

ASSESSMENT

CHEMISTRY

SECTION A	40
SECTION B	45
SECTION C	15
TOTAL	100

SECTION A Multiple-choice

(Total 40 marks)

Select the correct response and write the corresponding letter (A, B, C or D) in the brackets provided.

1. Which of these materials is **incorrectly** classified?

	Material	Classification
A.	Music CD	Metal
B.	Microwave dish	Ceramic
C.	Saucepan	Plastic
D.	Terylene shirt	Fibre

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2. Which of the following shows four materials arranged in order of *increasing* density?

- A. Glass, gold, helium, polythene
 B. Gold, glass, polythene, helium
 C. Polythene, helium, glass, gold
 D. Helium, polythene, glass, gold

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3. Which of these substances are non-metals?

I Diamond

II Graphite

III Sodium

IV Sulfur

A. I, II and III

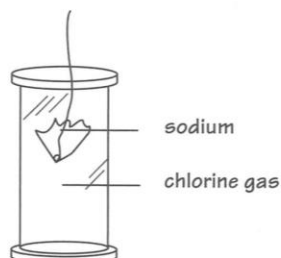
B. I, II and IV

C. II, III and IV

D. All of these

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4. When sodium and chlorine react together, they form a compound called _____.



- A. sodium chlorine
 C. sodium chloride

- B. sodium chlorate
 D. sodium chlorite

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5. Common salt is dissolved in water to form salt water. Which of these is correct?

	Solute	Solvent	Solution
A.	Common salt	Salt water	Water
B.	Common salt	Water	Salt water
C.	Water	Common salt	Salt water
D.	Water	Salt water	Common salt

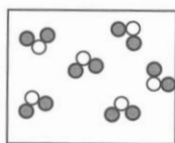
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6. When electricity is passed through acidified water, bubbles are formed. This is because water _____.

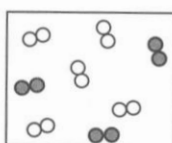
- A. decomposes to form oxygen and hydrogen gases
 B. heats up and forms steam
 C. is a good conductor of electricity
 D. reacts with the electricity to form acid gas

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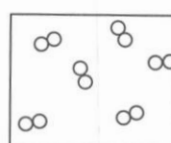
7. The diagrams show the different particle arrangements in either elements, mixtures or compounds. Which is the correct key?



I



II



III

	Element	Mixture	Compound
A.	I	II	III
B.	II	I	III
C.	II	III	I
D.	III	II	I

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8. Which of these mixtures could be separated by adding water, stirring and then filtering?

- A. Iron and sulfur
 B. Salt and pepper
 C. Sand and chalk
 D. Sugar and salt

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9. When a compound is formed, _____.

- A. a chemical reaction takes place
 B. it is easy to change back to its elements
 C. its properties depend on the elements it contains
 D. there is no energy change

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10. The table shows the pH of various substances in solution. Which of these substances, when added to a marble chip (calcium carbonate), would give off carbon dioxide gas?

Substance	pH value
A	2
B	7
C	11
D	14

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11. Which of these factors affects the solubility of a particular solute in a solvent?

- A. Amount of solute you use B. Surface area of the solute
C. Temperature of the solvent D. Boiling point of solvent

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12. A solution at a particular temperature has as much solute dissolved as possible. It is described as a/an _____.

- A. aqueous solution B. saturated solution
C. solvent D. suspension

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13. A steel bridge expands in hot weather because _____.

- A. it stores heat energy between its particles
B. at higher temperatures there are more particles
C. its particles become larger
D. its particles vibrate more

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14. Which of these reactions involves oxidation?

- A. Adding an acid to an alkali
B. Respiration of foodstuffs
C. Passing electricity through chemicals
D. Thermal decomposition of carbonates

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15. Which of these statements applies to acids?

- I Gives off a gas when added to carbonates
II Feels soapy to touch
III Has no effect on red litmus
IV Dissolves many metals to form salts

- A. I, II and III B. I, II and IV C. I, III and IV D. All of these

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16. Which of these statements about elements is **false**?

At room temperature and pressure, _____.

- A. about 75% of elements are solid metals
- B. bromine is a reddish-brown gas
- C. copper is a reddish-brown solid
- D. only two elements are liquids

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17. Which key shows *both* a correct physical and chemical change?

	Physical change	Chemical change
A.	Melting	Electrolysis
B.	Thermal decomposition	Photosynthesis
C.	Respiration	Sublimation
D.	Evaporation	Condensation

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18. Which of these changes that takes place is physical and **not** chemical?

- A. Combustion of fossil fuels
- B. Expansion of a metal on heating
- C. Rusting of iron metal
- D. Photosynthesis in green plants

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19. Which poisonous pollutant gas is produced by the incomplete combustion of fuels in motor vehicles?

