1994

CHEMISTRY UNIT 1 TRIAL EXAM

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CHEMISTRY UNIT 1 (YEAR 11)
MATERIALS

SECTION A. MULTIPLE CHOICE ANSWER SHEET

ABSENT

SURNAME
GIVEN NAME(S)

How to complete this form

Please use an **HB PENCIL** only.
If you make a mistake, **ERASE** the incorrect answer.
DO NOT just cross it out.

EXAMPLE ONLY

9	**1**	**9**	**1**	**0**	**9**	**1**	**0**	**E**
0	0	0	0	0	0	0	0	A
1	1	1	1	1	1	1	1	E
9	9	9	9	9	9	9	9	X

Enter your Student Number (if one is provided) in the box below as shown in the example above

All answers must be completed like this.

A	B	C	D	E

ONLY mark ONE box per line.

STUDENT NUMBER

0	0	0	0	0	0	0	0	A
1	1	1	1	1	1	1	1	E
2	2	2	2	2	2	2	2	F
3	3	3	3	3	3	3	3	G
4	4	4	4	4	4	4	4	J
5	5	5	5	5	5	5	5	L
6	6	6	6	6	6	6	6	R
7	7	7	7	7	7	7	7	T
8	8	8	8	8	8	8	8	W
9	9	9	9	9	9	9	9	X

PLEASE TURN OVER

SECTION A.

MULTIPLE CHOICE ANSWER SHEET

Instructions

Complete **ALL** the questions.

Marks will **NOT** be deducted for incorrect answers.

NO mark will be given if more than **ONE** answer is completed for any question.

USE HB PENCIL ONLY.

One answer per line ***One answer per line***

1	A	B	C	D	17	A	B	C	D
2	A	B	C	D	18	A	B	C	D
3	A	B	C	D	19	A	B	C	D
4	A	B	C	D	20	A	B	C	D
5	A	B	C	D	21	A	B	C	D
6	A	B	C	D	22	A	B	C	D
7	A	B	C	D	23	A	B	C	D
8	A	B	C	D	24	A	B	C	D
9	A	B	C	D	25	A	B	C	D
10	A	B	C	D	26	A	B	C	D
11	A	B	C	D	27	A	B	C	D
12	A	B	C	D	28	A	B	C	D
13	A	B	C	D	29	A	B	C	D
14	A	B	C	D	30	A	B	C	D
15	A	B	C	D	31	A	B	C	D
16	A	B	C	D	32	A	B	C	D

Please DO NOT fold, bend or staple this form

DETACH THIS ANSWER SHEET AT THE START OF THE EXAMINATION

CHEMISTRY UNIT 1 (YEAR 11)
MATERIALS
1994 TRIAL EXAMINATION

(not to be used before Tuesday April 19, 1994)

Reading time: 15 minutes

Total writing time: 1 hour 30 minutes

STUDENT NAME _____

Structure of examination paper: Number of booklets = 1
Number of Sections = 2

Directions to students

Materials

Question and answer booklet of 19 pages, including data tables on page 2.
Multiple choice answer sheet.
An approved calculator may be used.

The task

Answer all items from Section A.
Section A items should be answered on the multiple-choice answer sheet provided.
Answer all questions from Section B.
Section B questions should be answered in this booklet in the spaces provided following each question.
All written responses should be in English.

At the end of the task

Please ensure that you write your **name** in the space provided on this booklet and your **name and student number (if one is provided)** in the space provided on the multiple-choice answer sheet.
Place the multiple-choice answer sheet inside the back cover of this booklet and hand them in.

SPECIFIC INSTRUCTIONS FOR SECTION A

(1) Section A, Question 1, consists of 32 multiple choice items and is worth 32 marks and therefore about 45% of the total marks available for this examination.You should therefore spend about 40 minutes on Section A.

(2) Choose the response you consider is correct or best, and mark your choice on the Multiple Choice Answer Sheet according to the instructions on that sheet.

(3) A correctly answered item scores 1, an incorrect item scores 0. No credit will be given for an item if two or more letters are marked for that item. Marks will NOT be deducted for incorrect answers and you are urged to attempt every item.

