Atoms, elements and compounds – 2021 O Level

1. Nov/2021/Paper_11/No.8

Which statement about atoms and ions is correct?

A Atoms and ions of the same element must have different numbers of neutrons.

B Isotopes of different elements must have different numbers of neutrons.

C The charge on a positive ion = (nucleon number – number of neutrons – number of electrons).

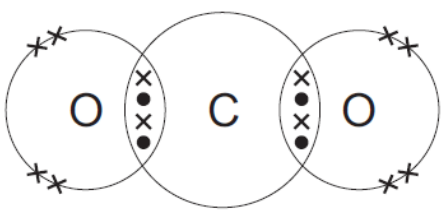
D The number of protons and number of neutrons in an atom must be the same.

2. Nov/2021/Paper_11/No.9

The bonding in a molecule of carbon dioxide can be represented by a dot-and-cross diagram.

Which diagram is correct?

A



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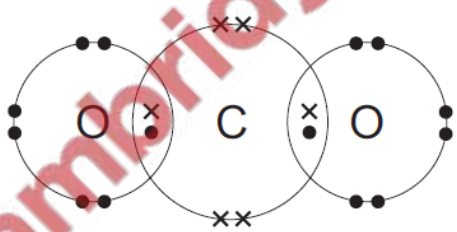

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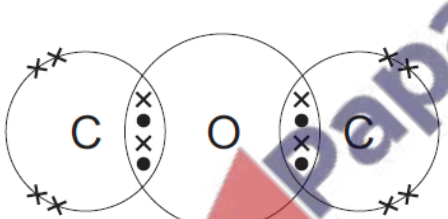

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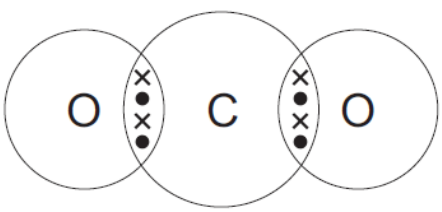

3. Nov/2021/Paper_11/No.10

Which statement about the structure or bonding of metals is correct?

A A metal lattice consists of negative ions in a 'sea of electrons'.

B Electrons in a metal move randomly through the lattice.

C Metals are malleable because the ions present are mobile.

D The ions in a metal move when positive and negative electrodes are attached.

4. Nov/2021/Paper_12/No.5

When aqueous sodium hydroxide is added to aqueous compound X, a red-brown precipitate is formed. When dilute nitric acid followed by aqueous barium nitrate is added to aqueous compound X, a white precipitate is formed.

What is X?

A chromium(III) sulfate

B chromium(III) chloride

C iron(III) chloride

D iron(III) sulfate

5. Nov/2021/Paper_12/No.8

The table shows data for some particles.

particle	proton number	nucleon number	number of protons	number of neutrons	number of electrons
sodium ion	11	23	11	W	10
fluoride ion	9	19	9	10	X
magnesium ion	12	24	Y	12	10

What are the values of W, X and Y?

	W	X	Y
A	10	10	12
B	11	12	10
C	12	10	12
D	12	10	10

6. Nov/2021/Paper_12/No.10

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7. Nov/2021/Paper_21/No.1

Choose from the following oxides to answer the questions.

aluminium oxide
calcium oxide
iron(II) oxide
magnesium oxide
silicon dioxide
sodium oxide
sulfur dioxide

Each oxide may be used once, more than once or not at all.

State which oxide:

(a) has a simple molecular structure

..... [1]

(b) is a coloured solid

..... [1]

(c) contains ions with a 3+ charge

..... [1]

(d) is a product of the thermal decomposition of calcium carbonate

..... [1]

(e) contributes to acid rain.

..... [1]

[Total: 5]

8. Nov/2021/Paper_22/No.1

Choose from the following chlorides to answer the questions.

aluminium chloride
ammonium chloride
cobalt(II) chloride
hydrogen chloride
iron(III) chloride
potassium chloride
silver chloride
sodium chloride

Each chloride may be used once, more than once or not at all.

State which chloride:

(a) contains a cation with a charge of 2+

..... [1]

(b) reacts with aqueous sodium hydroxide to form a red-brown precipitate

..... [1]

(c) is insoluble in water

..... [1]

(d) reacts with sodium hydroxide when warmed to produce a gas which turns damp red litmus paper blue

..... [1]

(e) when added to water can form an aqueous solution with a pH of 1.

..... [1]

[Total: 5]

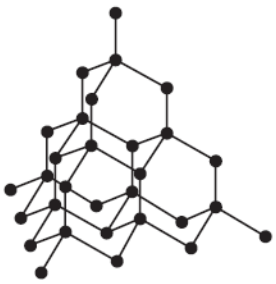
9. Jun/2021/Paper_11/No.6

Which particle contains most electrons?

