## 9.4 Transition elements

01. 0620_m21_qp_22 Q: 28

The properties of an element are listed.

Its melting point is 3414 °C.

Some of its compounds are catalysts.

It has variable oxidation states.

Where is the element found in the Periodic Table?

**A** alkali metals

**B** halogens

**C** noble gases

**D** transition elements

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02. 0620_s21_qp_21 Q: 23

Which elements in the table are transition elements?

| element | property |
|---|---|
| E | forms $E^{3+}$ ions only |
| F | forms $F^{+}$ and $F^{2+}$ ions |
| G | forms only white salts |
| H | used in catalytic converters |

**A** E and G **B** E and H **C** F and G **D** F and H



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03. 0620_s21_qp_22 Q: 24

When aqueous iodine is added to a solution of vanadium ions, $V^{2+}$, the $V^{2+}$ ions each lose one electron.

Which property of transition elements is shown by this reaction?

**A** Transition elements have variable oxidation states.

**B** Transition elements form a stable 1+ ion.

**C** Transition elements are oxidising agents.

**D** Transition elements can act as catalysts.

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04. 0620_s21_qp_23 Q: 21

Which property is shown by transition elements?

**A** low density

**B** low melting point

**C** variable oxidation state

**D** white compounds

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05. 0620_w21_qp_22 Q: 23

Which row describes properties of transition elements?

| | property 1 | property 2 | property 3 |
|---|---|---|---|
| **A** | coloured compounds | high density | variable oxidation states |
| **B** | high density | high melting point | one oxidation state |
| **C** | high melting point | coloured compounds | one oxidation state |
| **D** | low melting point | high density | variable oxidation states |



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06. 0620_w21_qp_23 Q: 23

Which property is shown by transition metals but **not** shown by Group I metals?

**A** good electrical conductivity

**B** good thermal conductivity

**C** loss of electrons to form positive ions

**D** variable oxidation states

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07. 0620_m20_qp_22 Q: 24

Some properties of substances are listed.

1 They conduct electricity.

2 They have low densities.

3 They have high melting points.

4 They are malleable.

Which properties are shown by transition metals?

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

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08. 0620_s20_qp_21 Q: 23

The properties of the element titanium, Ti, can be predicted from its position in the Periodic Table.

Which row identifies the properties of titanium?

| | can be used as a catalyst | conducts electricity when solid | has low density | forms coloured compounds |
|---|---|---|---|---|
| **A** | ✓ | ✓ | ✓ | ✗ |
| **B** | ✓ | ✓ | ✗ | ✓ |
| **C** | ✓ | ✗ | ✓ | ✓ |
| **D** | ✗ | ✓ | ✓ | ✓ |

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09. 0620_w20_qp_22 Q: 28

Transition elements can have variable oxidation states.

Which pair of compounds shows a transition element in two different oxidation states?

**A** $Cr_2O_3$ and $Cr_2(SO_4)_3$

**B** $Cu_2O$ and $CuCO_3$

**C** ZnS and $ZnSO_4$

**D** NiO and $Ni(NO_3)_2$



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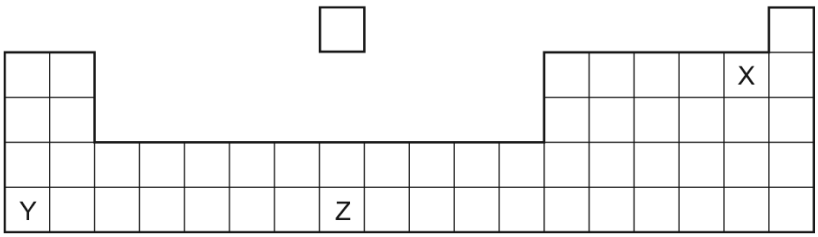
10. 0620_s19_qp_22 Q: 20

Part of the Periodic Table is shown.




Which row describes the properties of X, Y and Z?

| | good conductor of electricity | high melting point |
|---|---|---|
| **A** | X | Z |
| **B** | Y | Z and X |
| **C** | Y and Z | Z |
| **D** | Z and X | X |

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11. 0620_w19_qp_21 Q: 25

Which pair of compounds shows that transition elements have variable oxidation states?

