

**1. June/2022/Paper\_11/No.12**

In the treatment of domestic water supplies, chlorine is added to water to kill bacteria. Some  $\text{ClO}^-$  ions are formed.

What is the change in oxidation number of chlorine when forming the  $\text{ClO}^-$  ion from aqueous chlorine?

- A** -1                      **B** 0                      **C** +1                      **D** +2

**2. June/2022/Paper\_11/No.22**

The results of tests performed on a white crystalline solid, X, are given in the table.

reagent and conditions	observation
X is gently heated	X sublimes
X is shaken with $\text{H}_2\text{O}$	a colourless solution, Y, forms
Y is warmed with $\text{NaOH}(\text{aq})$	a gas is given off
$\text{AgNO}_3(\text{aq})$ is added to Y	a white precipitate, Z, forms
Z is shaken with $\text{NH}_3(\text{aq})$	a colourless solution forms

What is the identity of X?

- A** aluminium bromide  
**B** aluminium chloride  
**C** ammonium bromide  
**D** ammonium chloride

**3. June/2022/Paper\_11/No.23**

Silicon is heated in an excess of chlorine, producing compound J.

An excess of water is added to the sample of J produced.

Which row is correct?

	structure of J	Is $\text{HCl}$ produced when water is added to J?
<b>A</b>	giant molecular	no
<b>B</b>	giant molecular	yes
<b>C</b>	simple molecular	no
<b>D</b>	simple molecular	yes

4. June/2022/Paper\_12/No.22

X, Y and Z are three elements in Group 17.

$X_2$  has weaker covalent bonds than  $Y_2$ .

$X_2$  has stronger instantaneous dipole–induced dipole forces between its molecules than  $Z_2$ .

$Y_2$  is a stronger oxidising agent than  $Z_2$ .

What could be X, Y and Z?

	X	Y	Z
A	Br	Cl	I
B	Cl	Br	I
C	I	Br	Cl
D	I	Cl	Br

5. June/2022/Paper\_12/No.23

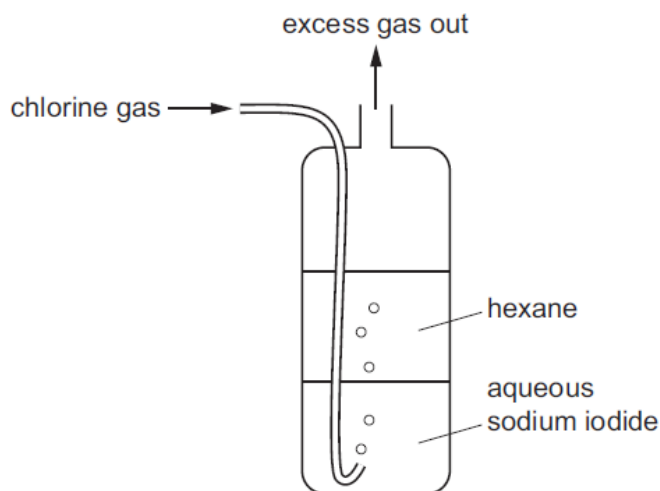
Chlorine reacts with aqueous sodium hydroxide forming two chlorine-containing products.

Which row shows the oxidation states of chlorine in the products under the conditions stated?

	conditions	oxidation state of Cl in products
A	cold NaOH(aq)	-1 and +3
B	cold NaOH(aq)	-1 and +5
C	hot NaOH(aq)	-1 and +3
D	hot NaOH(aq)	-1 and +5

6. June/2022/Paper\_13/No.22

Chlorine is bubbled through a cylinder containing aqueous sodium iodide and an immiscible layer of hexane.



As the bubbles pass through the cylinder, what is observed in the lower and upper layers?

	lower aqueous layer	upper hexane layer
<b>A</b>	colourless solution becomes brown	colourless liquid becomes coloured
<b>B</b>	colourless solution becomes brown	colourless liquid is unchanged
<b>C</b>	brown solution becomes colourless	colourless liquid becomes coloured
<b>D</b>	brown solution becomes colourless	colourless liquid is unchanged

7. June/2022/Paper\_13/No.23

Chlorine and bromine have different volatilities.

Which row identifies the more volatile of the two elements, and gives the correct explanation?

	identity of the more volatile element	explanation for the difference in volatility
<b>A</b>	bromine	intermolecular forces are greater in bromine than they are in chlorine
<b>B</b>	bromine	intermolecular forces are greater in chlorine than they are in bromine
<b>C</b>	chlorine	intermolecular forces are greater in bromine than they are in chlorine
<b>D</b>	chlorine	intermolecular forces are greater in chlorine than they are in bromine

8. June/2022/Paper\_22/No.2(d)

(d) A sample of aqueous calcium halide,  $\text{CaX}_2(\text{aq})$ , contains either chloride, bromide or iodide ions.

Complete Table 2.1 to describe a two-step process that could be used to identify the halide ion present.

Table 2.1

step	method	observation with $\text{CaCl}_2$	observation with $\text{CaBr}_2$	observation with $\text{CaI}_2$
step 1				
step 2				

[3]

9. June/2022/Paper\_23/No.2(b)

(b) Tennessine, Ts, is an unstable man-made element. It is found below astatine, At, in Group 17. The chemical properties of Ts and its compounds have only been predicted.

(i) Suggest an equation for the reaction of  $\text{NaTs}$  and  $\text{Br}_2$ . Assume that Ts follows the same trends as the other elements in Group 17. Explain your answer.

equation .....

explanation .....

.....

[2]

(ii) Some scientists predict that Ts has properties typical of metals like copper.

Complete Table 2.2 with:

- the predicted melting point of tennessine
- the lattice structure of solid chlorine, bromine and tennessine.

Assume that Ts has properties typical of metals like copper.

**Table 2.2**

element	chlorine	bromine	tennessine
melting point/ $^{\circ}\text{C}$	-101	-7.2	
lattice structure of crystalline solid			

[2]