- A. Carbon dioxide
- B. Carbon monoxide
- C. Oxides of nitrogen
- D. Sulfur dioxide

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20. When sulfuric acid is added to sodium carbonate it fizzes and gives off carbon dioxide gas. Which key gives the correct reactants (chemicals you start with) and products (chemicals that you finish with)?

	Reactants	Products
A.	Sodium carbonate, carbon dioxide	Sodium sulfate, sulfuric acid, water
B.	Sodium carbonate, sodium sulfate	Carbon dioxide, sulfuric acid, water
C.	Sodium carbonate, sulfuric acid	Sodium sulfate, carbon dioxide, water
D.	Sodium sulfate, carbon dioxide	Sodium carbonate, sulfuric acid, water

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21. When the particles in a gas are cooled down and the gas condenses, then its molecules _____.

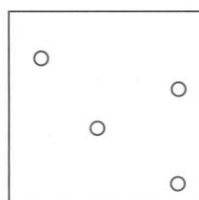
- A. become further apart
- B. collide more frequently with the walls of the container
- C. expand and become heavier
- D. move more slowly

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22. Which of these physical properties is directly related to the thermal conductivity of the material?
- A. Electrical conductivity B. Amount of expansion
C. Melting point D. Elasticity ()
23. Which of these statements applies to liquids?
- I Have a fixed shape but a variable volume
II Made up of particles
III Particles are smaller than a solid but larger than a gas
- A. I only B. I and II C. II only D. I, II and III ()
24. Which of these changes involves new molecules being formed and is therefore, a chemical change?
- A. Crystallising B. Distilling C. Rusting D. Freezing ()
25. In which of these substances are the particles farthest apart?
- A. Cold water B. Compressed air
C. Crystal of common salt D. Liquefied oxygen ()
26. A chemical symbol represents _____.
- A. one atom of an element
B. one molecule of a compound
C. the abbreviation for an element's name
D. the first two letters of the element ()
27. The two diagrams show how the particles are arranged in substance X at 10°C and 50°C.



10°C



50°C

Which of these statements is true?

- A. Boiling point of X is above 50°C.
B. Melting point of X is below 10°C.
C. Substance X boils above 50°C.
D. Substance X is a solid at room temperature. ()

28. The average size of an atom in millimetres is _____.

- A. 0.1 mm
 B. 0.001 mm
 C. 0.0000001 mm
 D. 0.00000000000000000001 mm

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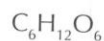
29. Which of these statements about the nucleus of an atom is/are true?

- I It is the centre of an atom.
 II It is positively charged.
 III It *always* contains protons and neutrons.

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

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30. Which elements are present in all *three* of these molecules?



- A. Hydrogen and sulfur
 B. Hydrogen and oxygen
 C. Oxygen and carbon
 D. Oxygen and sulfur

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31. A potassium atom can be represented by ${}^{39}_{19}\text{K}$.

Which key gives the correct protons, neutrons and electrons in this atom?

	Proton	Neutron	Electron
A.	19	19	20
B.	19	20	19
C.	20	19	19
D.	20	19	20

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32. Which of these reactions of copper, or its compounds, involves thermal decomposition?

- A. copper + oxygen → copper oxide
 B. copper carbonate → copper oxide + carbon dioxide
 C. copper oxide + hydrogen → copper + water
 D. copper sulfate + sodium hydroxide → copper hydroxide + sodium sulfate

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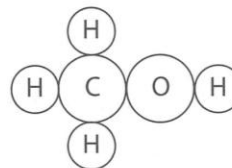
33. Which of these molecules is **not** a compound?

- A. S_8
 B. NH_3
 C. HCl
 D. $\text{C}_6\text{H}_{12}\text{O}_6$

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34. The diagram shows the atoms present in a molecule of methanol. Which key is correct about this molecule which is an alcohol found in methylated spirits?

	Number of elements	Number of atoms
A.	3	3
B.	3	6
C.	6	3
D.	6	6



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35. Which of these particles has the smallest mass?

A. Hydrogen atom B. Electron C. Neutron D. Proton ()

36. Which of these molecules is diatomic?

A. CO B. H₂O C. CO₂ D. NH₃ ()

37. If we subtract the proton number from the mass number of a particular element this gives us the number of _____ in the nucleus of an atom.

A. electrons B. neutrons
C. protons D. protons and neutrons ()

38. 1 g of hydrogen gas reacts with 8 g of oxygen gas to form 9 g of water. Which of these masses for this chemical reaction are correct?

	Mass of hydrogen (g)	Mass of oxygen (g)	Mass of water (g)
A.	2	8	10
B.	2	18	20
C.	10	8	18
D.	5	40	45

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39. Which of these compounds could be formed by an element burning in air?