DATA

TABLE 1: ELEMENTS AND THEIR ATOMIC NUMBERS

Element	Symbol	Atomic No.
Aluminium	Al	13
Bromine	Br	35
Calcium	Ca	20
Carbon	C	6
Chlorine	Cl	17
Copper	Cu	29
Fluorine	F	9
Iron	Fe	26
Hydrogen	H	1
Lithium	Li	3
Magnesium	Mg	12
Nitrogen	N	7
Sodium	Na	11
Oxygen	O	8
Phosphorus	P	15
Sulfur	S	16
Zinc	Zn	30

TABLE 2: CONCENTRATION ABBREVIATIONS

ppm = parts per million (10^6)

ppb = parts per billion(10^9)

g/L = grams per litre

SECTION A QUESTION 1

For each of the following , put a line through the correct response on the answer sheet provided.

Item 1

Which one of the following is most likely to be a good conductor of electricity?

A. solid sodium chloride

B. sodium

C. water

D. methane

Item 2

The fundamental particles found in the nucleus of the atom are

A. protons only.

B. protons and neutrons.

C. neutrons only.

D. electrons and neutrons.

Item 3

An atom becomes a NEGATIVE ion when

A. it gains electrons.

B. its mass number changes.

C. it gains protons.

D. its atomic number changes.

Item 4

Of the following, the material most resistant to scratching would be

A. soda glass.

B. copper.

C. diamond.

D. nylon.

SECTION A QUESTION 1

Item 5

In the positively charged ion, $^{40}_{20}Ca^{2+}$, the numbers of protons, neutrons and electrons are respectively

A. 20 , 20 , 18.

B. 20 , 18 , 20.

C. 18 , 20 , 20.

D. 20 , 40 , 18.

Item 6

Of the following materials, the one most likely to show both covalent bonding and hydrogen bonding is

A. diamond.

B. ethylene.

C. ethanol.

D. ethane.

Item 7

A PERIOD in the Periodic Table is identified as

A. elements with different numbers of valence electrons.

B. a column of the periodic table.

C. elements with the same number of neutrons.

D. a row of the periodic table.

Item 8

Sodium (Na) and Fluorine (F) have very different chemical properties because

A. they have different mass numbers.

B. they have different shells as their outershell.

C. they have atoms that are different in size.

D. they have different numbers of outershell electrons.

SECTION A QUESTION 1

Item 9

Ionic bonding involves

A. a transfer of electrons between a metal and a non-metal.

B. a sharing of electrons between two non-metals.

C. a transfer of electrons between two non-metals.

D. a sharing of electrons between a metal and a non-metal.

Item 10

The main type of force holding the molecules of water together in ice (solid water) is

A. nuclear.

B. electrostatic.

C. gravitational.

D. magnetic.

Item 11

The most important types of chemical bonding present in a sample of ammonia gas dissolved in water are

A. covalent bonding and dispersion forces.

B. ionic bonding and hydrogen bonding.

C. ionic bonding and covalent bonding.

D. covalent bonding and hydrogen bonding.

Item 12

Metal M forms a compound with the formula M_2CO_3.Which one of the following formulae is correct?

A. M_2NO_3

B. $M(OH)_2$

C. MSO_4

D. MCl

SECTION A QUESTION 1

Item 13
Two molecules of ethanol, CH_3CH_2OH, contain a total of

A. 6 atoms.

B. 9 atoms

C. 18 atoms.

D. 24 atoms.

Item 14
A solution of iron(III) nitrate, $Fe(NO_3)_3$, contains

A. equal numbers of iron and nitrate ions.

B. three times as many nitrate ions as iron ions.

C. twice as many nitrate ions as iron ions.

D. nine times as many nitrate ions as iron ions.

Item 15
Nitrogen reacts with hydrogen to produce ammonia according to the equation:

$$x\ N_2(g) + y\ H_2(g) = z\ NH_3(g)$$

The values of x , y , z which will balance this equation are respectively

A. 2 , 3 , 1

B. 1 , 3 , 2

C. 2 , 1 , 3

D. 3 , 2 , 1

SECTION A QUESTION 1

Item 16
The balanced equation for the reaction between aluminium hydroxide and hydrochloric acid is

