**Questions**

**Q1.**

For drivers in the UK, the legal limit of the concentration of ethanol (molar mass 46 g mol−1) in the blood is 80 mg per 100 cm3. This is equivalent to a concentration of

   **A**    17.4 mol dm−3

   **B**    1.74 mol dm−3

   **C**    0.0174 mol dm−3

   **D**    0.00174 mol dm−3

**(Total for Question = 1 mark)**

**Q2.**

Which of the following contains the greatest number of hydrogen atoms?

   **A**     2 moles of water, H2O

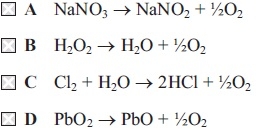
   **B**     1.5 moles of ammonia, NH3

   **C**     1 mole of hydrogen gas, H2

   **D**     0.5 moles of methane, CH4

**(Total for question = 1 mark)**

**Q3.**Oxygen can be prepared using several different reactions. Which of those given below  
 has the highest atom economy by mass?



**(Total for question = 1 mark)**

**Q4.**

Which of the following processes has the highest atom economy?

   **A**     Making poly(ethene) from ethene.

   **B**     Making ethene from eicosane, C20H42.

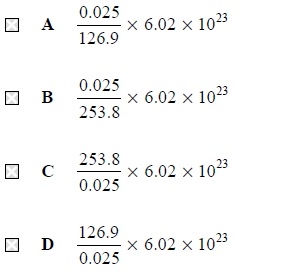
   **C**     Making chloromethane from methane.

   **D**     Making magnesium chloride from magnesium and hydrochloric acid.

**(Total for question = 1 mark)**

**Q5.**

The human body contains around 0.025 g of iodine molecules, I2. Which of the  
 following shows the number of iodine **atoms** in 0.025 g of I2?  
  
 The Avogadro constant is 6.02 × 1023 mol-1.



**(Total for question = 1 mark)**

**Q6.**

The Avogadro constant is 6.0 x 103 mol−1. Therefore the number of **atoms** in 1 mol of carbon dioxide is

   **A**      2.0 x 1023

   **B**      6.0 x 1023

   **C**      1.2 x 1024

   **D**      1.8 x 1024

**(Total for question = 1 mark)**

**Q7.**

How many molecules are present in 16 g of oxygen gas, O2(g)?

[Avogadro constant = 6 × 1023 mol−1]

   **A**     96 × 1023

   **B**     12 × 1023

   **C**     6 × 1023

   **D**     3 × 1023

**(Total for question = 1 mark)**

**Q8.**

A compound was analysed and found to contain



[Relative atomic masses: C = 12; H = 1; N = 14]

The empirical formula of the compound is

   **A**     CH3N

   **B**     CH4N

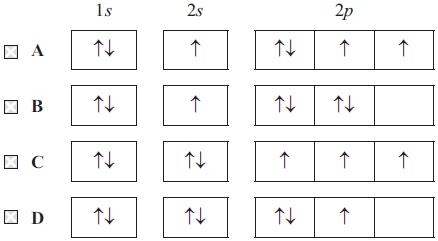
   **C**     CH5N

   **D**     C2H4N

**(Total for question = 1 mark)**

**Q9.**

Which of the following represents the electronic structure of a nitrogen atom?



**(Total for question = 1 mark)**

**Q10.**

When 0.635 g of copper (relative atomic mass, RAM = 63.5) is added to an excess of silver nitrate solution, 2.158 g of silver (RAM = 107.9) form.  The ionic equation for the reaction is

   **A**     Cu(s)    +  Ag2+(aq)  →  Cu2+(aq) +  Ag(s)

   **B**     Cu(s)    + Ag+(aq)    →  Cu+(aq)   +  Ag(s)

   **C**     2Cu(s) +  Ag2+(aq)  →  2Cu+(aq) +  Ag(s)

   **D**     Cu(s)    +  2Ag+(aq) →  Cu2+(aq)  +  2Ag(s)

**(Total for question = 1 mark)**

**Q11.**

The recommended limit for safe exposure to sulfur dioxide in the air is 0.000025%.   
What is this concentration in parts per million, ppm?

