

Westminster School



Sixth Form Entrance Examination

CHEMISTRY

Sample compulsory question (Q1)

The following questions are offered to give an idea to prospective candidates on the style that is used in our 6th Form Entry papers.

The first question on the paper each year is compulsory for all candidates – there is a choice in later questions to account for the fact that pupils will have been taught different topics in different orders.

This first question tests a candidate's ability to apply routine fundamentals that will have been covered on any (I)GCSE course by this point. There is good correlation between success on this question with later questions. A number of marks are allocated to writing formulae and equations, which is seen as a key skill for success at A-Level.

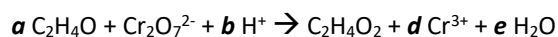
Typically, this first question would make up for 40% of the overall mark allocation.

Question One – ALL candidates should attempt this question

This question is about basic principles in chemistry.

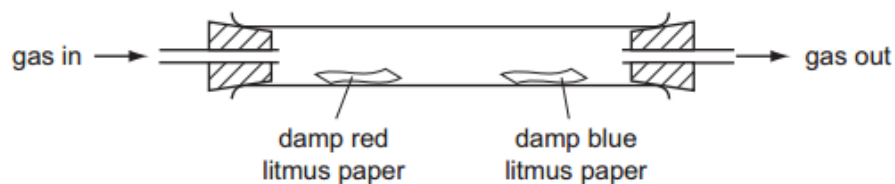
a) For each of the following, please **circle** the letter of your chosen answer. There is only **one** correct answer in each case.

(i) When balanced, what is the value of **e** in the following equation?



- A 2
- B 4
- C 6
- D 8

(ii) Four different gases are passed through the apparatus shown.

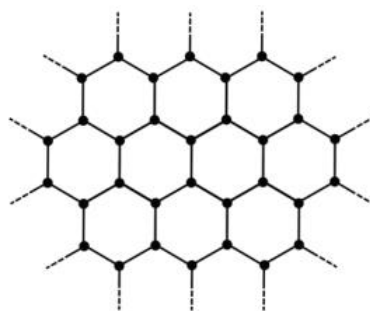


Which gas has **no** effect on either piece of litmus paper?

- A Ammonia (NH₃)
 - B Carbon dioxide (CO₂)
 - C Hydrogen chloride (HCl)
 - D Hydrogen (H₂)
- (iii) Elements **X**, **Y** and **Z** are in group 7 of the Periodic Table. **X** is a gas; **Y** is less reactive than **Z**; and **Z** is a liquid. Which of the following gives the correct order of increasing reactivity?
- A X→Y→Z
 - B X→Z→Y
 - C Y→X→Z
 - D Y→Z→X

- (vii) Graphene is a new material composed of carbon atoms arranged in tightly bound hexagons just one atom thick.

The diagram shows a simplified structure of graphene.



Considering its structure, which of the properties below could be predicted about graphene?

1.	High melting point
2.	Good electrical conductivity
3.	Soluble in water

- A 1 only
- B 1 and 2 only
- C 2 only
- D 1,2 and 3
- (viii) A metal, **X**, is in group 3 of the Periodic Table. A non-metal, **Y**, is in group 6 of the Periodic Table. They react together to form a compound. What is the formula of the compound?
- A X_2Y
- B X_2Y_3
- C X_3Y_2
- D X_6Y_3
- (ix) Magnesium hydrogen phosphate contains the following ions: Mg^{2+} , H^+ and PO_4^{3-} . Which one of the following is a possible formula for magnesium hydrogen phosphate?
- A $Mg(HPO_4)_2$
- B $Mg(H_2PO_4)_2$
- C MgH_3PO_4
- D MgH_2PO_4

- (x) Naturally occurring chlorine is a mixture of two isotopes with mass number 35 and 37. The isotope with mass number 35 is three times as common as the isotope with mass number 37. Naturally occurring bromine is a mixture of two isotopes with mass numbers 79 and 81. They are present in equal amounts.

What fraction of the naturally occurring compound CH_2BrCl has a relative molecular mass of 128? [The relative molecular mass of a compound is the sum of its atomic masses].

- A 1/8
- B 1/4
- C 3/8
- D 1/2

b) Give the chemical formulae of the following substances:

(i) Magnesium chloride

.....

(ii) Magnesium hydroxide

.....

(iii) Nitric acid

.....

(iv) Sulphuric acid

.....

[4]

c) Write **balanced chemical equations** for the following processes. State symbols are **not** required.

(i) The neutralization of magnesium hydroxide with sulphuric acid.

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(ii) The reaction of magnesium metal with hydrochloric acid.

.....

(iii) The reaction of magnesium carbonate with nitric acid.

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[6]

[Total for Q: 20 marks]