave no response. The most commonly seen incorrect response was the formula for ethane, shown by adding just 'H' to the partial formula given. A very small minority of students attempted to complete the formula by adding 'H' within the carbon chain.

(c) About 11% of students gained both marks by giving carbon dioxide and water. Butane oxide was commonly seen, often paired with hydrogen. Carbon and hydrogen was another incorrect combination. A small number of students wrote formulae. When correct, these were credited. Students giving either carbon dioxide or water gained one mark, with numbers approximately equally split between these two alternatives.

(d) The test for alkenes using bromine water is not well known, with just around 5% of students awarded both marks and 8% at least one mark. It is apparent that students are not remembering this simple test. Students appeared to confuse 'alkene' with 'alkali', as the most frequently seen incorrect tests involved testing for pH (e.g. universal indicator or litmus). Testing with limewater or a lighted or glowing splint was also seen. A very small minority of students knew the use of bromine water to test for alkenes, but were unable to give the correct colour change.

(e) 'Sustainable development' was correctly identified by half of students.

Q7.

(a) (i) A large number of candidates used the information provided to correctly identify nitrogen as the main gas in the Earth's atmosphere.

(ii) The majority of candidates realised from the data that carbon dioxide used to be the main gas in the Earth's atmosphere.

(b) (i) Most responses were incorrect because they were based on the idea that there was a lack of valid evidence which was caused by inadequate technology or the composition of the atmosphere changing.

(ii) Many candidates recognised that liquid water would not exist on the surface of Venus because it was too hot or any liquid water would boil/evaporate. Simply to state that the temperature on Venus is 460°C is an incomplete explanation

and did not receive credit.

(c) The diagram was given to cue candidates into how carbon dioxide was removed from the Earth's early atmosphere. Many candidates gained two marks for stating that trees absorb carbon dioxide and give out oxygen. Several of these candidates also appreciated that carbon dioxide was dissolved into the oceans. There was evidence that the majority of candidates do not understand that a large proportion of this carbon dioxide gradually became locked up in sedimentary rocks as carbonates and fossil fuels.