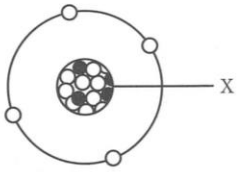
Model of Matter - Atoms and Molecules

UNIT 8

Section A Multiple Choice Questions

For each question, choose the most suitable option and write its letter (A, B, C or D) in the brackets provided.

1. What is 'X'?



A Atom
B Proton
C Nucleus
D Electron [ ]

2. Atoms are made up of _____.

A ions B elements
C molecules D subatomic particles [ ]

3. What are the particles present inside the nucleus?

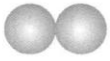
A Only protons B Only electrons
C Protons and electrons D Protons and neutrons [ ]

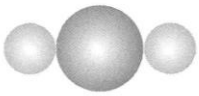
4. The number of atoms and kinds of atoms present in a molecule can be inferred from its _____.

A symbol B chemical formula
C chemical equation D atomic number [ ]

5. Which of the following gases contains two types of atoms in it?

A 
Oxygen

B 
Hydrogen

C 
Carbon dioxide

D 
Argon

[ ]

6. Identify the common element found in the following substances.

NH_3 NaOH HCl CH_4

A Nitrogen
B Hydrogen
C Oxygen
D Carbon

[ ]

7. Which one of the following is **not** made of a single type of atoms?

A Alcohol
B Diamond
C Hydrogen gas
D Oxygen gas

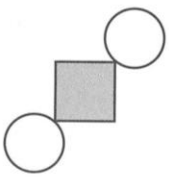
[ ]

8. Name the elements present in sodium hydroxide (NaOH) .

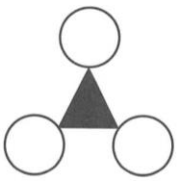
A Nitrogen, Oxygen and Hydrogen
B Sodium, Oxygen and Hydrogen
C Sodium, Carbon and Hydrogen
D Nitrogen, Oxygen and Helium

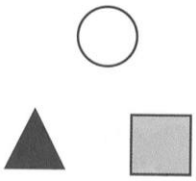
[ ]

9. If each of the symbols  , represent different kinds of atoms, which one of the following represents the molecule of an element?

A 

B 

C 

D 

[ ]

10. Which one of the following chemical formulas contains 5 atoms in it?

A NaOH **B** $CuSO_4$
C $CaCO_3$ **D** H_2SO_4 [ ]

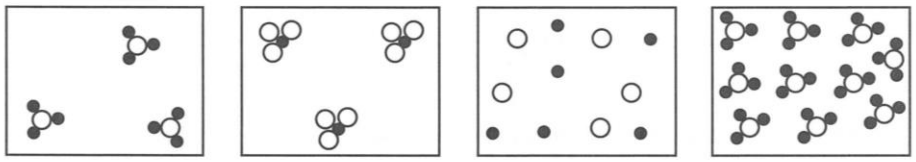
11. Which one of the following statements is true for all atoms?

A Number of protons = number of electrons
B Number of protons = number of neutrons
C Number of neutrons = number of electrons
D Number of neutrons = number of protons + number of electrons [ ]

12. A sodium atom has 11 protons and 12 neutrons inside its nucleus.
What is number of electrons outside the nucleus?

A 23 **B** 12
C 11 **D** 10 [ ]

13. Which one of the following diagrams represents ammonia gas, NH_3? (● - hydrogen atom, O - nitrogen atom)



A **B** **C** **D** [ ]

14. Given below is the chemical formula of sulfuric acid.

$$H_2SO_4$$

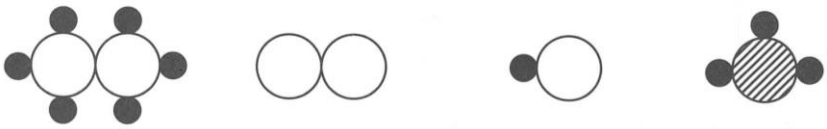
How many elements are present in sulfuric acid?

A 3 **B** 4
C 6 **D** 7 [ ]

15. What is the symbol for iron?

A I **B** Ir
C F **D** Fe [ ]

16. Which of the following diagrams represents the molecule of an element?



A B C D

[ ]

17. Which of the following chemical formulas has the greatest number of atoms?

A $K_2Cr_2O_7$ **B** $C_6H_{12}O_6$

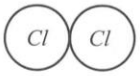
C $CuSO_4$ **D** Na_2CO_3 [ ]

18. The atomic number of silicon is 14. How many electrons does this atom contain?

A 28 **B** 14

C 7 **D** 42 [ ]

19. Given below is the diagram of a chlorine molecule. Which of the statements is **not** correct about the chlorine molecule?