   **A**    25

   **B**    0.25

   **C**    0.025

   **D**    0.0025

**(Total for question = 1 mark)**

**Q12.**

Which of the following statements is true? The Avogadro constant is the number of

   **A**   grams of any element which contains 6.02 × 1023 atoms of that element.

   **B**   atoms contained in one mole of any element.

   **C**   atoms contained in one mole of any monatomic element.

   **D**   particles (atoms, molecules or ions) required to make one gram of a substance.

**(Total for question = 1 mark)**

**Q13.**A molecule is

   **A**      a group of atoms bonded by ionic bonds.

   **B**      a group of atoms bonded by covalent bonds.

   **C**      a group of ions bonded by covalent bonds.

   **D**      a group of atoms bonded by metallic bonds.

**(Total for question = 1 mark)**

**Q14.**In the ethene molecule, the CC double bond is made up of

   **A**    two sigma bonds.

   **B**    one pi bond.

   **C**    two pi bonds.

   **D**    one sigma bond and one pi bond.

**(Total for Question = 1 mark)**

**Q15.**

The compound butane has

   **A**      the empirical formula C4H10 and the molecular formula C2H5.

   **B**      the empirical formula C2H5 and the molecular formula C4H10.

   **C**      the empirical formula C2H5 and the molecular formula CnH2n+2.

   **D**      the empirical formula CnH2n+2 and the molecular formula C4H10.

**(Total for question = 1 mark)**

**Q16.**

1.12 g of iron reacts with oxygen to form 1.60 g of an oxide of iron. Use relative atomic masses: Fe = 56, O = 16.

What is the formula of this oxide of iron?

   **A**    FeO5

   **B**    Fe2O10

   **C**    Fe3O2

   **D**    Fe2O3

**(Total for question = 1 mark)**

**Q17.**

Oxygen gas, O2, can be converted into ozone, O3, by passing it through an electric discharge.

3O2(g) → 2O3(g)

In an experiment, a volume of 300 cm3 of oxygen was used but only 10% of the oxygen was converted into ozone. All volumes were measured at the same temperature and pressure.

The **total** volume of gas present at the end of the experiment, in cm3, was

   **A**    200

   **B**    210

   **C**    290

   **D**    300

**(Total for question = 1 mark)**

**Q18.**

Magnesium oxide reacts with dilute hydrochloric acid according to the following  
 equation.



How many **moles** of magnesium oxide, MgO, are required to neutralize 20 cm3 of  
 0.50 mol dm−3 hydrochloric acid, HCl?

   **A**     0.0010

   **B**     0.0050

   **C**     0.010

   **D**     0.020

**(Total for question = 1 mark)**

**Q19.**A compound was found to contain 2.8 g of nitrogen and 8.0 g of oxygen.

What is the empirical formula of the compound?

Use the Periodic Table as a source of data.

   **A**    NO

   **B**    NO2

   **C**    N2O3

   **D**    N2O5

**(Total for Question = 1 mark)**

**Q20.**

Which of these solutions does **not** contain the same total number of ions as the others?

   **A**     10.00 cm3 of 0.100 mol dm-3  NaCl(aq)

   **B**     20.00 cm3 of 0.050 mol dm-3  NaCl(aq)

   **C**     20.00 cm3 of 0.050 mol dm-3  MgCl2(aq)

   **D**     13.33 cm3 of 0.050 mol dm-3  MgCl2(aq)

**(Total for question = 1 mark)**

**Q21.**

Hydrogen and oxygen react according to the following equation.



If all volumes are measured at 110 °C and one atmosphere pressure, the volume of steam  
 produced after 50 cm3 of hydrogen react completely with 25 cm3 of oxygen is

   **A**     25 cm3

   **B**     50 cm3

   **C**     75 cm3

   **D**     100 cm3

**(Total for question = 1 mark)**

**Q22.**

An important reaction which occurs in the catalytic converter of a car is



In this reaction, when 500 cm3 of CO reacts with 500 cm3 of NO at 650 °C (the operating temperature of the catalyst) and at 1 atm, the **total** volume of gases produced at the same temperature and pressure is

