Atoms, elements and compounds – 2022J O Level 5070

1. June/2022/Paper_11/No.6

Two particles have the symbols $^{54}_{26}Fe^{2+}$ and $^{59}_{27}Co^{3+}$.

Which statement about these particles is correct?

A They contain the same number of electrons.

B They contain the same number of neutrons.

C They contain the same number of protons.

D They do not contain the same number of protons, neutrons or electrons.

2. June/2022/Paper_11/No.7

Two isotopes of chlorine are ^{35}Cl and ^{37}Cl.

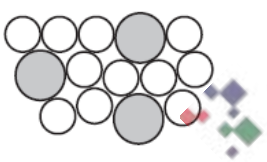
Using these isotopes and ^{12}C and ^{1}H, how many different relative molecular masses are possible for the compound with molecular formula $C_2H_3Cl_3$?

A 2 **B** 3 **C** 4 **D** 5

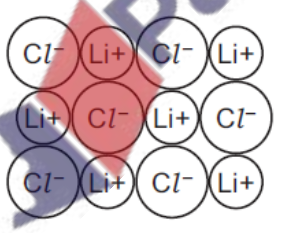
3. June/2022/Paper_11/No.8

Which statement about the substances, at room temperature and pressure, is correct?

W



X



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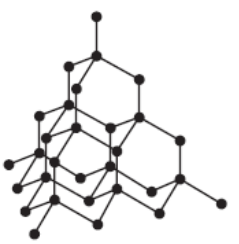
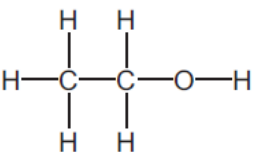


Z



A W and X conduct electricity.

B W and Y are elements.

C X and Z dissolve in water.

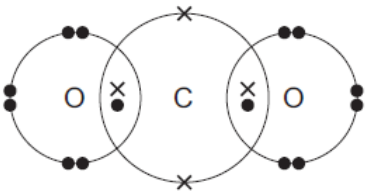
D Y and Z have low melting points.

4. June/2022/Paper_11/No.10

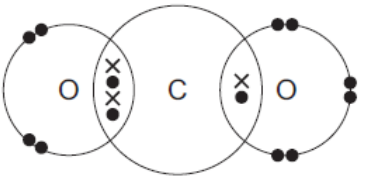
Which dot-and-cross diagram represents carbon dioxide?

Only outer shell electrons are shown.

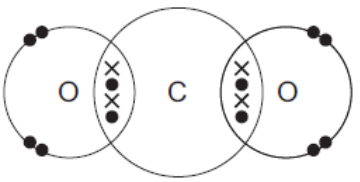
A



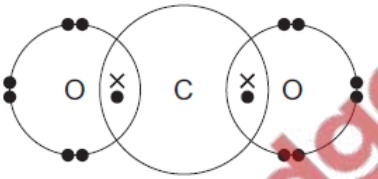
B



C



D



5. June/2022/Paper_11/No.12

How many different elements are present in ammonium nitrate?

A 2 **B** 3 **C** 4 **D** 5

6. June/2022/Paper_12/No.6

Element X can be represented by the symbol $^{14}_{6}X$.

Which statements about an atom of element X are correct?

1 It has 6 electrons.

2 It has 8 protons.

3 It is an isotope of carbon.

4 It is an isotope of nitrogen.

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

7. June/2022/Paper_12/No.7

Two isotopes of chlorine are ^{35}Cl and ^{37}Cl.

Using these isotopes and ^{12}C and ^{1}H, how many different relative molecular masses are possible for the compound with molecular formula $C_2H_3Cl_3$?

A 2 **B** 3 **C** 4 **D** 5

8. June/2022/Paper_12/No.8

Which row is correct?

	elements	compounds	mixtures
A	graphite, iron	methane, water	air, copper
B	graphite, iron	sand, water	air, brass
C	iron, water	methane, graphite	air, brass
D	water, methane	air, graphite	iron, brass

9. June/2022/Paper_12/No.9

Which statement about ionic compounds is correct?

A They are all solids at room temperature.

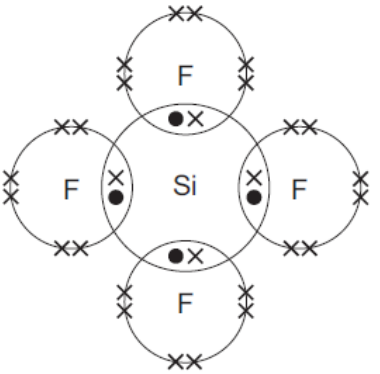
B They all conduct electricity at room temperature.

