

National 5 Chemistry

Relevant Past Paper Questions from
SQA Standard Grade Credit
and Intermediate 2 papers

Problem Solving Questions

March 2014



N5 Chemistry Past Paper Questions

This resource has been produced in response to the requests from practitioners who attended the National Qualifications Sciences events at Hampden Stadium in December 2013 which Education Scotland organised in partnership with the SQA.

The questions in this resource relate to Problem Solving for National 5 Chemistry and have been taken from the 2011, 2012 and 2013 Standard Grade and Intermediate 2 Past Papers.

In cases where the questions relate to more than one of the National 5 Units, the constituent parts of the question have been separated into their respective key areas. The stem of the question has been retained to give the context of the question. If practitioners require the full integrated question, they should refer to the original past paper on the [SQA website](#).

Past paper questions for the National 5 Chemistry Units, Chemical Changes and Structure, Nature's Chemistry and Chemistry in Society, are also available from Education Scotland's National Qualifications Glow portal: <http://www.educationscotland.gov.uk/nqcoursematerials/> (cut and paste link into your browser).

Education Scotland would like to acknowledge the support of the SQA in helping us produce this resource. We hope it proves helpful to practitioners across Scotland and assists with the implementation of the national qualifications.

Problem Solving

Not linked to any particular key area

Marks

St Gr 2011 Q12 (b) i & ii The table below shows the relationship between the percentage of ethanol and the density of alcoholic drinks.

Percentage of ethanol (%)	40	50	60	70	80
Density of alcoholic drink (g/cm³)	0.928	0.907	0.886	0.865	0.844

- (a) Write a general statement describing how the percentage of ethanol affects the density of the alcoholic drink. 1

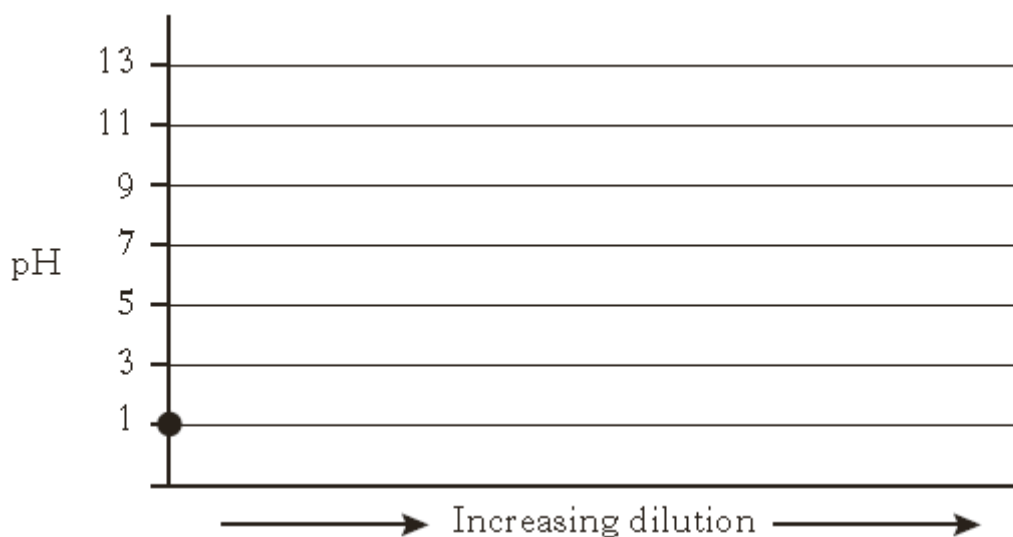
- (b) The density of a particular brand of alcoholic drink is 0.970 g/cm³. Predict the percentage of ethanol in this alcoholic drink. 1

Answer	Sample Answers and Mark Allocation	Notes
(a)	As the percentage increases...the density decreases As the percentage decreases...the density increases Density increases as percentage decreases Density decreases as percentage increases etc 1	Not acceptable: As the density increases percentage decreases eg wrong cause and effect
(b)	20 1	

St A solution of 0.1 mol/l hydrochloric acid has a pH of 1.

Gr
2012
Q17
(a) i
& ii

- (a) What colour would universal indicator turn when added to a solution of hydrochloric acid? 1
- (b) Starting at pH 1, draw a line to show how the pH of this acid changes when diluted with water. 1



Answer	Sample Answers and Mark Allocation	Notes
(a)	Red, pink, orange, yellow 1	

(b)	Line must be increasing Line stops at pH7 or below	1
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St
Gr
2012
Q 18

Marks

A student investigated how the concentration of sodium chloride in water affected the freezing point.