A. $AlOH + HCl_2 = AlCl_2 + H_2O$

B. $AlOH + HCl = AlCl + H_2O$

C. $Al(OH)_3 + H_2Cl = AlCl + 5H_2O$

D. $Al(OH)_3 + 3HCl = AlCl_3 + 3H_2O$

Item 17
The chemical formulae for ethane and ethene are respectively:

A. C_2H_6 and C_2H_4

B. C_3H_8 and C_4H_{10}

C. C_3H_6 and C_4H_8

D. C_2H_6 and C_3H_8

Item 18
The properties of a metal can be modified using the process of **alloying**. In this process

A. the metal is mixed with one other metal in a ratio of 1:1.

B. the metal is mixed with other metals in variable proportions.

C. the metal is mixed with one other non-metal in a ratio of 1:1.

D. the metal is mixed with other metals or non-metals in variable proportions.

Item 19
A soft and ductile metal would most likely be manufactured by the process of

A. annealing.

B. quenching.

C. tempering.

D. metal fatigue.

Item 20
Of the following list of fibres, the synthetic fibre is

A. silk.

B. cotton.

C. asbestos.

D. polyester.

Item 21
Which one of the following is **not** a possible carbon compound?

A. CH_3CH_2Cl

B. $CH_3CH_3NH_2$

C. CH_3COCH_3

D. CH_3COOH

Item 22
Which one of the following is a thermosetting polymer?

A. polystyrene

B. polypropylene

C. urea-formaldehyde

D. polyethylene

Item 23
The systematic name for the compound $ClH_2C\text{-}CH_2Cl$

A. 1,2 dichloroethane

B. 1,1 dichloroethane

C. 1,2 dichloroethene

D. 1,1 dichloroethene

SECTION A QUESTION 1

Item 24
Of the following monomers, the pair most likely to undergo addition polymerisation are

A. $CH_2=CH_2$ and CHCl=CHCl

B. $NH_2(CH_2)_6NH_2$ and $ClOC(CH_2)_4COCl$

C. H_2 and O_2

D. C_2H_6 and Cl_2

Item 25
The general chemical formula for the homologous series known as the alkenes is

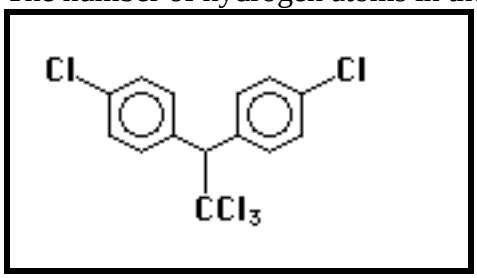
A. C_nH_{2n-2}

B. C_nH_{2n}

C. C_nH_{2n+1}

D. C_nH_{2n+2}

Item 26
The number of hydrogen atoms in the structure of DDT shown below is



A. 2

B. 3

C. 8

D. 9

SECTION A QUESTION 1

Item 27
It is found that DDT is present in plant material at a concentration of 50 ppb. The number of grams of DDT in 1 kilogram of this plant material is

A. $1000 \times \frac{50}{10^9}$

B. $1000 \times \frac{10^9}{50}$

C. $1 \times \frac{50}{10^9}$

D. $1 \times \frac{10^9}{50}$

Item 28
Which one of the following materials is **not** involved in the formation of photochemical smog?

A. hydrocarbons

B. carbon monoxide

C. nitrogen monoxide

D. nitrogen dioxide

Item 29
The balanced equation for the complete combustion of propane gas (C_3H_8) is

A. $C_3H_8(g) + 5O_2(g) = 3CO_2(g) + 4H_2O(g)$

B. $C_3H_8(g) + 5O_2(g) = 3CO_2(g) + 8H_2O(g)$

C. $C_3H_8(g) + 7O_2(g) = 3CO(g) + 4H_2O(g)$

D. $2C_3H_8(g) + 7O_2(g) = 6CO(g) + 8H_2O(g)$

SECTION A QUESTION 1

Item 30
Which one of the following would be best described as an **intractable** waste material?

