

Group Properties

Question Paper

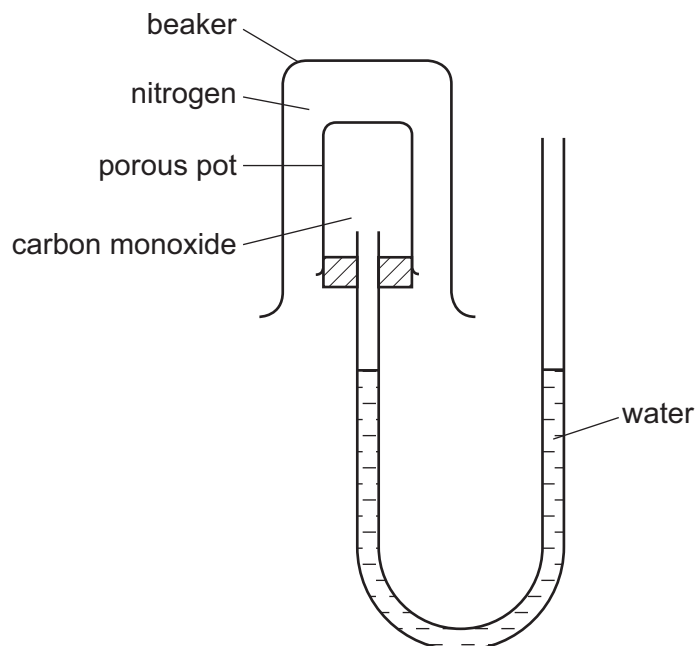
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|------------|--------------------------------------|
| Level | O Level |
| Subject | Chemistry |
| Exam Board | Cambridge International Examinations |
| Topic | The Periodic Table |
| Sub-Topic | Group Properties |
| Booklet | Question Paper |

Time Allowed: 32 minutes

Score: /27

Percentage: /100

- 1 Gases can diffuse through porous pots. The diagram shows a beaker full of nitrogen inverted over a porous pot containing carbon monoxide.



The water level does not move.

Which statement explains this?

- A Nitrogen is almost inert.
 - B The two gases have equal molecular masses.
 - C Both gases have two atoms in a molecule.
 - D Neither gas is soluble in water.
- 2 Which element is sodium?

| | melting point in °C | electrical conduction | density in g/cm ³ |
|----------|---------------------|-----------------------|------------------------------|
| A | 1535 | good | 7.86 |
| B | 1083 | good | 8.92 |
| C | 113 | poor | 2.07 |
| D | 98 | good | 0.97 |

- 3 A non-metal element forms oxides of the type XO_2 and XO_3 .
What is X?
- A aluminium
 - B carbon
 - C hydrogen
 - D sulfur
- 4 Which property would all the hydrogen compounds of the Group VII elements possess?
- A be covalent
 - B be solids at room temperature
 - C form alkaline aqueous solutions
 - D conduct electricity when molten
- 5 What suggests that metal *M* is **not** in Group I of the Periodic Table?
- A *M* has a bright, silvery appearance and is a good conductor of electricity.
 - B *M* is hard and difficult to cut.
 - C *M* produces an alkaline solution when it reacts with water.
 - D *M* produces hydrogen gas when it reacts with water.
- 6 Which statement explains why the chemical properties of sodium and potassium are similar?
- A They are in the same group of the Periodic Table.
 - B They are in the same period of the Periodic Table.
 - C They are soft and can be cut with a knife.
 - D They have similar melting points.

7 A gas **G**

- 1 has no smell,
- 2 is not poisonous,
- 3 reacts with hydrogen at high temperature and pressure.

What is gas **G**?

- A** carbon monoxide
- B** helium
- C** nitrogen
- D** chlorine

8 Which change in the properties of the halogens is **not** correct?

| | chlorine → bromine → iodine |
|----------|-------------------------------|
| A | darker in colour |
| B | decrease in melting point |
| C | decrease in rate of diffusion |
| D | increase in density |

9 A metal **X** forms oxides with the formulae XO and X_2O_3 .

Where is **X** in the Periodic Table?

- A** in Group II
- B** in Group III
- C** the second Period
- D** in the transition elements

10 Which pair of metals are not oxidised when added to water?

1. calcium 2. copper 3. potassium 4. silver

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

11 Which element in the table is an alkali metal?

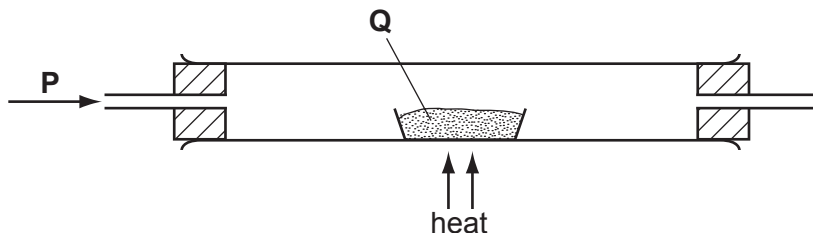
| | melting point °C | density g/cm ³ |
|----------|---------------------|------------------------------|
| A | -39 | 13.60 |
| B | -7 | 3.10 |
| C | 98 | 0.97 |
| D | 1083 | 8.92 |

12 Carbon and silicon are both in Group IV of the Periodic Table

Which statement is correct for both carbon dioxide and silicon dioxide?

- A** They are acidic oxides.
B They are readily soluble in water.
C They contain ionic bonds.
D They have giant molecular structures.