- (a) What type of bond is broken in sodium chloride when it dissolves in water? 1
- (b) The table shows information about the freezing point of different sodium chloride solutions. 1

Concentration of sodium chloride solution (mol/l)	0	0.09	0.18	0.27	0.37	0.46
Freezing point (°C)	0	-0.2	-0.5	-0.8	-1.1	-1.5

Describe the relationship between the concentration and freezing point.

- (c) Predict the freezing point of a 0.55 mol/l sodium chloride solution. 1

Answer

Sample Answers and Mark Allocation

Notes

(a)

Ionic
Ionic lattice
Ionic network

1

Not acceptable:

Ionic molecular
Lattice on its own
Network on its own
Sodium to chlorine bonds

(b)

As concentration increases/decreases freezing point decreases/increases
The freezing point decreases/increases as concentration increases/decreases
As concentration increases freezing point gets colder

1

Not acceptable:

Wrong cause & effect eg:
As freezing point decreases concentration increases.

(c) -1.8 to -2.0 inclusive

1 **Not acceptable:**
Statement
Less than -1.5

Marks

Int 2 A student investigated how the concentration of sodium chloride in water affected the freezing
2011 point.
B

1

Q9(d)



The little pen-tailed tree shrew, found in the jungles of West Malaysia, feeds on nectar from the Bertam palm tree. This nectar contains glucose which ferments, producing solutions of up to 3.8% alcohol. Therefore, the tree shrew regularly drinks a solution which is equivalent to a man drinking 9 units of alcohol per day. It seems that the tree shrew never gets drunk because it is able to breakdown the alcohol much quicker than humans can.

Using information in the passage above, calculate the volume of alcohol solution the tree shrew drinks each day.

$$\text{Volume of alcohol solution} = \frac{\text{units of alcohol} \times 1.25}{\% \text{ of alcohol}}$$

Answer	Sample Answers and Mark Allocation	Notes
(a)	$\frac{9 \times 1.25}{3.8}$ $= 2.96$ <p style="text-align: center;">1</p>	2.9 or 3.0 or 3 without working – zero marks

		2.96/2.9605/2.961/2.9605263 on its own – 1 mark 3.0 or/3 with working	
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Marks

Int 2 Some indicators can have different colours when in solutions of different pH values.
 2011 The tables give information about two indicators, bromothymol blue and methyl orange.
 B
 Q13

Bromothymol blue	
Colour	pH
yellow	below 6.0
blue	above 7.6

Methyl orange	
Colour	pH
red	below 3.1
yellow	above 4.4

The pH of three solutions was investigated using both indicators.
 The results are shown below.

Substance	Colour with bromothymol blue	Colour with methyl orange
A	yellow	red
B	yellow	yellow
C	blue	yellow

- (a) Which solution is alkaline? 1
- (b) Suggest a pH value for solution B. 1

Answers	Sample Answers and Mark Allocation	Notes
(a)	(solution) C Last one/bottom one 1	
(b)	any value above 4.4 and below 6.0 (not inclusive) must acknowledge both parameters number within range 1	Not acceptable: value below 6.0 value above 4.4

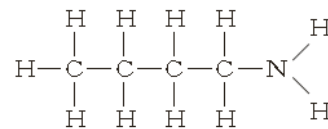
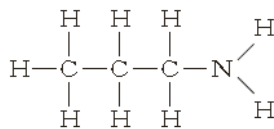
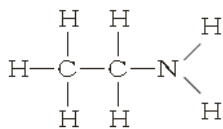
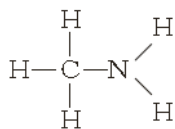
Marks

1

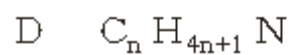
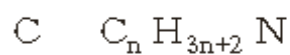
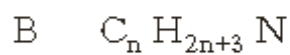
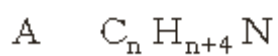
Int 2 The first four members of the amine homologous series are:

2013

A
Q15



What is the general formula for this homologous series?



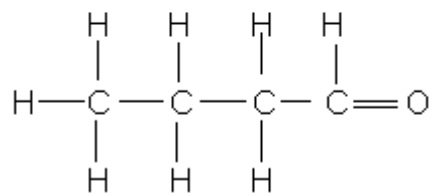
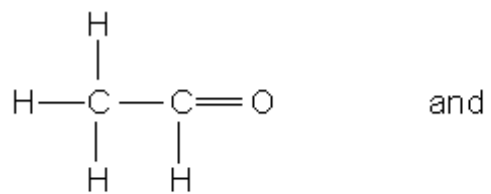
Answer

Sample Answers and Mark Allocation

Notes

B

1



Not acceptable:
No 5 bonded carbons

both required for 1 mark
allow one missing H or one missing C to H bond