

Past-paper walk-through

Properties of metals ■ 9.1

eXercise

Questions in this set

- 0620/41 N25 Q2 ■ 17 marks
- 0620/43 N25 Q5 ■ 12 marks

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 2

0620/41 N25 ■ Q2 ■ 17 marks

2 Calcium is an element in Group II of the Periodic Table.

(a) Identify the element in Group II which has only five occupied electron shells.

Question 2

(b) Name and describe the type of bonding found in elements in Group II.

Question 2

Question 2

[4]

- (c) When a piece of calcium is added to some cold water containing universal indicator a reaction takes place.
- (i) Give **three** observations when this reaction takes place.

Question 2

Question 2

Question 2

[3]

(ii) Name the **two** products of this reaction.

Question 2

(d) Calcium burns in oxygen.

(i) State the colour of the flame.

Question 2

(ii) Write the symbol equation for this reaction.

Question 2

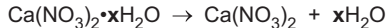
- (e) Crystals of hydrated calcium nitrate contain water molecules.

The formula of hydrated calcium nitrate is $\text{Ca}(\text{NO}_3)_2 \cdot x\text{H}_2\text{O}$.
 x is a whole number.

- (i) State the term given to the water molecules present in hydrated crystals.

Question 2

- (ii) When hydrated calcium nitrate is heated gently, the following reaction occurs.



A sample of hydrated calcium nitrate is heated gently. 3.28 g of $\text{Ca}(\text{NO}_3)_2$ forms and the mass of the crystals decreases by 1.44 g.

[M_r : $\text{Ca}(\text{NO}_3)_2$, 164; H_2O , 18]

Determine the value of x in $\text{Ca}(\text{NO}_3)_2 \cdot x\text{H}_2\text{O}$ using the following steps.

- Calculate the number of moles of $\text{Ca}(\text{NO}_3)_2$ that remain.

Question 2

Question 2

..... mol

- Calculate the number of moles of H_2O given off.

..... mol

- Determine the value of x .

Question 2

Question 2

Question 2

[3]

[Total: 17]

Solution 2

(a)

Mark scheme

- strontium / Sr
- 1

Solution 2

(b)

Mark scheme

- M1 metallic (M2)
- positive ions / cations (M3)
- sea of electrons / mobile electrons / delocalised electrons (M4)
- attraction between positive ions and electrons
- 4

Solution 2

(c)(i)

Mark scheme

- M1 effervescence (M2)
- solid dissolves (M3)
- solution turns blue
- 3

Solution 2

(c)(ii)

Mark scheme

- calcium hydroxide (1)
- hydrogen (1)
- 2

Solution 2

(d)(i)

Mark scheme

- orange-red
- 1

Solution 2

(d)(ii)

Mark scheme

- $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$ (M1)
- CaO as only product (M2)
- correct equation
- 2

Solution 2

(e)(i)

Mark scheme

- water(s) of crystallisation
- 1

Solution 2

(e)(ii)

Mark scheme

- M1 $3.28 \div 164 = 0.02(00)$ M2
- $1.44 \div 18 = 0.08(00)$ M3
- $= M2 \div M1 = 4/3$ 0620/41
- October/November 2025

Question 5

0620/43 N25 ■ Q5 ■ 12 marks

5 This question is about metallic compounds.

(a) Insoluble metal salts, such as lead(II) sulfate, are made by precipitation.

When aqueous lead(II) ions react with aqueous sulfate ions, a precipitate of lead(II) sulfate forms.

A sample of pure lead(II) sulfate can be obtained from the precipitate formed.

(i) Write an ionic equation for this precipitation reaction. Include state symbols.

Question 5

(ii) State the name of an aqueous solution containing lead(II) ions.

Question 5

- (iii) State the name of an aqueous solution containing sulfate ions.

Question 5

- (iv) The lead(II) sulfate precipitate is separated from the rest of the reaction mixture by filtration. The impure lead(II) sulfate remains on the filter paper.

State the general term given to an insoluble substance that remains on the filter paper during filtration.

Question 5

- (v) Describe how the lead(II) sulfate is purified after filtration.

Question 5

(b) Copper is a transition element.

A list of properties of copper is shown.

- It has good electrical conductivity.
- It has variable oxidation states.
- It forms soluble salts.
- It forms coloured compounds.
- It forms basic oxides.
- It acts as a catalyst.

(i) Give **two** properties from the list that show how copper is similar to metals in Group I of the Periodic Table.

Question 5

Question 5

[2]

- (ii) Give **two** properties from the list that show how copper is different from metals in Group I of the Periodic Table.

Question 5

Question 5

[2]

[Total: 12]

Solution 5

(a)(i)

Mark scheme

- $\text{Pb}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s})$ (M1)
- PbSO_4 as the ONLY formula on the right (M2)
- ONLY Pb^{2+} and SO_4^{2-} on the left (M3)
- state symbols
- 3

Solution 5

(a)(ii)

Mark scheme

- lead(II) nitrate
- 1

(a)(iii)

Mark scheme

- sodium sulfate / potassium sulfate / ammonium sulfate
- 1

Solution 5

(a)(iv)

Mark scheme

- residue
- 1

Solution 5

(a)(v)

Mark scheme

- M1 wash with distilled water **M2**
- suitable method of drying
- 2

Solution 5

(b)(i) Mark scheme

- any two from:
 - ■
 - good conductor of electricity
 - ■
 - soluble salts
 - ■
 - basic oxides
 - 2

Solution 5

(b)(ii) Mark scheme

- any two from:
 - ■
 - variable oxidation states
 - ■
 - coloured compounds
 - ■
 - catalyst
 - 2

Solution 5

- 0620/43
- October/November 2025