A Chlorine gas contains two *Cl* atoms in a molecule.

B Chlorine gas exists as *Cl* molecules.

C Chlorine is a compound made up of 2 atoms of chlorine chemically combined.

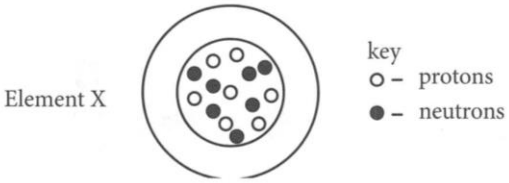
D Chloride is an element made of chlorine molecules. [ ]

20. Which of the following shows the correct charges of an electron, a neutron and a proton?

	Electron	*Neutron*	*Proton*
A	Positive	Negative	Neutral
B	Negative	Positive	Neutral
C	Negative	Neutral	Positive
D	Positive	Neutral	Negative

[ ]

21. The diagram shown below is an atom of element X.



Which of the following shows the correct representation of element X?

A $^{7}_{7}X$ **B** $^{14}_{7}X$

C $^{14}_{14}X$ **D** $^{7}_{14}X$ [ ]

22. Elements are arranged in the Periodic Table according to their _____.

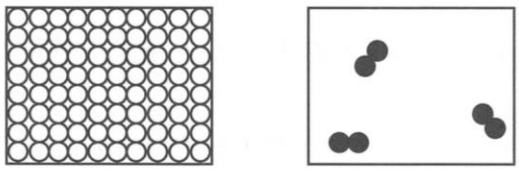
A number of protons and neutrons inside the nucleus

B number of electrons

C number of protons

D number of neutrons [ ]

23. The diagrams below represent two elements.



Which of the following statements is true about the two elements?

A Both are elements made of atoms.

B Both are elements made of molecules.

C Element P is a solid and element Q is a gas.

D Elements P and Q must have the same number of protons. [ ]

24. Which of the following groups of chemical formulas represent compounds only?

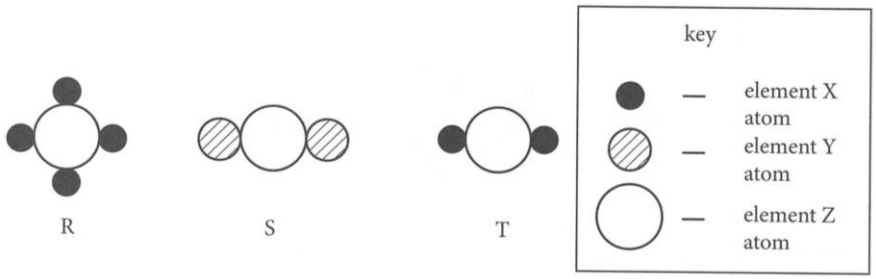
A CH_4, Cl_2, CO_2

B NaOH, O_2, N_2

C Cl_2, H_2, Br_2

D HCl, H_2SO_4, HNO_3 [ ]

25. The diagram below shows three substances R, S and T.



Which statement about these three substances is **not** correct?

A Substance R has the most number of atoms.

B Substances R and T have the same number of element X atoms.

C Substances R, S and T have one atom of element Z each.

D Substances R and S have the same number of elements. [ ]

26. How many oxygen atoms are there in one unit of $Ca_3(PO_4)_2$?

A 2

B 4

C 6

D 8 [ ]

27. The chemical formula for water is H_2O. Which of the following statements is correct for a water molecule?

A There is twice as much mass of hydrogen as oxygen in each molecule.

B There are two hydrogen atoms and one oxygen atom per water molecule.

C There are twice the number of protons of hydrogen atoms than the oxygen atom.

D There are two oxygen atoms and one hydrogen atom per water molecule. [ ]

28. The elements present in FeO are _____.

A iron and oxygen

B iron and carbon

C fluorine and oxygen

D iron, oxygen and carbon [ ]

Section B Short Answer Questions

Answer all the questions in the spaces provided.

1. **(a)** What is a chemical formula?

_____

_____

(b) What is a proton number?