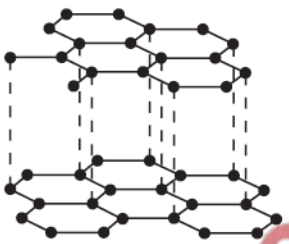
A O^{3-} **B** Ne **C** Na^{-} **D** Mg^{3+}

10. Jun/2021/Paper_11/No.7

The diagrams show the structures of two solids, P and Q.



P



Q

Which row is correct?

	has covalent bonding	conducts electricity
A	P only	P only
B	P only	Q only
C	both P and Q	P only
D	both P and Q	Q only

11. Jun/2021/Paper_11/No.8

What is a covalent bond?

A a pair of electrons shared by two non-metallic atoms

B electrons being shared by a lattice of positively charged ions

C elements losing electrons to achieve a noble gas structure

D oppositely charged particles strongly attracting each other

12. Jun/2021/Paper_11/No.12

How many elements combine to form the compound ammonium sulfate?

A 2 **B** 4 **C** 10 **D** 15

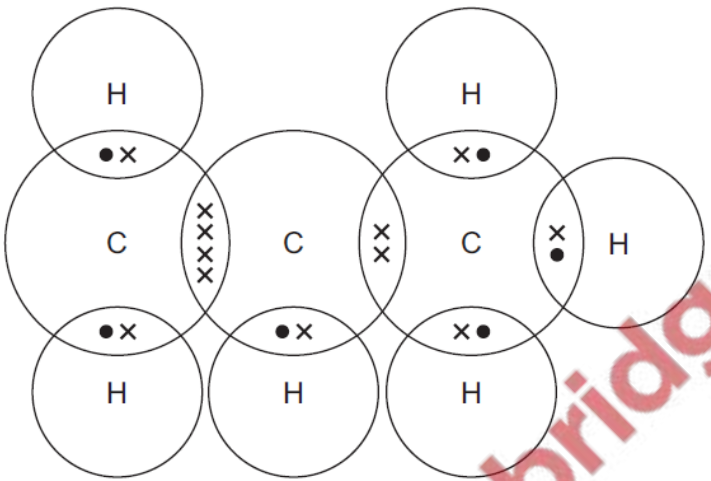
13. Jun/2021/Paper_11/No.35

How many moles of hydrogen chloride are formed when one mole of methane reacts with a large excess of chlorine in sunlight?

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

14. Jun/2021/Paper_11/No.36

Compound X is shown in the dot-and-cross diagram.



Which statement about compound X is correct?

A It is a saturated hydrocarbon.

B It is an isomer of butene.

C It will decolourise bromine water.

D Its name is propane.

15. Jun/2021/Paper_12/No.3

Which separation method would give pure samples of **both** substances from the mixture?

	mixture	separation method
A	copper sulfate crystals and water	crystallisation
B	ethanol and water	evaporation
C	salt and sand	filtration
D	nitrogen and oxygen	fractional distillation

16. Jun/2021/Paper_12/No.8

The table shows data for particles W, X, Y and Z.

particle	proton number	nucleon number	number of electrons
W	6	12	6
X	6	14	6
Y	7	14	7
Z	8	16	10

Which statements are correct?

1 W and X are isotopes of the same element.

2 Y is in Group V of the Periodic Table.

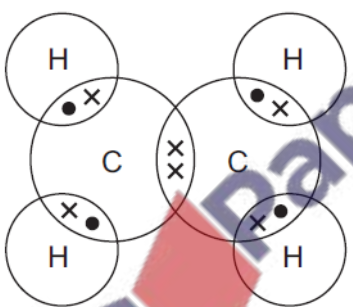
3 Z is a cation.

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

17. Jun/2021/Paper_12/No.9

Which dot-and-cross diagram correctly shows a molecule of ethene?

A



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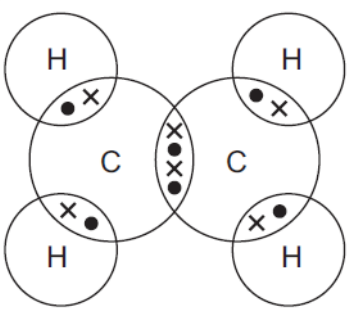

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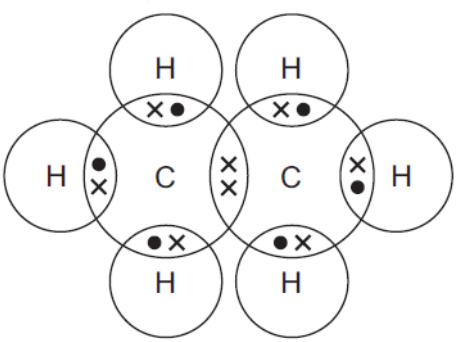

D