C They are all soluble in water.

D They all have strong intermolecular forces.

10. June/2022/Paper_12/No.10

A molecule of tetrafluorosilane, SiF_4, is shown in the dot-and-cross diagram. Only the outer shell electrons are shown.



Which statement is correct?

A Each molecule of SiF_4 has exactly 16 pairs of electrons.

B In SiF_4 both the silicon and the fluorine have the same electronic configuration as neon.

C Molten SiF_4 will conduct electricity.

D SiF_4 has a low melting point.

11. June/2022/Paper_21/No.2

The table shows some information about elements in Group V.

element	electronic configuration	melting point /°C	boiling point /°C
nitrogen	2, 5	–210	–196
phosphorus		44	280
arsenic	2, 8, 18, 5	817	613
antimony	2, 8, 18, 18, 5	630	1380
bismuth	2, 8, 18, 32, 18, 5		

(a) State the electronic configuration for phosphorus.

..... [1]

(b) Explain why it is easier to predict the boiling point of bismuth than to predict its melting point.

.....

.....

..... [1]

(c) Use information from the table to explain why antimony is a liquid at 1000 °C.

.....

.....

..... [1]

(d) Nitrogen exists as a diatomic molecule, N_2.

(i) Draw the dot-and-cross diagram to show the bonding in N_2.

Show only the outer shell electrons.

[1]

(ii) Explain, in terms of structure and bonding, why nitrogen has a low melting point.

.....

..... [1]

(e) Bismuth is a metal.

Predict **two** physical properties of bismuth.

1 .....

2 .....

[2]

(f) Calculate the volume, in dm^3, of 19.2 g of nitrogen at room temperature and pressure.

Give your answer to **two** significant figures.

volume ..... dm^3 [3]

[Total: 10]

12. June/2022/Paper_21/No.4

The table shows information about some particles.

particle	proton number	nucleon number
$^{35}_{17}Cl$	17	35
$^{35}_{17}Cl^-$	17	35
$^{39}_{19}K$	19	39
$^{39}_{19}K^+$	19	39

(a) State the number of neutrons in $^{35}_{17}Cl$.

.....

[1]

(b) State the number of electrons in $^{35}_{17}Cl^-$.

.....

[1]

(c) $^{39}_{19}K$ is the full symbol for one isotope of potassium.

Suggest the full symbol for one **other** isotope of potassium.

..... [1]

(d) Describe how a potassium ion, K^+, is formed from a potassium atom, K.

.....

..... [1]

(e) Potassium chloride is an ionic compound.

Potassium chloride has a high melting point and a high boiling point.

(i) Explain why potassium chloride has a high melting point.

.....

.....

..... [2]

(ii) Predict two **other** physical properties of potassium chloride.

1 .....

2 .....

[2]

[Total: 8]

13. June/2022/Paper_22/No.2(d)

(d) Oxygen exists as a diatomic molecule, O_2.

(i) Draw the dot-and-cross diagram for a molecule of oxygen.

Show only the outer shell electrons.

[1]

(ii) Explain, in terms of structure and bonding, why oxygen has a low melting point.

.....

..... [1]

14. June/2022/Paper_22/No.4

The table shows information about some particles.

particle	number of		
	protons	neutrons	electrons
$^{79}_{35}Br$	35	44	35
$^{79}_{35}Br^-$	35	44	
$^{40}_{20}Ca$	20	20	20
$^{40}_{20}Ca^{2+}$	20	20	18

(a) State the nucleon number for $^{79}_{35}Br$.

.....

[1]

(b) State the number of electrons in $^{79}_{35}Br^-$.

.....

[1]

(c) $^{40}_{20}Ca$ is the full symbol for one isotope of calcium.

Write the full symbol for one **other** isotope of calcium.

..... [1]

(d) Describe how a calcium ion, Ca^{2+}, is formed from a calcium atom, Ca.

.....

..... [1]

(e) Calcium bromide is an ionic compound.

Calcium bromide conducts electricity when molten but not when solid.

(i) Explain why calcium bromide conducts electricity when molten but **not** when solid.

.....

.....

..... [2]

(ii) Predict two **other** physical properties of calcium bromide.

1. .....

2. .....

[2]

[Total: 8]