_____

_____

2. Complete the following by making use of the Periodic Table.

	Element	*Proton Number*	*Electron Number*	*Neutron number*	*Name of the element*
(i)	Na	11	11		
(ii)	Cl	17	17		
(iii)	K	19	19		
(iv)	O	8	8		
(v)	Mg	12	12		
(vi)	F	9	9		
(vii)	Li	3	3		

3. Complete the following table.

	Chemical formula	*Name of the elements*	*Number of atoms*
(a)	CO_2		
(b)	NH_3		
(c)	$CaCO_3$		
(d)	$MgSO_4$		
(e)	Fe_2O_3		

4. Give the correct formula for the following substances.

(a) Oxygen gas: _____

(b) Carbon dioxide: _____

(c) Copper metal: _____

(d) Water vapour: _____

(e) Sodium chloride: _____

5. Explain why the number of protons in an atom does not change.

_____

_____

_____

6. Identify the elements present in the following compounds and state the number of atoms in each compound.

(a) KNO_3: _____

_____

(b) $Ca(OH)_2$: _____

_____

(c) $NaC_2H_3O_2$: _____

_____

(d) $(NH_4)_2CO_3$: _____

_____

7. Give the chemical symbol and state the number of protons in each atom of the following elements. [Use the Periodic Table for reference]

	Element	*Chemical symbol*	*Number of protons in each atom*
(i)	Lithium		
(ii)	Bromine		
(iii)	Helium		
(iv)	Magnesium		
(v)	Copper		

8. Fill in the blanks with the correct word.

The atomic number tells you the number of _____ in one atom of an element.

It also tells you the number of _____ in a neutral atom of that element.

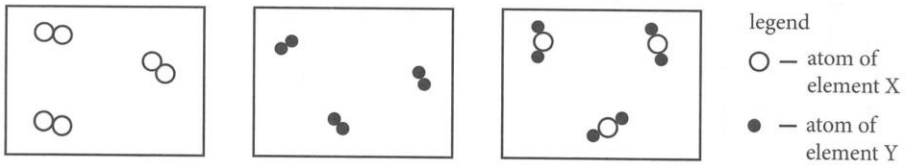
The atomic number gives the 'identity' of an element and determines its _____ in the Periodic Table.

No two different elements will have the _____ atomic number.

9. Complete the table by filling in all the missing parts and name the element that has the corresponding number of particles. [Use the Periodic Table for reference]

	Protons	*Neutrons*	*Electrons*	*Name of the element*
(i)	26	30	26	
(ii)	53	74		
(iii)			2	
(iv)	20			
(v)	78			

10. Given below are three diagrams of different substances.



A B C

(a) Give **two** properties that are common to all three substances.

1. _____

2. _____

(b) What can you say about the particles in all three substances?

_____

_____

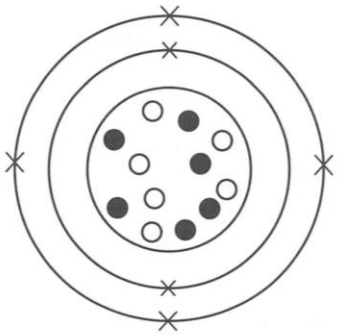
(c) Identify all three substances.

_____

_____

_____

11. The diagram below shows the structure of an atom of the element E.



(a) Complete the table below with information regarding the three different particles found in an atom of element E.

Particle	*Number of particles in one atom*	*Name of the particle*	*Relative mass of particle*	*Relative charge on particle*
×		electron		
●				
○				

(b) Explain why the atom of element E shown above is electrically neutral.

_____

_____

12. The chemical symbols of two elements, carbon and nitrogen, are shown below.

$$^{6}_{12}C \qquad ^{7}_{14}N$$

(a) State the number of electrons, protons and neutrons in each atom of carbon and nitrogen.

	Carbon	*Nitrogen*
Electrons		
Protons		
Neutrons		

(b) Give **two** similarities between the above two elements.

_____

_____

(c) How do these elements differ from each other?

_____

_____

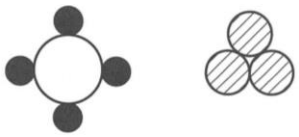
_____

(d) Carbon is a black solid. What will happen to carbon if one more proton is added to its nucleus?

_____

_____

13. The diagram below shows two particles X and Y.



X Y

(a) What is a molecule?

