

# 1.1 Matter, Chemical Change & the Mole Concept

## Question Paper

Course	DPIB Chemistry
Section	1. Stoichiometric Relationships
Topic	1.1 Matter, Chemical Change & the Mole Concept
Difficulty	Easy

**Time allowed:** 20  
**Score:** /13  
**Percentage:** /100

**Question 1**

*A periodic table is needed for this question*

A compound has an empirical formula of  $C_2H_6O$  and a molar mass of 92.16.  
What is the molecular formula of this compound?

- A**      $C_2H_6O$
- B**      $C_4H_{12}O_2$
- C**      $C_6H_{18}O_3$
- D**      $C_8H_{24}O_4$

[1 mark]

**Question 2**

Which equation below represents deposition?

- A**      $2Al(s) + 3Br_2(g) \rightarrow 2AlBr_3(s)$
- B**      $MgCO_3(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + CO_2(g) + H_2O(l)$
- C**      $I_2(g) \rightarrow I_2(s)$
- D**      $HgCl_2(s) \rightarrow HgCl_2(g)$

[1 mark]

**Question 3**

Below are three statements about mixtures. Which of them are correct?

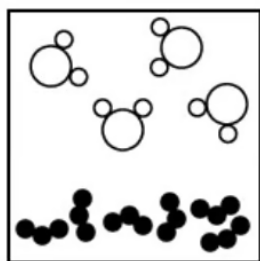
- I Mixtures can contain elements and compounds.
- II The components of a mixture must be in the same state.
- III The components of a mixture keep their own properties.

- A I and II only
- B I and III only
- C II and III only
- D I, II and III

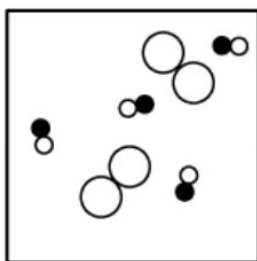
[1 mark]

**Question 4**

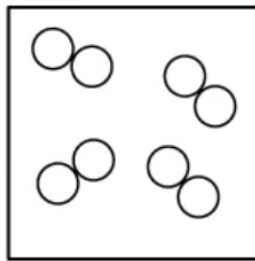
Which box shows a heterogeneous mixture?



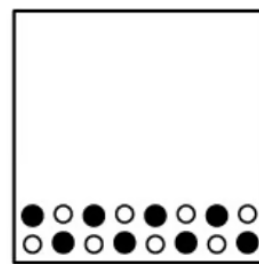
A



B



C



D

[1 mark]

**Question 5**

Ethane has the formula  $C_2H_6$ . What is the mass in grams of one molecule of ethane?  
(RAMs: C = 12.0; H = 1.0)

- A  $1.8 \times 10^{25}$
- B  $3.0 \times 10^{-23}$
- C 30.0
- D  $5.0 \times 10^{-23}$

[1 mark]

**Question 6**

Shown below are four molecular formulas. Which one is also an empirical formula?

- A  $PCl_5$
- B  $CH_3COOH$
- C  $H_2O_2$
- D  $C_6H_{12}O_6$

[1 mark]

**Question 7**

The relative atomic mass is a way of representing the mass of an atom.

Which of the following definitions is correct for the term relative atomic mass?

- A** the mass of an electron
- B** 1/12 the mass of a carbon-12 atom
- C** the mass of a hydrogen-1 atom
- D** the mass of a proton

[1 mark]

**Question 8**

*A periodic table is needed for this question*

Which of the following shows the relative formula mass of ammonium sulfate,

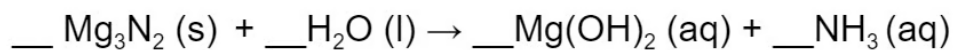
$(\text{NH}_4)_2\text{SO}_4$ ?

- A** 70.00
- B** 132.00
- C** 114.09
- D** 132.17

[1 mark]

**Question 9**

When the following equation is balanced correctly, using the smallest whole number coefficients, which row represents the coefficients?



	$\text{Mg}_3\text{N}_2$	$\text{H}_2\text{O}$	$\text{Mg}(\text{OH})_2$	$\text{NH}_3$
<b>A</b>	1	6	3	2
<b>B</b>	1	3	3	1
<b>C</b>	2	6	2	2
<b>D</b>	2	6	3	2

[1 mark]

**Question 10**

Which one of the following is the correct net ionic equation for the reaction between  $\text{CaCl}_2$  and  $\text{AgNO}_3$ ?

- A**  $\text{Ca}^{2+} (\text{aq}) + 2\text{AgNO}_3 (\text{aq}) \rightarrow 2\text{Ag}^+ (\text{s}) + \text{Ca}(\text{NO}_3)_2 (\text{aq})$
- B**  $\text{CaCl}_2 (\text{aq}) + 2\text{Ag}^+ (\text{aq}) \rightarrow 2\text{AgCl} (\text{s}) + \text{Ca}^{2+} (\text{aq})$
- C**  $\text{Ca}^{2+} (\text{aq}) + 2\text{NO}_3^- (\text{aq}) \rightarrow \text{Ca}(\text{NO}_3)_2 (\text{aq})$
- D**  $\text{Ag}^+ (\text{aq}) + \text{Cl}^- (\text{aq}) \rightarrow \text{AgCl} (\text{s})$

[1 mark]

**Question 11**

Which one of the following is the correct net ionic equation for the reaction between  $\text{NaC}_2\text{H}_3\text{O}_2(\text{aq})$  and  $\text{HCl}(\text{aq})$ ?

- A**  $\text{C}_2\text{H}_3\text{O}_2^- (\text{aq}) + \text{HCl} (\text{aq}) \rightarrow \text{CCl}^- (\text{aq}) + 2\text{H}_2 (\text{aq}) + \text{CO}_2 (\text{aq})$
- B**  $\text{C}_2\text{H}_3\text{O}_2^- (\text{aq}) + \text{H}^+ (\text{aq}) \rightarrow \text{HC}_2\text{H}_3\text{O}_2 (\text{aq})$
- C**  $\text{Na}^+ (\text{aq}) + \text{Cl}^- (\text{aq}) \rightarrow \text{NaCl} (\text{aq})$
- D**  $\text{NaC}_2\text{H}_3\text{O}_2 (\text{aq}) + \text{H}^+ (\text{aq}) \rightarrow \text{HC}_2\text{H}_3\text{O}_2 (\text{aq}) + \text{Na}^+ (\text{aq})$

[1 mark]

**Question 12**

A sample of hydrated calcium sulfate,  $\text{CaSO}_4 \cdot x\text{H}_2\text{O}$ , has a relative formula mass of 172.19

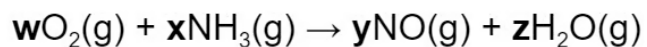
What is the value of  $x$ ?

- A** 1
- B** 2
- C** 3
- D** 4

[1 mark]

**Question 13**

Oxidation of ammonia by oxygen is the first step in the manufacture of nitric acid, which is used in the production of the synthetic material nylon.



Which values for **w**, **x**, **y** and **z** balance this equation?

	<b>w</b>	<b>x</b>	<b>y</b>	<b>z</b>
<b>A</b>	5	4	4	6
<b>B</b>	6	4	4	5
<b>C</b>	6	5	5	4
<b>D</b>	5	6	6	4

[1 mark]