   **A**    500 cm3

   **B**    750 cm3

   **C**    1000 cm3

   **D**    impossible to calculate without knowing the molar volume of gases under these conditions.

**(Total for Question = 1 mark)**

**Q23.**

The equation for the complete combustion of octane is



(a) The mass of 10 mol of octane is

**(1)**

   **A**      0.66 kg

   **B**      1.14 kg

   **C**      2.10 kg

   **D**      2.28 kg

(b) The volume of 1 mol of any gas (measured at room temperature and pressure) is 24 dm3. Hence the volume of oxygen (measured at room temperature and pressure) required for the complete combustion of 10 mol of octane is

**(1)**

   **A**      240 dm3

   **B**      300 dm3

   **C**      3000 dm3

   **D**      6000 dm3

**(Total for question = 2 marks)**

**Q24.**

Which of the following mixtures could **not** form when octane, C8H18, is cracked?

   **A**      propane + pentene

   **B**      butane + butene

   **C**      pentane + propene

   **D**      heptane + ethene

**(Total for question = 1 mark)**

**Q25.**

Calculate the mass of calcium hydroxide, Ca(OH)2, present in 100 cm3 of a 0.100 mol dm−3 solution.

[Assume the molar mass of Ca(OH)2 is 74.0 g mol−1.]

   **A**     0.570 g

   **B**     0.740 g

   **C**       1.85 g

   **D**       3.70 g

**(Total for question = 1 mark)**

**Q26.**

An organic compound contains 38.4 % carbon, 4.80 % hydrogen and 56.8 % chlorine by mass.  What is the empirical formula of the compound?

   **A**     C2H3Cl

   **B**     CH3Cl

   **C**     C2H5Cl

   **D**     C3H5Cl3

**(Total for question = 1 mark)**

**Q27.**

Which of the following observations provides the best evidence for the presence of ionic bonding in an unknown substance?

The substance conducts electricity

   **A**    in the solid state.

   **B**    in the solid state and in aqueous solution.

   **C**    in the solid state and when molten.

   **D**    when molten but not in the solid state.

**(Total for question = 1 mark)**

**Q28.**

Complete combustion of 50 cm3 of a hydrocarbon vapour gave 350 cm3 of carbon dioxide, both gas volumes being measured at the same temperature and pressure. The formula of the hydrocarbon could be

   **A**   C8H18

   **B**   C7H16

   **C**   C6H14

   **D**   C5H12

**(Total for question = 1 mark)**

**Q29.**

The elements in Group 1 of the Periodic Table have very similar chemical properties.  
 This is because

   **A**    they have the same number of outer electrons.

   **B**    they have the same number of filled shells of electrons.

   **C**    their outer electrons are in the s sub-shell.

   **D**    their outer electrons have very similar shielding.

**(Total for Question = 1 mark)**

**Q30.**

Which of the following can be determined, for an unknown alkene, using only percentage composition by mass data?

   **A**    Molecular formula

   **B**    Empirical (simplest) formula

   **C**    Both the molecular formula and the empirical (simplest) formula

   **D**    Structural formula

**(Total for question = 1 mark)**

**Q31.**

When aqueous solutions of barium chloride and potassium sulfate are mixed, a white precipitate forms.  The ionic equation for the reaction is

   **A**     K+(aq)     +    Cl− (aq)     →  KCl(s)

   **B**     K2+(aq)    +    2Cl− (aq)   →  KCl2(s)

   **C**     Ba+(aq)    +    SO4− (aq)  →  BaSO4(s)

   **D**     Ba2+(aq)  +  SO42− (aq)   →  BaSO4(s)

**(Total for question = 1 mark)**

**Q32.**

The equations below show some reactions of magnesium and its compounds.

**A**   2Mg(s) + O2(g)        → 2MgO(s)

**B**   Mg(NO3)2(s)           → MgO(s) + 2NO2(g) + O2(g)

**C**   MgO(s) + 2HCl(aq) → MgCl2(aq) + H2O(1)

**D**   Mg(s) + CuSO4(aq) → MgSO4(aq) + Cu(s)

(a) Which equation is **not** balanced?

**(1)**

   **A**

   **B**

   **C**

   **D**

(b) Which equation can be classified as a displacement reaction?