A. aluminium

B. glass

C. plutonium

D. ozone

Item 31
A cup of hot water has a spoonful of sugar added to it. The sugar is dissolved by stirring. The best method of obtaining a sample of pure water that is **not sweet** would be

A. filtration using a very fine mesh filter paper.

B. distillation.

C. addition of silver nitrate to precipitate the sugar.

D. addition of vinegar to neutralise the sweet taste of the sugar.

Item 32
The amount of energy required to produce 1 tonne (10^6 g) of aluminium is approximately 18 000 kWh. If the cost of energy is 12.0 cents per kWh, then the cost to produce an aluminium soft drink can weighing 18 g would be

A. 83.3 cents.

B. 3.9 cents.

C. 1.5 cents.

D. 0.7 cents.

END OF SECTION A

SECTION B

SPECIFIC INSTRUCTIONS FOR SECTION B

(1) Section B consists of 8 questions (numbered 2 to 9) and is worth 40 marks and therefore about 55% of the total marks available for the examination.

You should therefore spend about 50 minutes on Section B. A suggested time allocation is given for each question and the marks allotted to each question are also indicated.

(2) Answers must be written in the spaces following each question in this booklet.

(3) When chemical symbols are used in equations they must be accompanied by correct symbols of state, for example $H_2(g)$ for hydrogen gas.

QUESTION 2 (7 minutes, 5 marks)
Name the following compounds:

(a) K_2SO_3 _____ (f) NaI _____

(b) $NaNO_3$ _____ (g) C_4H_{10} _____

(c) $Fe_2(SO_4)_3$ _____ (h) CH_3COOH _____

(d) KCl _____ (i) CH_3OH _____

(e) CO_2 _____ (j) H_2SO_4 _____

SECTION B

QUESTION 3 (7 minutes, 5 marks)

Write balanced chemical equations for each of the following:

(a) silver nitrate solution is added to potassium chloride solution and a precipitate forms.

_____

(b) butane gas burns in oxygen gas to produce carbon dioxide gas and water vapour.

_____

(c) hydrogen gas reacts explosively with oxygen gas to produce water vapour

_____

(d) dilute hydrochloric acid is neutralised by calcium hydroxide solution.

_____

QUESTION 4 (7 minutes, 5 marks)
Write the electronic configuration of each of the following:

(a) He _____ (b) Ar_____

(c) Ne_____ (d) Ca_____

(e) Al_____ (f) Cl_____

(g) Mg_____ (h) O_____

(i) N _____ (j) B _____

SECTION B

QUESTION 5 (7 minutes, 5 marks)

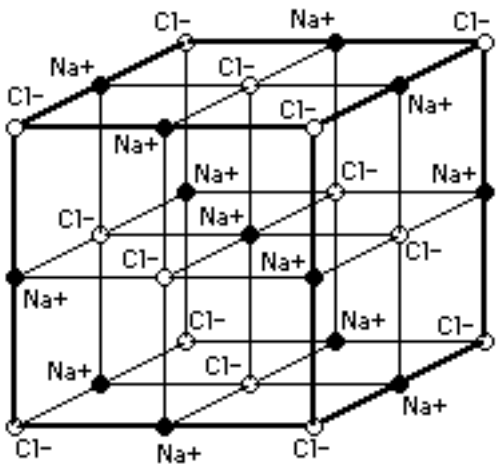
(a) Draw diagrams showing the *INTRAMOLECULAR* and *INTERMOLECULAR* bonding in **water.**

(b) Draw the structures of the following molecules and describe the shape of each. Indicate clearly whether the molecules are POLAR or NON-POLAR.

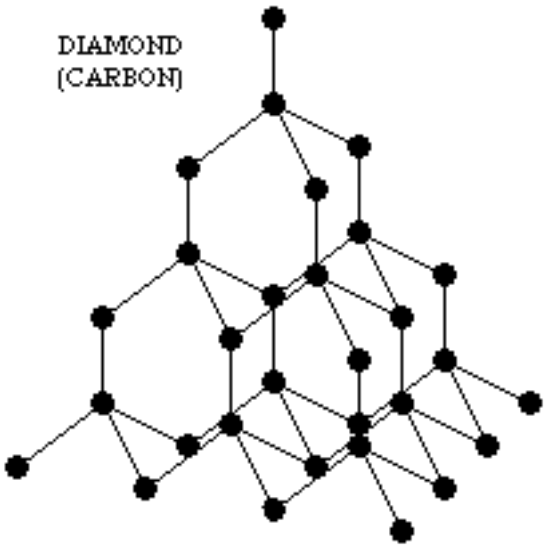
H_2 **C_2H_4** **$C_2H_5NH_2$**

SECTION B

QUESTION 6 (7 minutes, 5 marks)
For each of the two structures drawn below, describe the types of chemical bonding present.