13 In the apparatus shown, gas **P** is passed over solid **Q**.



No reaction occurs if **P** and **Q** are

| | P | Q |
|----------|----------|-----------------|
| A | hydrogen | lead(II) oxide |
| B | hydrogen | magnesium oxide |
| C | oxygen | carbon |
| D | oxygen | sulfur |

14 A lump of element **X** can be cut by a knife.

During its reaction with water, **X** floats and melts.

What is **X**?

- A** calcium
- B** copper
- C** magnesium
- D** potassium

15 Which statement about the elements chlorine, bromine and iodine is correct?

- A** They are all gases at room temperature and pressure.
- B** They are in the same period of the Periodic Table.
- C** They become darker in colour from chlorine to bromine to iodine.
- D** They possess one electron in the outermost shell.

16 A hydride is a compound containing only two elements, one of which is hydrogen.

Which element forms the **most** hydrides?

- A carbon
- B chlorine
- C nitrogen
- D oxygen

17 Caesium, Cs, is an element in Group I of the Periodic Table.

Which statements about Caesium are true?

- 1 Caesium conducts electricity both when solid and when molten.
- 2 Caesium reacts explosively with water.
- 3 Caesium reacts with water and forms a solution of $\text{pH} < 7$.

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

18 The list shows some properties of metals.

- 1 Metals are good conductors of electricity.
- 2 Metals form ions by the loss of electrons.
- 3 Metals have high melting points.

Mercury is a metallic element.

Which of these statements do **not** apply to mercury?

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

19 X and Y are diatomic elements. X is less reactive than Y.

What are elements X and Y?

| | X | Y |
|----------|----------|----------|
| A | chlorine | iodine |
| B | fluorine | nitrogen |
| C | iodine | bromine |
| D | oxygen | nitrogen |

20 A metal X, in Group I of the Periodic Table, would be expected to

- A** form a nitrate of formula $X(\text{NO}_3)_2$.
- B** form an acidic oxide.
- C** form an insoluble chloride.
- D** produce hydrogen from cold water.

21 Rubidium, Rb, is an element in Group I of the Periodic Table.

Which statement about rubidium is correct?

- A** It reacts slowly with water.
- B** It forms an insoluble hydroxide.
- C** It is liberated at the cathode during the electrolysis of an aqueous solution of its chloride.
- D** It forms a sulphate, Rb_2SO_4 .

22 The positions of four elements are shown on the outline of part of the Periodic Table.

Element X has a high melting point and is a good conductor of electricity.

It forms chlorides $\text{XC}l_2$ and $\text{XC}l_3$.

Which element is X?

The diagram shows a simplified periodic table with the following structure:

- Period 1: 2 boxes.
- Period 2: 2 boxes on the left, 6 boxes on the right.
- Period 3: 2 boxes on the left, 6 boxes on the right.
- Period 4: 2 boxes on the left, 6 boxes on the right.
- Period 5: 2 boxes on the left, 6 boxes on the right.

Element positions are marked as follows:

- A**: Bottom-left box of Period 2.
- B**: Second box from the left of Period 2.
- C**: Seventh box from the left of Period 3.
- D**: Second box from the left of Period 4.
- X**: A single box located above the gap between the two groups of boxes in Period 2.

23 Which statement about all the noble gases is correct?

- A** The number of protons in the atoms equals the number of neutrons.
- B** Their atoms each have a stable arrangement of electrons.
- C** Their atoms each have eight electrons in their outer shell.
- D** They exist as molecules containing two atoms.

24 X and Y are diatomic elements. X is less reactive than Y.

What are elements X and Y?

| | X | Y |
|----------|-----------|-----------|
| A | bromine | iodine |
| B | iodine | bromine |
| C | potassium | sodium |
| D | sodium | potassium |

25 The results of three halogen displacement experiments are shown.

The table shows the results.

| experiment | halogen added | halide solution | | |
|------------|----------------|-----------------|--------------------------|--------------------------|
| | | X ⁻ | Y ⁻ | Z ⁻ |
| 1 | X ₂ | – | Y ₂ displaced | Z ₂ displaced |
| 2 | Y ₂ | no reaction | – | no reaction |
| 3 | Z ₂ | no reaction | Y ₂ displaced | – |

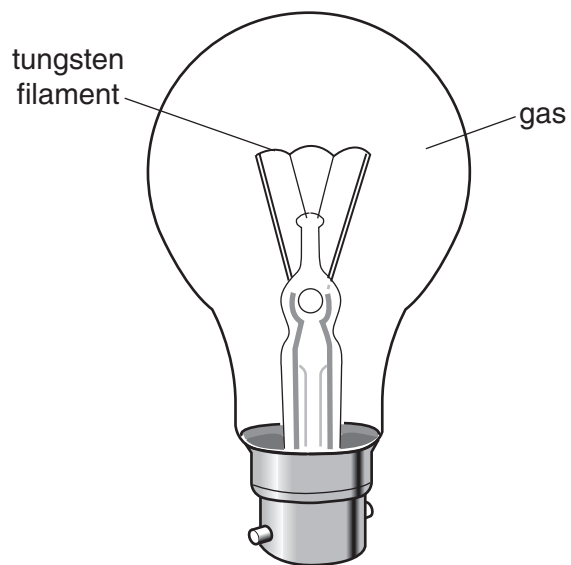
What are halogens X, Y and Z?

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

26 Which statement about the alkali metals is true?

- A** they form covalent bonds with Group VII elements
- B** they form oxides on reacting with water
- C** their melting points decrease on descending Group I
- D** their reactivities decrease on descending Group I

27 Which gas is present in the light bulb?



- A** argon
- B** krypton
- C** nitrogen
- D** oxygen