**(1)**

   **A**

   **B**

   **C**

   **D**

**(Total for question = 2 marks)**

**Q33.**

Which of the following gas samples occupies the greatest volume at the same  
 temperature and pressure?



   **A**     1 gram of ethane

   **B**     1 gram of oxygen

   **C**     1 gram of fluorine

   **D**     1 gram of neon

**(Total for question = 1 mark)**

**Q34.**

Hydrogen peroxide decomposes on heating as follows:



What mass of hydrogen peroxide is required to give 16 g of oxygen gas?

   **A**     8.5 g

   **B**     17 g

   **C**     34 g

   **D**     68 g

**(Total for question = 1 mark)**

**Q35.**How many moles of **ions** are present in 20 cm3 of 0.050 mol dm−3 calcium chloride solution, CaCl2(aq)?

   **A**    0.0050

   **B**    0.0030

   **C**    0.0020

   **D**    0.0010

**(Total for Question = 1 mark)**

**Q36.**The definition of the mole is

   **A**      the amount of any substance which occupies a volume of 24 dm3 at room  
                 temperature and pressure.

   **B**      the amount of any substance containing the same number of identical entities as  
                 there are in exactly 12 g of the carbon-12 isotope.

   **C**      the number of atoms in exactly 12 g of the carbon-12 isotope.

   **D**      the number of molecules in exactly 2 g of hydrogen at room temperature and  
                 pressure.

**(Total for question = 1 mark)**

**Q37.**Phosphorus(V) chloride, PCl5, reacts with water according to the equation

PCl5(s) + 4H2O(l) → H3PO4(aq) + 5HCl(aq)

If 1.04 g of phosphorus pentachloride (molar mass = 208 g mol−1) is reacted completely with water and the solution made up to 1 dm3, the concentration of the hydrochloric acid in mol dm−3 is

   **A**    0.001

   **B**    0.005

   **C**    0.025

   **D**    0.250

**(Total for Question = 1 mark)**

**Q38.**

A sample of gas was prepared for use in helium-neon lasers. It contained 4 g of helium  
 and 4 g of neon. What is the ratio of helium atoms to neon atoms in the sample?

   **A**       1 : 1

   **B**    2.5 : 1

   **C**       1 : 5

   **D**       5 : 1

**(Total for question = 1 mark)**

**Q39.**

What is the number of **atoms** in 2.8 g of ethene, C2H4?

DATA

 The molar mass of C2H4 is 28 g mol−1  
 The Avogadro constant is 6.0 × 1023 mol−1

   **A**    1.0 × 1022

   **B**    6.0 × 1022

   **C**    1.2 × 1023

   **D**    3.6 × 1023

**(Total for question = 1 mark)**

**Q40.**

For the oxidation of ammonia



the values of the coefficients in the balanced equation are

   **A**      a = 2, b = 3, c = 2 and d = 3

   **B**      a = 4, b = 7, c = 4 and d = 4

   **C**      a = 4, b = 5, c = 4 and d = 6

   **D**      a = 6, b = 7, c = 6 and d = 9

**(Total for question = 1 mark)**

**Q41.**A sample of swimming pool water contains 0.482 parts per million (ppm) of chlorine. This is equal to a percentage of

   **A**    0.000482

   **B**    0.0000482

   **C**    0.00000482

   **D**    0.000000482

**(Total for Question = 1 mark)**

**Q42.**

The equation for the dehydration of cyclohexanol, C6H11OH, to cyclohexene, C6H10 is:

C6H11OH → C6H10 + H2O

50.0 g of cyclohexanol produced 32.8 g of cyclohexene.  
  
 [Molar masses / g mol−1 : cyclohexanol = 100; cyclohexene = 82]  
  
 Calculate the percentage yield of cyclohexene.

   **A**     32.8 %

   **B**     40.0 %

   **C**     65.6 %

   **D**     80.0 %

**(Total for question = 1 mark)**

**Q43.**

In an experiment, 1.226 g of potassium chlorate(V), KClO3, was heated. A mass of 0.320 g of oxygen gas, O2, was collected.

2KClO3(s) → 2KCl(s) + 3O2(g)

Use the molar mass of KClO3 = 122.6 g mol−1 and relative atomic mass O = 16.