COMMON SALT
(SODIUM CHLORIDE)



SECTION B

QUESTION 7 (7 minutes, 5 marks)

(a) The electronic configuration of a carbon atom is _____

(b) An homologous series is

_____

_____

_____

_____

_____

(c) Draw the valence structures of

(1) ETHANE	**(2) PROPANE**	**(3) n-BUTANE**

SECTION B

QUESTION 8 (7 minutes, 5 marks)
Waste materials can be described using the following categories

(1) Tractable

(2) Intractable

(3) Biodegradable

(4) Non-biodegradable

Explain the meaning of each of these categories and give an example of a waste material that fits into each category.

SECTION B

QUESTION 9 (7 minutes, 5 marks)

Waste materials can also be classified according to how they are treated, namely

(1) Reused
(2) Recycled
(3) Treated
(4) Incinerated
(5) Stored
(6) Dumped

Explain the meaning of each of these treatments and give an example of a waste material that is treated by each method.

END OF 1994 VCE CHEMISTRY TRIAL UNIT 1 EXAMINATION

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SUGGESTED SOLUTIONS

QUESTION 1

ITEM 1 **ANS B**
A material will be a good conductor of electricity if there are free electrons or ions available in the structure. In sodium metal, the outershell electron is shared throughout the metallic lattice. A 'sea' of electrons exists which can move when an electric potential is applied. In solid sodium chloride the ions are held in fixed positions in the three dimensional lattice and the electrons are held firmly within the ions. In both water and methane, the electrons are held within the atoms and the covalent bonds. There are a few ions present in pure water but not enough to make it a good conductor.

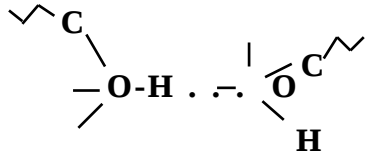
ITEM 2 **ANS B**
Protons **and** neutrons are found in the nucleus of the atom while electrons move outside the nucleus in atomic orbitals.

ITEM 3 **ANS A**
Electrons are negatively charged. Hence, an atom becomes a negative ion when it gains an electron or electrons. A change in the mass number by adding neutrons does not give the atom any charge. If an atom gains protons or changes its atomic number (by gaining or losing protons), it becomes a different element.

ITEM 4 **ANS C**
The material most resistant to scratching is the hardest material. Of those listed, diamond is by far the hardest.

ITEM 5 **ANS A**
In the ion $^{40}_{20}Ca^{2+}$, the **20** indicates the number of protons in the nucleus and the **40** shows the total number of protons plus neutrons in the nucleus. Hence, there are 20 neutrons in the nucleus. The **2+** shows that there are two less negatively charged electrons than protons around the nucleus. Hence, there are 18 electrons.

ITEM 6 **ANS C**
All of the materials listed have covalent bonding. The formulae are respectively C(d), C_2H_4, CH_3CH_2OH and C_2H_6. Hydrogen bonding occurs when a H atom is bonded to a very electronegative atom such as F, O or N and there is a non-bonding electron pair on a neighbouring molecule. The only material for which this is true is ethanol, CH_3CH_2OH. The hydrogen bonding can be represented as . . . as in the diagram below



ITEM 7 **ANS D**
A PERIOD in the Periodic Table is a row in the Periodic Table. (The number of protons in the nucleus of the elements is increasing one at a time. The number of valence electrons in the atoms of the elements is also increasing one at a time.)

SUGGESTED SOLUTIONS

ITEM 8 ANS D
The chemical properties of an element are determined by the number of outershell electrons (valence electrons) in the atoms of the elements. Sodium has one outershell electron which it tends to lose easily. Fluorine has seven outershell electrons and tends to gain one more electron. Mass number, size and the number of the outershell are **not** the important factors.

ITEM 9 ANS A
Ionic bonding is the electrostatic attraction between oppositely charged ions. The positive and negative ions are produced by a transfer of electron(s) from a metal (to produce a positive ion) to a non-metal (to produce a negative ion). For example Na^+ and Cl^-.

