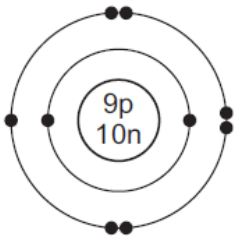
Atoms, Elements and Compounds – 2022 Nov IGCSE Chemistry 0620

1. Nov/2022/Paper_11/No.4

The structure of an atom is shown.



key
● = electron
n = neutron
p = proton

Which row shows the nucleon number and proton number of this atom?

	nucleon number	proton number
A	9	10
B	19	10
C	10	9
D	19	9

2. Nov/2022/Paper_11/No.5

Which statement about an alloy is correct?

A It is a compound made of two or more elements, one of which is a metal.

B It is a layer of a metal plated onto another metal.

C It is a mixture of a metal with one or more other elements.

D It is a single element.

3. Nov/2022/Paper_11/No.6

Which statements about potassium bromide are correct?

1 It has a high melting point.

2 It dissolves in water.

3 It conducts electricity when solid.

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

4. Nov/2022/Paper_11/No.7

Which row describes the bonding in graphite and a use of graphite?

	bonding in graphite	a use of graphite
A	each atom is bonded covalently to three other atoms	in cutting tools
B	each atom is bonded covalently to three other atoms	as an electrical conductor
C	each atom is bonded covalently to four other atoms	in cutting tools
D	each atom is bonded covalently to four other atoms	as an electrical conductor

5. Nov/2022/Paper_12/No.4

How many neutrons are present in one atom of $^{35}_{17}Cl$?

A 17 **B** 18 **C** 35 **D** 52

6. Nov/2022/Paper_12/No.6

Which statement about compounds is correct?

A Covalent compounds are less volatile than ionic compounds.

B Covalent compounds conduct electricity when they are solid.

C Ionic compounds conduct electricity when molten.

D Ionic compounds are insoluble in water.

7. Nov/2022/Paper_12/No.7

Which statement explains why diamond is used in cutting tools?

A It has no free electrons.

B It has a high melting point.

C It is colourless.

D It is hard.

8. Nov/2022/Paper_13/No.4

Which two particles have the same electronic structure?

A C and O^{2-}

B F^- and Na

C K^+ and S^{2-}

D Mg and Na^+

9. Nov/2022/Paper_13/No.6

Magnesium reacts with oxygen to form magnesium oxide.

In the reaction, each magnesium atom .....1..... two .....2..... .

Which words complete gaps 1 and 2?

	1	2
A	loses	electrons
B	loses	protons
C	gains	electrons
D	gains	protons

10. Nov/2022/Paper_13/No.7

Which row about the structures and uses of diamond and graphite is correct?

	structure	use
A	diamond has a giant covalent structure	diamond is used to make electrodes
B	diamond has a simple covalent structure	diamond is used to make cutting tools
C	graphite has a giant covalent structure	graphite is used as a lubricant
D	graphite has a simple covalent structure	graphite is used to make cutting tools

11. Nov/2022/Paper_21/No.4

Which statements about isotopes of the same element are correct?

1 They are atoms which have the same chemical properties because they have the same number of electrons in their outer shell.

2 They are atoms which have the same number of electrons and neutrons but different numbers of protons.

3 They are atoms which have the same number of electrons and protons but different numbers of neutrons.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

12. Nov/2022/Paper_21/No.5

Which type of structure and bonding is present in an element that is malleable and conducts electricity?

A covalent molecular

B ionic lattice

C covalent macromolecular

D metallic lattice

13. Nov/2022/Paper_21/No.6

Which statements about potassium bromide are correct?

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A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

14. Nov/2022/Paper_21/No.7

Which substance has a similar structure to silicon(IV) oxide?

A carbon dioxide

B diamond

C graphite

D sodium oxide

15. Nov/2022/Paper_22/No.4

Which statements about isotopes of the same element are correct?

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3 They are atoms which have the same number of electrons and protons but different numbers of neutrons.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

16. Nov/2022/Paper_22/No.5

Which statement about solid magnesium oxide is correct?

A It is a giant structure made up of magnesium and oxygen atoms bonded covalently.

B It is an electrical conductor with mobile magnesium ions and oxygen ions.

C Magnesium loses electrons and these electrons move freely through a lattice.