The percentage yield of oxygen in this experiment is

   **A**    17.4%

   **B**    26.1%

   **C**    66.7%

   **D**    100%

**(Total for question = 1 mark)**

**Q44.**

In which of the following series does the melting temperature of the element **increase** from left to right?

   **A**    Li, Na, K

   **B**    Al, Si, P

   **C**    Si, P, S

   **D**    Na, Mg, Al

**(Total for question = 1 mark)**

**Q45.**

A solution contains 66 ppm of a solute. The mass of the solute dissolved in 1 kg of this solution is

   **A**   66 g

   **B**   0.66 g

   **C**   0.066 g

   **D**   0.000066 g

**(Total for question = 1 mark)**

**Q46.**The relative atomic mass is defined as

   **A**      the mass of an atom of an element relative to 1/12 the mass of a carbon-12  
                atom.

   **B**      the mass of an atom of an element relative to the mass of a hydrogen atom.

   **C**      the average mass of an element relative to 1/12 the mass of a carbon atom.

   **D**      the average mass of an atom of an element relative to 1/12 the mass of a  
                carbon-12 atom.

**(Total for question = 1 mark)**

**Q47.**

Most compounds of lead are insoluble, an exception being lead(II) nitrate. Therefore a good method of preparing lead(II) sulfate is

   **A**     adding dilute sulfuric acid to lead metal.

   **B**     adding concentrated sulfuric acid to lead metal.

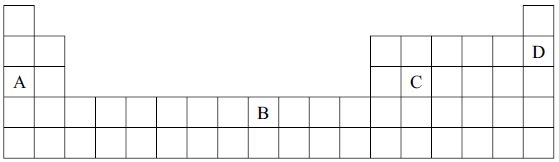
   **C**     adding dilute sulfuric acid to lead(II) nitrate solution.

   **D**     adding dilute sulfuric acid to solid lead(II) oxide.

**(Total for question = 1 mark)**

**Q48.**

In the following outline of the Periodic Table, the letters A to D are **not** the symbols of the elements.



Select from **A to D** the element which

(a) is a non-metal with a high melting temperature and boiling temperature.

**(1)**

   **A**

   **B**

   **C**

   **D**  

(b) is in the d block of the Periodic Table.

**(1)**

   **A**

   **B**

   **C**

   **D**  

(c) has a very stable electronic structure.

**(1)**

   **A**

   **B**

   **C**

   **D**  

(d) is a metal with a high melting temperature and boiling temperature.

**(1)**

   **A**

   **B**

   **C**

   **D**

**(Total for Question = 4 marks)**

**Q49.**

In 2006, the concentration of carbon dioxide in the atmosphere was 382 ppm. This is equivalent to

   **A**     0.00382%

   **B**     0.0382%

   **C**     0.382%

   **D**     3.82%

**(Total for question = 1 mark)**

**Q50.**

The European Union has set a limit (with effect from January 2010) of 3.13 ppm for the proportion of the toxic gas carbon monoxide in the air that we breathe. This is equivalent to

   **A**    3.13%

   **B**    0.0313%

   **C**    0.000313%

   **D**    0.00000313%

**(Total for Question = 1 mark)**

**Q51.**The Avogadro constant is 6.0 × 1023 mol−1. The number of **atoms** in 1 mol of dinitrogen tetroxide, N2O4, is

   **A**    3.6 × 1024

   **B**    1.8 × 1024

   **C**    6.0 × 1023

   **D**    1.0 × 1023

**(Total for Question = 1 mark)**

**Q52.**What is the total number of **atoms** in 1.8 g of water, H2O?

DATA

 The molar mass of H2O is 18 g mol−1  
 The Avogadro Constant is 6.0 × 1023 mol−1

   **A**    6.0 × 1022

   **B**    6.0 × 1023

   **C**    1.8 × 1023

   **D**    1.8 × 1024

**(Total for Question = 1 mark)**

**Q53.**

A compound has the following percentage composition by mass.

C 61.0%     H 15.3%     N 23.7%

The empirical formula of the compound is

   **A**    CH3N

   **B**    C3H9N

   **C**    C6H9N2

   **D**    C8H2N3

**(Total for question = 1 mark)**

**Q54.**

17.1 g of aluminium sulfate, Al2(SO4)3, was dissolved in water.