ITEM 10 ANS B
In ice, water molecules are held together by hydrogen bonding. Like all chemical bonding, hydrogen bonding involves the attraction between positive and negative charges. That is, it is electrostatic.

ITEM 11 ANS D
When ammonia gas is dissolved in water, hydrogen bonds are formed between the ammonia molecules and the water molecules. This is the reason why ammonia is so soluble in water! Within the ammonia molecules themselves, there is covalent bonding. Dispersion forces due to instantaneous dipoles are also present but the covalent and hydrogen bonds are far more significant.

ITEM 12 ANS D
The carbonate ion, CO_3^{2-}, bonds with two metal M ions. Hence, the metal M must form the ion M^+. Hence, the correct formulae are MNO_3, MOH, M_2SO_4 and MCl.

ITEM 13 ANS C
In one molecule of ethanol, there are 2 carbon atoms, 6 hydrogen atoms and 1 oxygen atom, a total of 9 atoms. Hence, in two molecules of ethanol, there are 18 atoms.

ITEM 14 ANS B
When iron(III) nitrate dissolves in water, one $Fe^{3+}(aq)$ ion is produced for every three $NO_3^-(aq)$ ions according to the equation: $Fe(NO_3)_3\ (s) + aq = Fe^{3+}(aq) + 3NO_3^-(aq)$.

ITEM 15 ANS B
The equation $x\ N_2(g) + y\ H_2(g) = z\ NH_3(g)$ can be balanced by the coefficients as shown:
$1\ N_2(g) + 3\ H_2(g) = 2\ NH_3(g)$

ITEM 16 ANS D
The correct formula for aluminium hydroxide is $Al(OH)_3$. Hence A and B are incorrect. The correct formula for hydrochloric acid is HCl. Hence C is false. In D, the formulae are correct and there are equal numbers of each kind of atom on both sides of the equation.

ITEM 17 ANS A
The chemical formulae and names of the materials listed are: C_2H_6 ethane, C_2H_4 ethene, C_3H_8 propane, C_4H_{10} butane, C_3H_6 propene, C_4H_8 butene.

SUGGESTED SOLUTIONS

ITEM 18 ANS D
In the process of alloying, it can be either metals which are mixed together in variable proportions (for example, brass: copper with zinc, bronze: copper with tin) or a mixture of metals with non-metals in variable proportions (for example, mild steel: iron, carbon and other non-metals).

ITEM 19 ANS A
A metal is produced by annealing when it is heated to a moderate temperature and allowed to cool slowly. This results in a soft and ductile metal because large crystals are formed in this process.

ITEM 20 ANS D
Silk, cotton and asbestos are naturally occurring fibres. Polyester is synthetic.

ITEM 21 ANS B
An atom of carbon is able to form **four** single covalent bonds. Compound **B** is **not** possible because the second carbon atom is shown as bonded to the first carbon atom, the nitrogen atom and three hydrogen atoms, making a total of five single covalent bonds.

ITEM 22 ANS C
A thermosetting polymer has covalent bonding in a three dimensional network lattice structure. It is formed by condensation polymerisation. Urea-formaldehyde is formed by this process from the monomers urea, $CO(NH_2)_2$ and formaldehyde, HCHO. Polystyrene, polypropylene and polyethylene are thermoplastic polymers formed by addition polymerisation from the monomers styrene, propylene and ethylene respectively.

ITEM 23 ANS A
There are only two carbon atoms with single bonds. Hence, the reference molecule is ethane. There is a chlorine atom attached to **each** of the carbon atoms. Hence, it is 1,2 dichloroethane.

ITEM 24 ANS A
Addition polymerisation is likely to occur between two molecules each of which has a double bond that is able to break down in the reaction to produce a long chain molecule. This could happen between ethylene and 1,2 dichloroethene. The molecules in **B** would undergo condensation polymerisation. Reactions would occur in **C** and **D** but polymers would not be produced.

ITEM 25 ANS B
The first three members of the alkene series are ethene C_2H_4, propene C_3H_6, and butene C_4H_8. In general, the formula is C_nH_{2n}.