_____

(b) Which one of the above particles represents the molecule of a compound? Explain your answer.

_____

_____

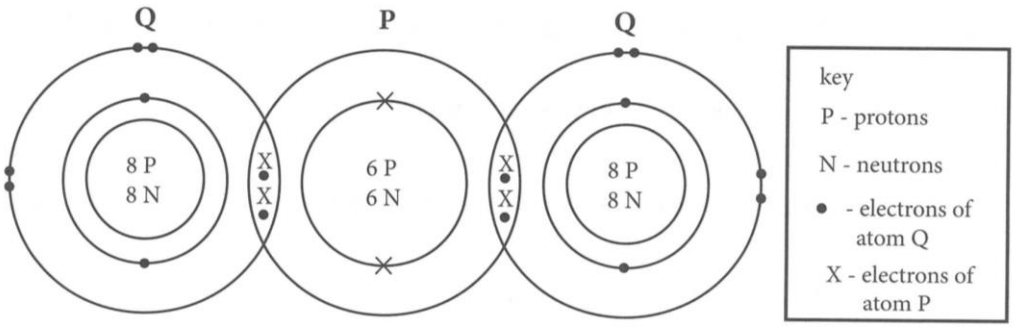
(c) The two particles are methane (CH_4) and ozone (O_3). Which of the above particles represents ozone? Give an explanation for your answer.

_____

_____

_____

14. The diagram below represents a molecule where two atoms of Q combine with one atom of P to form a compound.



(a) State the number of protons in this molecule.

_____

(b) Identify elements P and Q using the Periodic Table and give the chemical formula of the molecule.

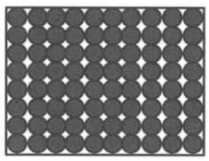
_____

_____

(c) Name the compound using the chemical formula.

_____

15. The diagram below shows the arrangement of atoms in a metal.



(a) Based on the arrangement, what can you say about the state of the metal?

_____

(b) Give a reason for your answer in (a).

_____

(c) Read the following statements and indicate whether they are 'True' or 'False'.

(i) Particles in metals do not exist as molecules. _____

(ii) Metals conduct electricity due to the free moving electron. _____

(iii) Metals react with metals to form salts. _____

(iv) At room temperature, all metals exist only in solid state except mercury. _____

(v) In the chemical formula for calcium chloride, $CaCl_2$, calcium is a metal and chlorine is a non-metal. _____

16. Complete the following table using the Periodic Table.

	Chemical formula of the compound	*Name of the compound*	*Symbol of elements present in the compound*	*Name of the elements in the compound*
(i)	$CuSO_4$	Copper (II) sulfate		
(ii)	Fe_2O_3	Iron (III) oxide		
(iii)	H_2SO_4	Sulfuric acid		
(iv)	$MgCl_2$	Magnesium chloride		
(v)	KNO_3	Potassium nitrate		

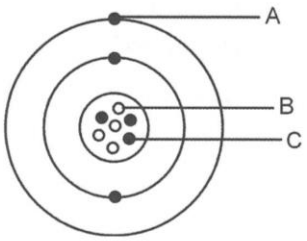
17. Match the symbol with the correct elements given.

P	Silver
Na	Tin
K	Phosphorus
Ag	Sodium
Sn	Potassium

Section C Free Response Questions

Answer all the questions in the spaces provided.

1. (a) Given below is the structure of an atom. Name the particles A, B and C.



A: _____

B: _____

C: _____

(b) Give the charges of the particles A, B and C.

A: _____

B: _____

C: _____

2. An atom of an element X may be written as $^{11}_{23}X$.

(a) In the symbol, what does 11 represent?

_____

(b) In the symbol, what does 23 represent?

_____

(c) Give the number of protons, neutrons and electrons for the element X.

_____

3. **(a)** What is a molecule?

_____

_____

(b) What are the **two** types of molecules? Give an example for each type.

_____

_____

_____

4. **(a)** Give the names of the following substances.

(i) $Ca(OH)_2$: _____

(ii) H_2SO_4: _____

(iii) $MgCl_2$: _____

(iv) $ZnCO_3$: _____

(v) NaCl: _____

(b) Give the chemical formula for the following substances.

(i) Iron (II) sulfate: _____

(ii) Copper (II) oxide: _____

(iii) Potassium nitrate: _____

(iv) Ammonium chloride: _____

(v) Lead (II) carbonate: _____