Calculate the number of sulfate ions, SO42−, present in the solution formed.

[Assume the molar mass of Al2(SO4)3 is 342 g mol−1 and the Avogadro Constant is   
6 × 1023 mol−1.]

   **A**     3 × 1021

   **B**     1 × 1022

   **C**     3 × 1022

   **D**     9 × 1022

**(Total for question = 1 mark)**

**Q55.**

The overall equation for the reaction between sulfur and oxygen to form sulfur trioxide  
 is shown below.



0.9 mol of O2(g) reacted completely with excess sulfur. What volume, in dm3, of  
 sulfur trioxide would form?  
  
 [Assume the molar gas volume = 24 dm3 mol-1]

   **A**   (0.9 × 3/2) × 24

   **B**   (0.9 × 3/2) ÷ 24

   **C**   (0.9 × 2/3) × 24

   **D**   (0.9 × 2/3) ÷ 24

**(Total for question = 1 mark)**

**Q56.**

Carbon monoxide and oxygen react together as follows.

2CO(g) + O2(g) → 2CO2(g)

If all volumes of gas are measured at the same temperature and pressure, the volume of carbon dioxide produced after 50 cm3 of carbon monoxide react with 25 cm3 of oxygen is

   **A**    100 cm3

   **B**    75 cm3

   **C**    50 cm3

   **D**    25 cm3

**(Total for question = 1 mark)**

**Q57.**

Potassium chlorate(V), KClO3, decomposes on heating as follows.

2KClO3(s) → 2KCl(s) + 3O2(g)

What is the maximum volume of oxygen, measured in dm3 at room temperature and pressure, which could be obtained by heating 0.50 mol potassium chlorate(V)?

[Molar volume of a gas = 24 dm3 mol−1 at room temperature and pressure.]

   **A**    8

   **B**    18

   **C**    36

   **D**    72

**(Total for question = 1 mark)**

**Q58.**The equation for the complete combustion of ethane is

2C2H6(g) + 7O2(g) → 4CO2(g) + 6H2O(l)

What volume of oxygen, measured at room temperature and pressure, is needed to completely burn 0.1 mol of ethane?

[The volume of 1 mol of any gas measured at room temperature and pressure is 24 dm3]

   **A**    2.4 dm3

   **B**    4.8 dm3

   **C**    8.4 dm3

   **D**    16.8 dm3

**(Total for Question = 1 mark)**

**Q59.**A sample of sodium chlorate(V), NaClO3, was heated and 120 cm3 of oxygen gas was collected.

2NaClO3(s) → 2NaCl(s) + 3O2(g)

Calculate the number of moles of sodium chlorate(V) that were decomposed in the above reaction.

[Molar volume of a gas under the conditions of the experiment = 24000 cm3 mol−1]

   **A**    2.50 × 10−3

   **B**    3.33 × 10−3

   **C**    5.00 × 10−3

   **D**    7.50 × 10−3

**(Total for Question = 1 mark)**

**Q60.**3.0 dm3 of sulfur dioxide reacts with 1.5 dm3 of oxygen, under suitable conditions, according to the equation below.

2SO2(g) + O2(g) → 2SO3(g)

What is the maximum volume of sulfur trioxide that can be formed in the above reaction?

[The volumes of the gases are measured at the same temperature and pressure.]

   **A**    6.0 dm3

   **B**    4.5 dm3

   **C**    3.0 dm3

   **D**    1.5 dm3

**(Total for Question = 1 mark)**

**Q61.**

Sodium hydrogensulfate, NaHSO4, reacts with sodium hydroxide, NaOH, as shown below.



0.0100 mol of sodium hydrogensulfate is neutralized with dilute sodium hydroxide,  
 concentration 0.200 mol dm−3.

Calculate the volume of sodium hydroxide required.