ITEM 26 ANS D
There is one carbon atom at each vertex of the hexagonal benzene ring. Each of these carbon atoms can form three covalent bonds, one with each of its neighbouring carbon atoms and one other. Where no other atom is shown, a hydrogen atom is attached to the carbon. There are eight carbon atoms like this in the structure shown. Also, between the two benzene rings, there is a carbon atom shown with just three lines (bonds) coming from it. There is a hydrogen atom attached to this carbon. Hence, the total number of hydrogen atoms in DDT is 9.

ITEM 27 ANS A
50 ppb means 50 parts per billion. That is, 50 parts per 10^9. Hence, the number of grams of DDT in 1000 g of this plant material is $1000 \times \frac{50}{10^9}$.

SUGGESTED SOLUTIONS

ITEM 28 ANS B
Photochemical smog is produced when nitrogen oxides mix with hydrocarbons in the presence of sunlight. Carbon monoxide is a pollutant from the internal combustion engine but it is not involved in the formation of photochemical smog.

ITEM 29 ANS A
In the **complete** combustion of propane gas, carbon dioxide is produced. Hence, **C** and **D** are false. **B** is false because the hydrogen atoms are not balanced.

ITEM 30 ANS C
Both aluminium and glass can be recycled. The ozone produced in photochemical smog will break down naturally over a period of time. The plutonium produced in nuclear reactors has a long half-life and remains dangerous for a long time. It is very difficult to make this material safe. Hence, it is referred to as an intractable waste.

ITEM 31 ANS B
Materials which are dissolved in water cannot be removed by filtration. **A** is false. Silver nitrate will **not** precipitate sugar from solution. **C** is false. Even if vinegar removed the sweet taste, the water would not be pure. **D** is false. By distillation, the pure water is evaporated from the solution and then condensed.

ITEM 32 ANS B
Energy required = 18 000 x $\frac{18}{10^6}$. Hence, the cost is 18 000 x $\frac{18}{10^6}$ x 12.0 = 3.9 cents.

SECTION B

QUESTION 2

(a) potassium sulfite
(b) sodium nitrate
(c) iron(III) sulfate
(d) potassium chloride
(e) carbon dioxide
(f) sodium iodide
(g) butane
(h) ethanoic acid (acetic acid)
(i) methanol (methyl alcohol)
(j) dihydrogen sulfate (sulfuric acid)

QUESTION 3

(a) $AgNO_3(aq) + KCl(aq) = AgCl(s) + KNO_3(aq)$
(b) $2C_4H_{10}(g) + 13O_2(g) = 8CO_2(g) + 10H_2O(g)$
(c) $2H_2(g) + O_2(g) = 2H_2O(g)$
(d) $2HCl(aq) + Ca(OH)_2(aq) = CaCl_2(aq) + 2H_2O(l)$

QUESTION 4

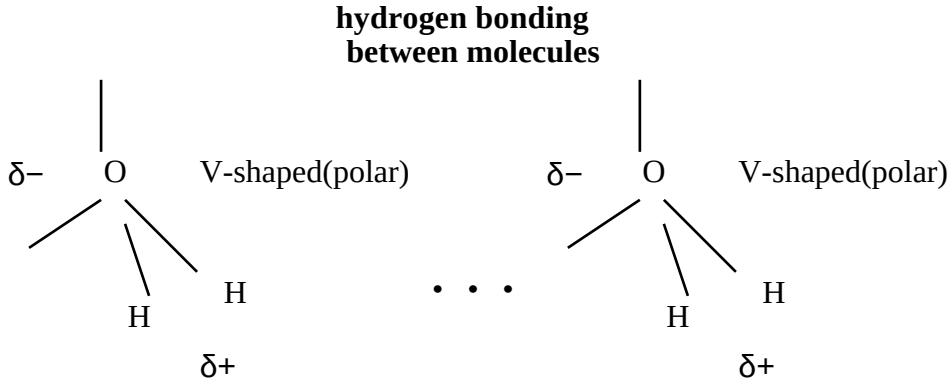
(a) 2 (b) 2, 8, 8 (c) 2, 8 (d) 2, 8, 8, 2 (e) 2, 8, 3

(f) 2, 8, 7 (g) 2, 8, 2 (h) 2, 6 (i) 2, 5 (j) 2, 3

SUGGESTED SOLUTIONS

QUESTION 5

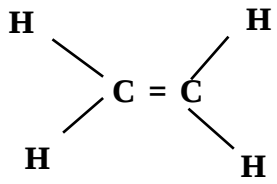
(a) water



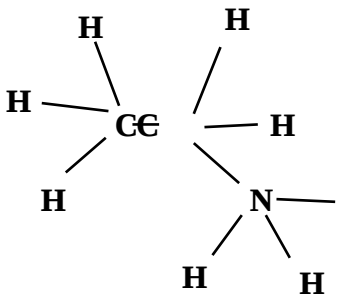
Strong covalent bonding within the water molecules, with hydrogen bonding between the molecules (together with dispersion forces).