A. Sulfuric acid B. Sodium chloride
C. Sodium hydroxide D. Carbon dioxide ()

40. Which of these lists consist only of compounds?

A. Air, oxygen, carbon dioxide
B. Brass, copper, zinc
C. Sodium chloride, chlorine, sodium carbonate
D. Common salt, water, chalk ()

SECTION B
Structured Questions
(Total 45 marks)

Answer each of these structured questions in the space provided. Marks for each question are shown in brackets.

1. Using a line, match the material to its correct classification. Each class of material can only be used once.

Material

Nylon •

Bronze •

Perspex •

Porcelain •

Classification

• Ceramic

• Plastic

• Fibre

• Metal

(4 marks)

2. (a) Give two physical properties of the material used which makes it suitable for its particular use.

(i) Steel bodywork of car _____

(ii) Glass ovenproof dish _____

(iii) Nylon fishing line _____

(3 marks)

- (b) Give one disadvantage of the material for each use.

(i) Steel _____

(ii) Glass _____

(iii) Nylon _____

(3 marks)

3. Choose *only* from this list of elements.

carbon	lithium	sulfur	potassium
nitrogen	magnesium	hydrogen	

- (a) Choose *three* elements that are

(i) metals _____

(ii) non-metals _____

- (b) Choose *two* elements that are

(i) gases _____

(ii) found in living things _____ (4 marks)

4. Compounds are made up of elements chemically combined together. Complete the table by naming the compound or elements present in the compound and classifying them correctly as metals or non-metals. The first example has been done to show you what to do.

Compound	Metal(s) present	Non-metal(s) present
Sodium carbonate	Sodium	Carbon, oxygen
Copper sulfate	Copper	
	Calcium	Carbon, oxygen
Zinc nitrate		Nitrogen, oxygen

(3 marks)

5. Veloo was making some notes about acids and alkalis and pH when doing an experiment. Unfortunately, he spilled some acid over his notes and some of the words were missing. Complete the paragraph by filling in those words that have been 'eaten away'.

Acids turn universal indicator _____ while _____ turn it blue. However, in _____ solution the colour of the universal indicator remains the same. The pH value of the neutral solution is _____. If the pH rises above the neutral value the solution is _____ but if it falls below the neutral value the solution is _____. A strong acid would have a pH of _____. A strong alkali would have a pH of _____. (4 marks)

6. Match the method of separation to the correct type of mixture by drawing a line between the two.

Method of Separation

Filtration •

Chromatography •

Evaporation •

Distillation •

Type of Mixture

• Pure liquid from a solution

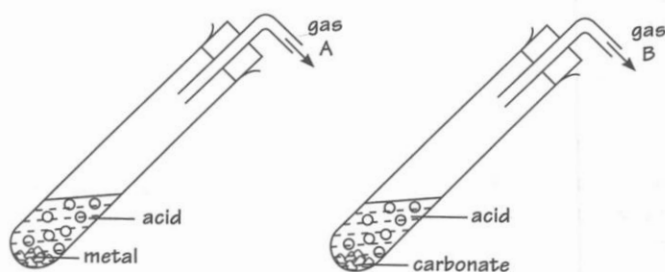
• Solution of solid dissolved in liquid

• Insoluble solid and liquid

• Mixture of dyes

(4 marks)

7. Observe the following set-ups.



(a) Identify gas A _____

Identify gas B _____

(b) Which of these gases is produced in certain fire extinguishers? _____ (3 marks)

8. Complete the following chemical equations in words by filling in the spaces.

(a) Sodium + _____ → Sodium oxide

(b) _____ + Oxygen → Carbon monoxide

(c) Sodium + _____ → Sodium chloride

(d) Aluminium + Chlorine → _____

(e) Iron + Sulfur → _____

(f) _____ + _____ → Potassium sulfide (7 marks)

9. Match each of these half-sentences to make three complete sentences about the different states of matter.

heating a solid causes it to expand

as the particles have more energy to escape

its particles lose energy and become regularly arranged

when a liquid freezes and becomes a solid

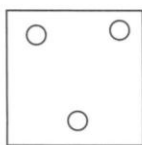
as the particles vibrate more and move further apart

a liquid evaporates as it warms up

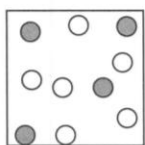
- (a) _____
- (b) _____
- (c) _____

(3 marks)

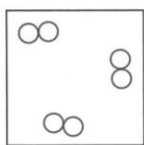
10. In the diagrams below,  is a magnesium atom and  is a chlorine atom.