   **A**     20.0 cm3

   **B**     50.0 cm3

   **C**     100 cm3

   **D**     500 cm3

**(Total for question = 1 mark)**

**Q62.**

Ethanol (molar mass 46 g mol−1) is manufactured by the hydration of ethene (molar mass 28 g mol−1):



In a typical process 28 tonnes of ethene produces 43.7 tonnes of ethanol. The percentage yield of ethanol in this process is

   **A**    64%

   **B**    95%

   **C**    100%

   **D**    156%

**(Total for Question = 1 mark)**

**Q63.**

Nickel(II) sulfate is prepared by adding an excess of nickel(II) carbonate to 0.010 mol of dilute sulfuric acid.



Solid nickel(II) sulfate crystals are produced with a 20% yield.  How many moles of nickel(II) sulfate crystals are obtained?

   **A**     0.001

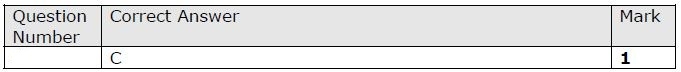
   **B**     0.002

   **C**     0.010

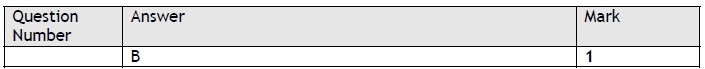
   **D**     0.050

**(Total for question = 1 mark)**

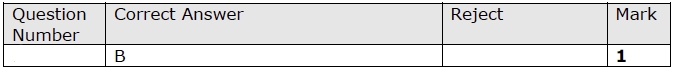
**Mark Scheme**

**Q1.**

**Q2.**



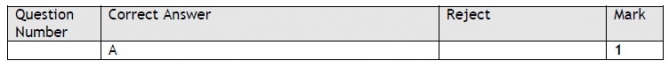
**Q3.**



**Q4.**



**Q5.**



**Q6.**



**Q7.**



**Q8.**



**Q9.**



**Q10.**



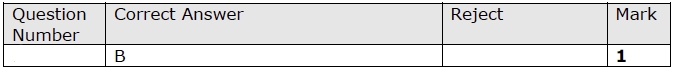
**Q11.**



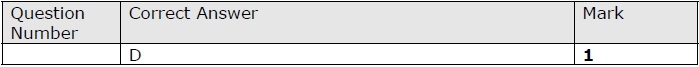
**Q12.**



**Q13.**



**Q14.**



**Q15.**



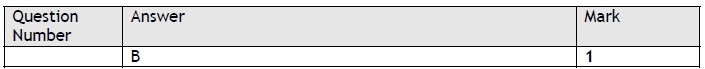
**Q16.**



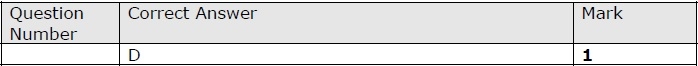