(b) (1) linear , non-polar H - H

(2) planar, non-polar C_2H_4



(3) three dimensional molecule, polar $C_2H_5NH_2$



SUGGESTED SOLUTIONS

QUESTION 6

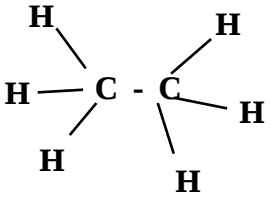
Chemical bonding is entirely electrostatic in character. That is, it involves the attraction between positive and negative charges.The bonding in sodium chloride is IONIC. There are forces of attraction between the positively charged sodium ions and the negatively charged chloride ions. Each sodium ion is surrounded by six chloride ions and each chloride ion is surrounded by six sodium ions. Dispersion forces are also present but they are weak compared with the ionic bonding. The bonding in diamond is COVALENT. One pair of electrons is shared between each pair of carbon atoms. Each carbon atom has four nearest neighbours.Dispersion forces are also present, but they are weak compared with the covalent bonding. Both sodium chloride and diamond are examples of giant three dimensional molecules. The bond angles in diamond are approximately 109^o and the bond angles in sodium chloride are 90^o.

QUESTION 7

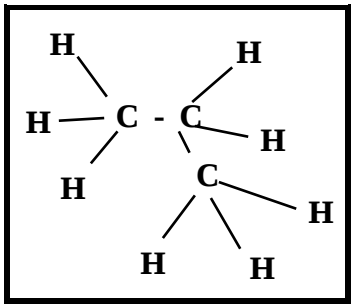
(a) 2 , 4

(b) An homologous series is a series of compounds with similar chemical properties in which successive members of the series differ in structure by a CH_2 unit.

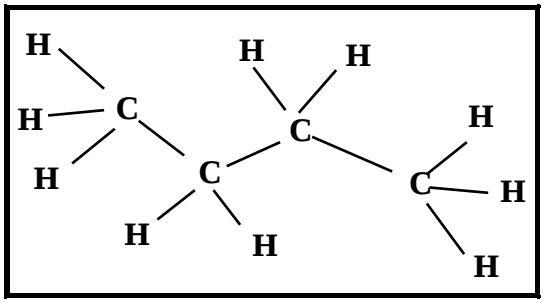
(c)



ETHANE



PROPANE



n-BUTANE

SUGGESTED SOLUTIONS

QUESTION 8

A tractable waste is a material that can treated safely. For example, glass or aluminium An intractable waste is a material that cannot be treated safely. For example, plutonium. A biodegradable waste is a material that breaks down in the environment into smaller molecules that can be recycled naturally. For example, oil. A non-biodegradable waste is a material that does not break down easily in the environment. For example, aluminium.

QUESTION 9

A material is reused when it performs the same role a n umber of times. For example a glass bottle. A material is recycled when it is put back into the manufacturing cycle and another item containing the same material is produced. For example, glass, paper and aluminium. A material is treated when some substance is removed from the original so that recycling can take place. For example, the de-inking of paper before recycling, domestic sewage. Alternatively, a material is treated by conversion into something else before release to the environment. For example, the catalytic conversion of CO and NO into CO_2 and N_2. A material is incinerated when it is burnt at high temperatures and thereby reduced to small molecules which hopefully can be recycled. For example, polychlorinated biphenyls (PCB's). A material is stored when the technology does not presently exist for making it safe. It is either stored permanently or temporarily. For example, radioactive nuclear waste such as plutonium. A material is dumped when it is believed that natural processes will eventually recycle the material. For example, paper, iron.

END OF 1994 VCE CHEMISTRY TRIAL UNIT 1 EXAMINATION SOLUTIONS

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