D Oxygen ions and magnesium ions are attracted to each other in a giant lattice.

17. Nov/2022/Paper_22/No.6

Which molecule contains only three shared pairs of electrons?

A CH_3OH **B** Cl_2 **C** H_2O **D** N_2

18. Nov/2022/Paper_22/No.7

Which particles are present in the structure of metals?

1 positive ions

2 negative ions

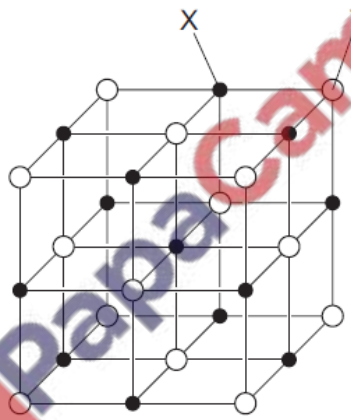
3 shared pairs of electrons

4 mobile electrons

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

19. Nov/2022/Paper_23/No.3

The structure of sodium chloride can be represented as shown.



What are X and Y?

	X	Y
A	metal atom	non-metal atom
B	negative ion	electron
C	positive ion	negative ion
D	positive ion	electron

20. Nov/2022/Paper_23/No.4

Which two particles have the same electronic structure?

A C and O^{2-}

B F^- and Na

C K^+ and S^{2-}

D Mg and Na^+

21. Nov/2022/Paper_23/No.5

Which statements about isotopes of the same element are correct?

1 They are atoms which have the same chemical properties because they have the same number of electrons in their outer shell.

2 They are atoms which have the same number of electrons and neutrons but different numbers of protons.

3 They are atoms which have the same number of electrons and protons but different numbers of neutrons.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

22. Nov/2022/Paper_23/No.6

What is the total number of shared electrons in a molecule of methanol, CH_3OH?

A 4 **B** 5 **C** 8 **D** 10

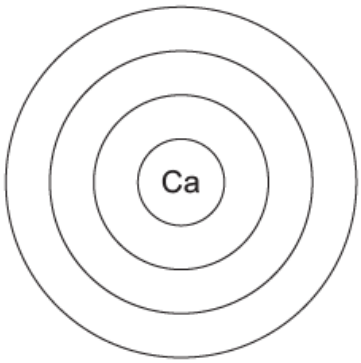
23. Nov/2022/Paper_23/No.7

Which row about the structures and uses of diamond and graphite is correct?

	structure	use
A	diamond has a giant covalent structure	diamond is used to make electrodes
B	diamond has a simple covalent structure	diamond is used to make cutting tools
C	graphite has a giant covalent structure	graphite is used as a lubricant
D	graphite has a simple covalent structure	graphite is used to make cutting tools

24. Nov/2022/Paper_31/No.2(b)

(b) Complete the diagram to show the electron arrangement in a calcium atom.



[2]

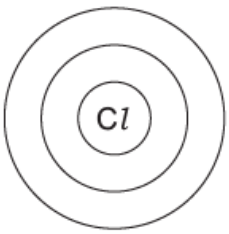
25. Nov/2022/Paper_32/No.2(b)

(b) Complete the diagram to show the electron arrangement in a silicon atom.

[2]

26. Nov/2022/Paper_33/No.2(b)

(b) Complete the diagram to show the electron arrangement in a chlorine atom.



[2]

27. Nov/2022/Paper_41/No.2(a_ b)

Potassium is a Group I element.

(a) Name and describe the bonding in potassium.

name .....

description .....

.....

.....

.....

[4]

(b) Potassium combines with sulfur to form an ionic compound, potassium sulfide, K_2S.