**Q17.**



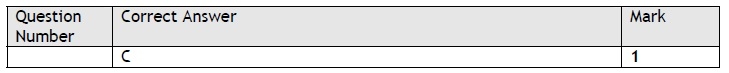
**Q18.**



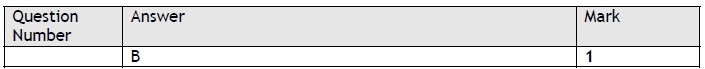
**Q19.**

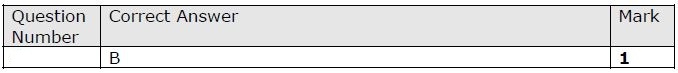


**Q20.**

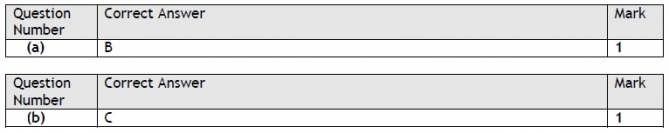


**Q21.**



**Q22.**

**Q23.**



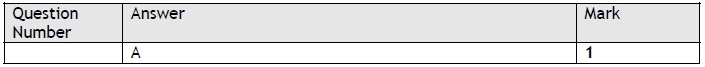
**Q24.**



**Q25.**



**Q26.**

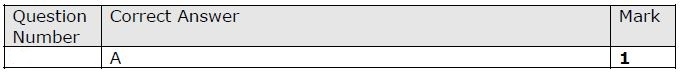


**Q27.**



**Q28.**



**Q29.**

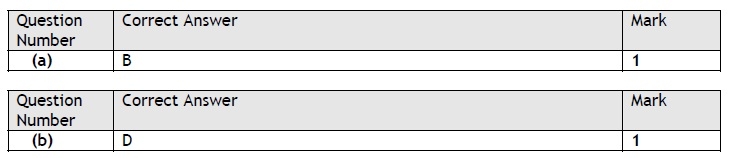
**Q30.**



**Q31.**



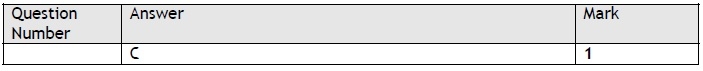
**Q32.**



**Q33.**



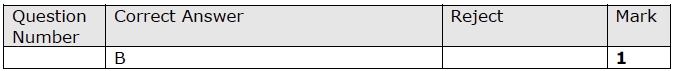
**Q34.**



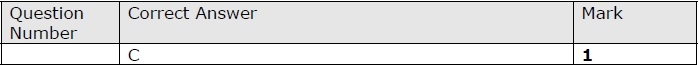
**Q35.**



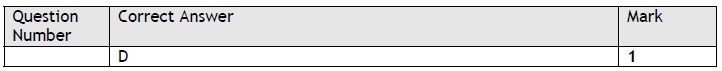
**Q36.**



**Q37.**



**Q38.**



**Q39.**



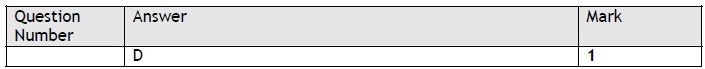
**Q40.**



**Q41.**



**Q42.**



**Q43.**



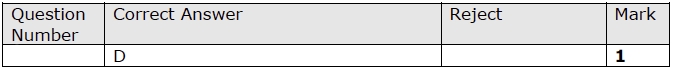
**Q44.**



**Q45.**

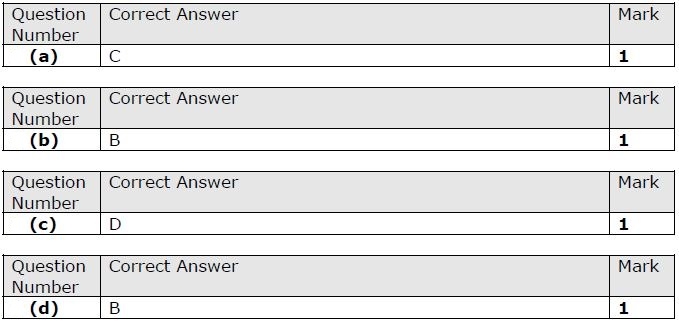


**Q46.**



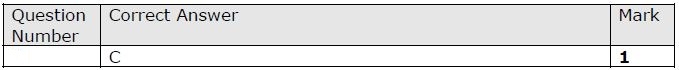
**Q47.**



**Q48.**

**Q49.**

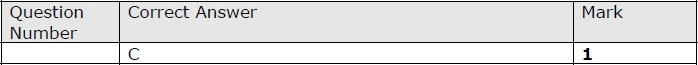


**Q50.**

**Q51.**



**Q52.**



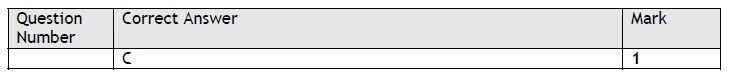
**Q53.**



**Q54.**



**Q55.**



**Q56.**



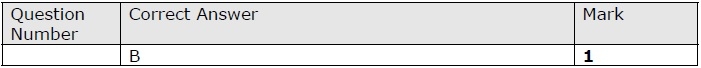
**Q57.**



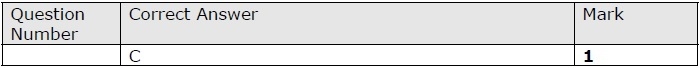
**Q58.**



**Q59.**

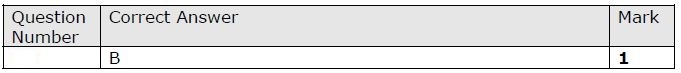


**Q60.**



**Q61.**



**Q62.**

**Q63.**