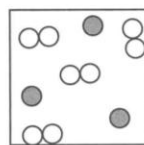
A



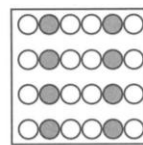
B



C



D



E

Which diagram represents

- (a) a molecule of chlorine gas? _____
- (b) the compound magnesium chloride? _____
- (c) a mixture of magnesium and chlorine gas? _____

(3 marks)

11. Choose only from the following chemical substances:



- (a) The substance which is **not** a compound. _____
- (b) The substance which has the most number of atoms. _____
- (c) The substance which is responsible for acid rain. _____
- (d) The substance that would neutralise an acid. _____ (4 marks)

SECTION C Free Response Questions

(Total 15 marks)

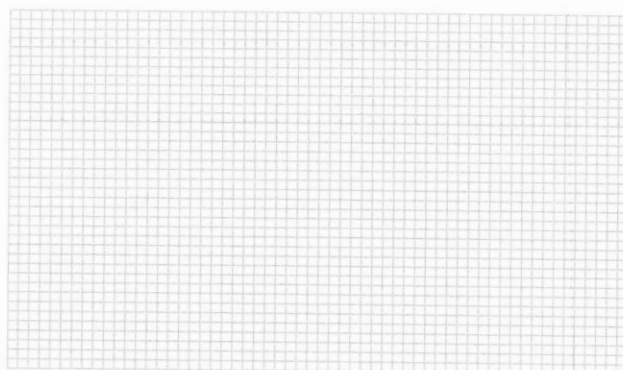
Choose **any three** questions.

1. Wenli investigated the speed of a chemical reaction of zinc metal with sulfuric acid to produce a salt. He did this by counting the number of bubbles of gas given off every thirty seconds. When no more bubbles were given off, the reaction had stopped. His results are shown in the table.

Time (min)	Total number of bubbles
0	0
0.5	69
1.0	105
1.5	123
2.0	136
2.5	146
3.0	154

Time (min)	Total number of bubbles
3.5	160
4.0	164
4.5	166
5.0	167
5.5	168
6.0	168

- (a) Plot a graph of the total number of bubbles (y axis) against time (x axis).



- (b) When was the reaction fastest and when did the reaction finish?

(5 marks)

or

- (a) Which gas was given off during the experiment? _____

- (b) Name the salt formed. _____

- (c) Write a word equation for this chemical reaction.

- (d) What would be different if zinc carbonate was used instead of zinc metal?

(5 marks)

2. Shanti had an accident in the kitchen when she dropped a glass bowl full of sugar. Describe an experiment to separate the sugar and glass.

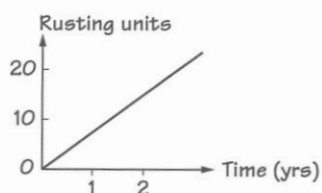
(5 marks)

or

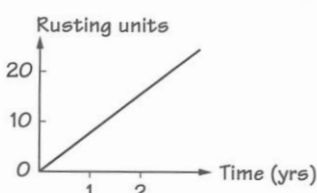
Acid rain is dissolving and wearing away marble gravestones so that it becomes difficult to read the inscription. One solution is to use gravestones made of granite. Devise a simple experiment to fairly test and compare the reactions of granite and marble with a laboratory acid such as hydrochloric acid. What are the independent, dependent and controlled variables in this experiment?

(5 marks)

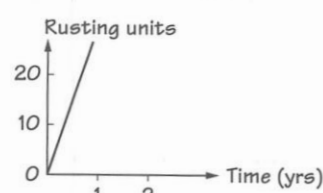
3. The speed at which the chemical change of steel rusting varies with conditions and composition. The graphs below show how the amount of rusting depends upon composition of the steel, pH and temperature.



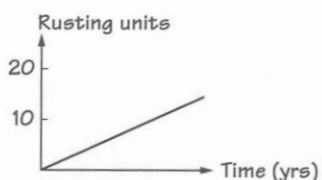
Composition : 98% iron, 2% carbon
pH : 4
Temperature : 30°C



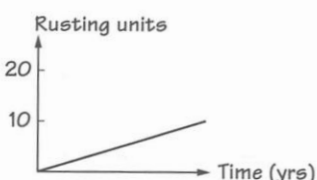
98% iron, 2% carbon
pH : 7
50°C



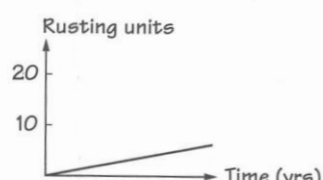
98% iron, 2% carbon
pH : 4
50°C



Composition : 98% iron, 2% carbon
pH : 7
Temperature : 30°C



99% iron, 1% chromium
pH : 7
30°C



95% iron, 5% chromium
pH : 7
30°C

- (a) Interpret these graphs to decide the conditions that will help to reduce rusting.

- (b) Steel rusts by the chemical combination of iron (in steel) with oxygen and water in the air. What other ways could you prevent steel from rusting?

(5 marks)

or

Explain how the subatomic particles are arranged in atoms. Give the charge and mass of the particles and illustrate your answer using the element boron ${}^{11}_{5}\text{B}$.

(5 marks)