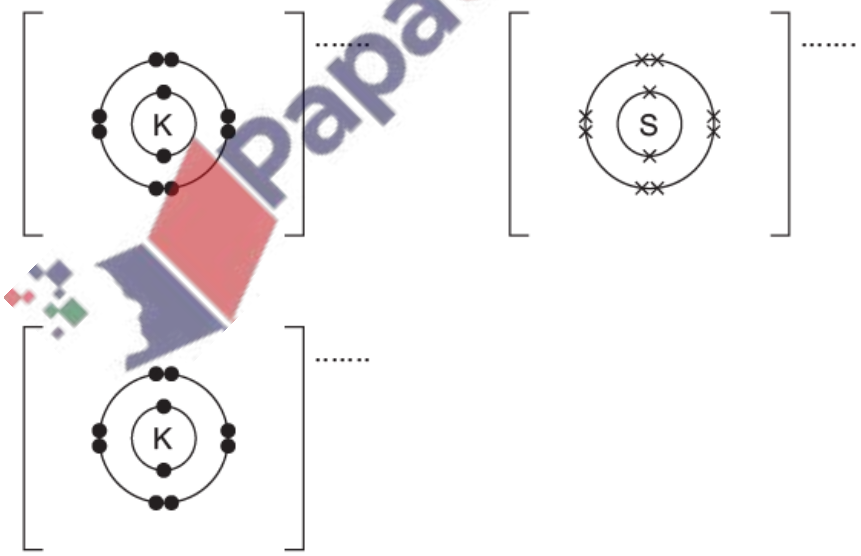
(i) Give **two** physical properties of ionic compounds.

1 .....

2 .....

[2]

(ii) Complete the dot-and-cross diagram to show the electron arrangement and charges of the ions in potassium sulfide.



[3]

28. Nov/2022/Paper_41/No.3

Ammonia is made in an industrial process starting with nitrogen. The equation for the reaction is shown.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

(a) Name the industrial process used to make ammonia.

..... [1]

(b) State the raw material from which nitrogen is obtained.

..... [1]

(c) State what is meant by the symbol $\rightleftharpoons$.

..... [1]

(d) State the temperature and pressure used in this industrial process.

temperature = ... °C

pressure = ... atm

[2]

(e) Name the catalyst used in this industrial process.

..... [1]

(f) The forward reaction is exothermic.

State the effect, if any, on the position of the equilibrium when the following changes are made. Explain your answers.

temperature is reduced

.....

.....

pressure is reduced

.....

.....

[4]

(g) Explain, in terms of particles, what happens to the rate of reaction when the temperature is reduced.

.....

.....

.....

.....

..... [3]

(h) Give the formula of the compound formed when sulfuric acid reacts with ammonia.

..... [1]

[Total: 14]

29. Nov/2022/Paper_42/No.1

Diamond and graphite are different solid forms of carbon. The carbon atoms in diamond and graphite are arranged in different ways.

(a) State the number of covalent bonds each carbon atom has in diamond.

..... [1]

(b) State the term used to describe the structure of diamond.

..... [1]

(c) Name an oxide that has a similar structure to diamond.

..... [1]

(d) Describe the arrangement of atoms in graphite.

.....

..... [2]

(e) Explain how graphite conducts electricity.

..... [1]

(f) Buckminsterfullerene is a simple molecular form of carbon.

The relative molecular mass of Buckminsterfullerene is 720.

Determine the number of carbon atoms in one molecule of Buckminsterfullerene.

..... [1]

(g) All forms of carbon burn to produce carbon dioxide.

Name the substance used to test for carbon dioxide.

..... [1]

[Total: 8]

30. Nov/2022/Paper_43/No.1

Atoms and ions are made from small particles called electrons, neutrons and protons.

(a) Complete the table.

particle	relative charge	relative mass
electron	–1	$\frac{1}{1840}$
neutron		
proton		

[2]

(b) Information about atoms and ions, **A**, **B** and **C**, is shown in the table.

Complete the table.

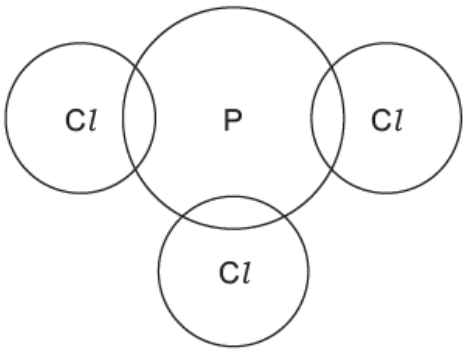
atom or ion	number of electrons	number of neutrons	number of protons	symbol
A	18		20	$^{42}_{20}Ca^{2+}$
B		18		$^{35}_{17}Cl$
C	18	16	16	

[6]

[Total: 8]

31. Nov/2022/Paper_43/No.4(b)

(b) Complete the dot-and-cross diagram to show the electron arrangement in a molecule of phosphorus(III) chloride, PCl_3. Show outer shell electrons only.



[2]