# 1.1 Matter, Chemical Change & the Mole Concept

## Question Paper
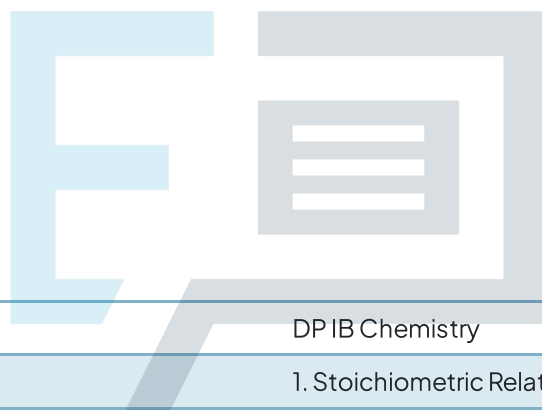
| Course | DP IB Chemistry |
|---|---|
| Section | 1. Stoichiometric Relationships |
| Topic | 1.1 Matter, Chemical Change & the Mole Concept |
| Difficulty | Medium |

To be used by all students preparing for DP IB Chemistry HL
Students of other boards may also find this useful
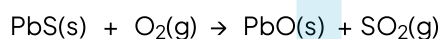
## Question 1

A compound of molar mass 92 $gmol^{-1}$ contains 12g of carbon, 2g of hydrogen and 32g of oxygen. What is the molecular formula of the compound?

    A. $CH_2O_2$

    B. $CH_2O$

    C. $C_2H_4O_2$

    D. $C_2H_4O_4$

**[1 mark]**

## Question 2

When lead sulfide reacts with oxygen it produces lead(II)oxide and sulfur dioxide according to the equation below:

$$PbS(s) \ + \ O_2(g) \ \rightarrow \ PbO(s) \ + \ SO_2(g)$$

What is the whole number sum of the coefficients in the balanced equation?

    A. 4

    B. 5

    C. 8

    D. 9

**[1 mark]**

## Question 3

A compound is made of sulfur and oxygen only. A sample of the compound has a mass of 8.0g, and consists of 3.2g of sulfur and 4.8g of oxygen. The empirical formula of the compound is:

(RAMs S = 32.0, O = 16.0)

    A. SO

    B. $SO_2$

    C. $SO_3$

    D. $S_2O_3$

**[1 mark]**

## Question 4

Which of these processes are endothermic?

        I. Condensing

        II. Subliming

        III. Melting

  A. I and II only

  B. I and III only

  C. II and III only

  D. I, II and III

**[1 mark]**

## Question 5

Ethanoic acid has the formula $CH_3COOH$. How many carbon atoms are present in 0.1 mol of ethanoic acid?

  A. $6.0 \times 10^{22}$

  B. $1.2 \times 10^{23}$

  C. $6.0 \times 10^{23}$

  D. $1.2 \times 10^{24}$

**[1 mark]**

## Question 6

Which of the following samples has the largest mass?

(RAMs, H = 1.01, N = 14.01, O = 16.00)

  A. 2.0 mol of $NH_4^+$

  B. 1.0 mol of $H_2S$

  C. 1.0 mol of $H_2O_2$

  D. 2.0 mol of $OH^-$

**[1 mark]**

## Question 7

A compound contains carbon and hydrogen only. The amount of carbon is 80% by mass. What is the empirical formula of the compound?

(RAMs, H = 1.01, C = 12.01)

A. CH

B. $CH_2$

C. $CH_3$

D. $CH_4$

**[1 mark]**

## Question 8

*A periodic table is needed to answer this question*

A hydrated carbonate of an unknown Group 1 metal has the formula $X_2CO_3 \bullet 10H_2O$ and is found to have a relative formula mass of 286.19
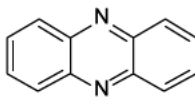
What is the group 1 metal?

A. Rb

B. K

C. Na

D. Li

**[1 mark]**

## Question 9

The diagram below shows the skeletal formula of phenazine.



Phenazine

What is the empirical formula of phenazine?

   A. $C_6H_6N$

   B. $C_{12}H_8N_2$

   C. $C_6H_4N$

   D. $C_{12}H_{12}N_2$

**[1 mark]**

## Question 10

*A periodic table is needed to answer this question*

A coin contains 5.869% Nickel by mass. If the coin weighs 10.00g, how many Nickel atoms are in the coin?

   A. $4.30 \times 10^{22}$

   B. $3.01 \times 10^{23}$

   C. $6.02 \times 10^{25}$

   D. $6.02 \times 10^{21}$

**[1 mark]**