

Rehearse and remember

Practice exam 1

answers

VCE Chemistry

Units 1 & 2



Chemistry

Practice Examination 1 Answers

The sample answers provided here are guidelines only as to what would be appropriate responses. Remember that, in order to satisfy the requirements of the external examination(s), you must submit work that is clearly your own.

Section A – Multiple-choice questions

- Q1 C
- Q2 D
- Q3 C
- Q4 D
- Q5 B
- Q6 C
- Q7 C
- Q8 D
- Q9 B
- Q10 A
- Q11 C
- Q12 C
- Q13 B
- Q14 D
- Q15 B
- Q16 A
- Q17 C
- Q18 A
- Q19 C
- Q20 B

Section B – Short-answer questions

Question 1

a Any one of the following:

Individual (1 mark)	Contribution (1 mark)
Dalton	Proposed that matter is made up of tiny, indivisible particles
Thomson	Proposed that atoms are positively charged spheres with electrons embedded in them
Rutherford	Developed the nuclear model; that is, the atom is mostly empty space with a positively charged nucleus with orbiting electrons
Bohr	Placed electrons into certain orbits of fixed energy called shells
Schrödinger	Proposed that electrons behave as negative clouds of charge found in regions of space called orbitals
Chadwick	Identified the neutron; that is, proposed that the nucleus contains positive protons and neutral neutrons

b i 17

(1 mark)

ii $35 - 17 = 18$

(1 mark)

iii Relative atomic mass is a weighted average (1 mark) of the masses of all of the isotopes of an element. This is an atom of one of the isotopes. (1 mark)

iv $1s^2 2s^2 2p^6 3s^2 3p^5$

(1 mark)

v $1s^2 2s^2 2p^6 3s^2 3p^6$

(1 mark)

Question 2

a Any one of the following:

Individual (1 mark)	Contribution (1 mark)
Mendeleev	Devised a periodic table in which elements were arranged in order of increasing atomic mass; elements with similar chemical properties were grouped together. Predicted the properties of elements as yet undiscovered
Rayleigh	Discovered some of the noble gases
Ramsay	Discovered some of the noble gases
Mosely	Rearranged the periodic table after the discovery of protons so that elements were placed in order of increasing atomic number instead of increasing atomic mass
Seaborg	Discovered many of the transuranium elements

b i Ca

ii Ar

iii C or Si

iv Na or Mg

v Li

vi N

(1 mark each)

- c Chemical reactivity increases (1 mark) because the outer-shell electrons become further from the nucleus (1 mark) and are more readily released.

Question 3

a % N in compound = $\frac{M(\text{N in formula})}{M(\text{formula})} \times 100$ (1 mark)

$$= \frac{28.0}{148.3} \times 100$$

$$= 18.9\%$$

(1 mark)

b i $\frac{18.9}{100} = \frac{3.45}{m(\text{Mg}(\text{NO}_3)_2)}$

$$m(\text{Mg}(\text{NO}_3)_2) = 18.3 \text{ g}$$

(1 mark)

ii $n(\text{Mg}(\text{NO}_3)_2) = \frac{m}{M}$ (1 mark)

$$= \frac{18.3}{148.3}$$

$$= 0.123 \text{ mol}$$
 (1 mark)

iii $n(\text{atoms}) = n(\text{compound}) \times \text{number of ions in compound}$

$$= 0.123 \times 3$$

$$= 0.369 \text{ mol}$$

(1 mark)

$$N(\text{atoms}) = n \times N_A$$

$$= 0.369 \times 6.02 \times 10^{23}$$

$$= 2.22 \times 10^{23} \text{ atoms}$$

(1 mark)

Question 4

a $m(\text{C}) = 10.8 \text{ g}$ $m(\text{H}) = 12.6 - 10.8 = 1.80 \text{ g}$ (1 mark)

<p>C</p> <p>m 10.8 g</p> <p>n $\frac{10.8}{12} = 0.900 \text{ mol}$</p> <p>$\frac{0.900}{0.900} = 1$</p>	<p>H</p> <p>1.80 g</p> <p>$\frac{1.8}{1} = 1.80 \text{ mol}$</p> <p>$\frac{1.80}{0.900} = 2$</p>
--	--

Empirical formula is CH_2 (1 mark)

b $M(\text{CH}_2) = 14.0 \text{ g mol}^{-1}$

$$\frac{56}{14.0} = 4$$
 (1 mark)

Molecular formula is C_4H_8 (1 mark)

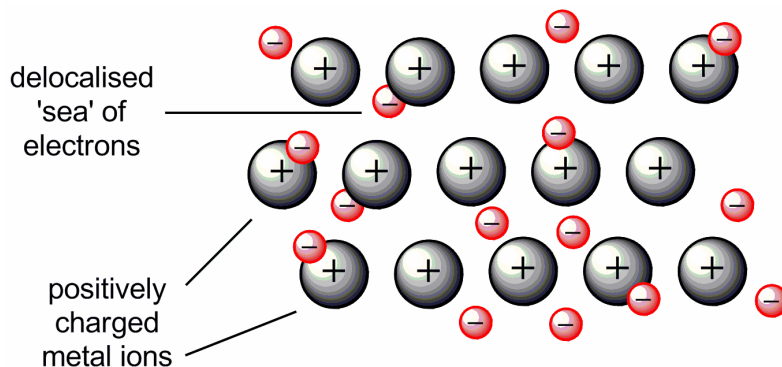
Question 5

a Structure: a lattice arrangement of cations surrounded by a sea of delocalised electrons

(1 mark).

Bonding: electrostatic attraction between the positively charged cations and the negatively charged electrons giving rise to metallic bonding.

(1 mark)



(1 mark)

b The electrons are charged particles that can move freely through the lattice.

(1 mark)

c When a sample of magnesium is hammered into a new shape, the cations can be moved with respect to one another but the 'sea' of electrons still surrounds them and the metallic bonds are not broken.

(1 mark)

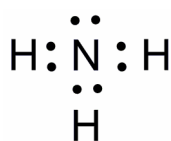
d Two of:

- alloying
- work hardening
- heat treatment.

(1 mark each up to 2 marks)

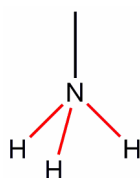
Question 6

a



(1 mark)

b



(1 mark)

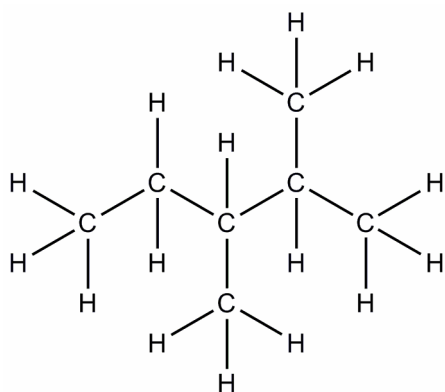
c Covalent bonding, which is the sharing of electrons

(1 mark)

d The ammonia molecule is a dipole containing highly polar N–H bonds. One end of an ammonia molecule electrostatically attracts the oppositely charged end of an adjacent ammonia molecule. (1 mark) This kind of electrostatic attraction is called a hydrogen bond. (1 mark)

Question 7

a



b i ethene

(2 marks)

ii methylpropane

(1 mark)

c methane

(1 mark)

(1 mark)

Question 8

a Nanotechnology involves the manipulation of materials at the nano size (0.1–100 nm).

(1 mark)

b For example:

- transparent sunscreen that can filter UV radiation
- drug delivery systems
- stain-free clothing
- non-porous gases.

(1 mark)