**A** $Cr_2O_3$ and $CrBr_3$

**B** $CuSO_4$ and $CuCl_2$

**C** $Fe_2O_3$ and $FeCl_2$

**D** NiO and $NiCl_2$

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12. 0620_w19_qp_22 Q: 25

Iron(II) ions can be oxidised to iron(III) ions by hydrogen peroxide.

Which statement explains why iron is a transition element?

**A** Iron is a transition element because it can be oxidised.

**B** Iron is a transition element because it has variable oxidation states.

**C** Iron is a transition element because it takes part in redox reactions.

**D** Iron is a transition element because it reacts with chlorine.

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13. 0620_w19_qp_23 Q: 25

Iron reacts with dilute hydrochloric acid to form iron(II) chloride, $FeCl_2$. Iron reacts with chlorine to form iron(III) chloride, $FeCl_3$.

Which property of transition elements is shown by this information?

**A** Transition elements have high melting points.

**B** Transition elements can act as catalysts.

**C** Transition elements have variable oxidation states.

**D** Transition elements have coloured compounds.

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14. 0620_s18_qp_21 Q: 23

Which row shows the catalytic activity of transition elements and their compounds?

| | catalytic activity of transition elements | catalytic activity of compounds of transition elements |
|---|---|---|
| **A** | good | good |
| **B** | good | poor |
| **C** | poor | good |
| **D** | poor | poor |

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15. 0620_s18_qp_22 Q: 23

Which row describes the properties of a transition element?

| | property 1 | property 2 |
|---|---|---|
| **A** | forms colourless compounds | acts as a catalyst |
| **B** | forms colourless compounds | low electrical conductivity |
| **C** | high density | acts as a catalyst |
| **D** | high density | low electrical conductivity |

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16. 0620_s18_qp_23 Q: 23

Which row describes a typical transition element?

| | density in g/cm$^3$ | melting point in °C | boiling point in °C | colour of oxide |
|---|---|---|---|---|
| **A** | 0.97 | 98 | 883 | white |
| **B** | 2.64 | 769 | 1382 | white |
| **C** | 3.10 | –7 | 59 | yellow |
| **D** | 8.96 | 1085 | 2562 | red |

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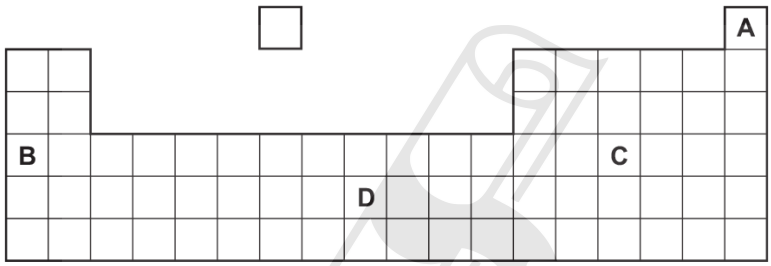
17. 0620_m17_qp_22 Q: 25

Part of the Periodic Table is shown.

Which element is used as a catalyst?

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18. 0620_w17_qp_21 Q: 23

Which row describes the properties of a typical transition element?

| | melting point | forms coloured compounds | can act as a catalyst |
|---|---|---|---|
| **A** | high | no | no |
| **B** | high | yes | yes |
| **C** | low | no | yes |
| **D** | low | yes | no |

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19. 0620_w17_qp_22 Q: 23

Which properties do the elements chromium, iron and vanadium have in common?

1 They all conduct electricity.

2 They, or their compounds, can act as catalysts.

3 They all form coloured compounds.

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

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20. 0620_w17_qp_23 Q: 23

The table gives some properties of an element.

| | |
|---|---|
| melting point in °C | 3422 |
| appearance of the element | grey |
| appearance of the chloride of the element | dark blue |
| density in g/cm$^3$ | 19.2 |
| electrical conductivity when solid | good |

Which other property would you expect this element to have?

**A** acts as a catalyst

**B** brittle

**C** forms an acidic oxide

**D** highly reactive with water

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21. 0620_s16_qp_21 Q: 23

Which of the following could be a transition element?

| | melting point in °C | density in g/cm$^3$ | colour | electrical conductor |
|---|---|---|---|---|
| **A** | 114 | 4.9 | purple | no |
| **B** | 659 | 2.7 | grey | yes |
| **C** | 1677 | 4.5 | grey | yes |
| **D** | 3727 | 2.3 | black | yes |

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22. 0620_s16_qp_22 Q: 23

The table gives information about four elements, P, Q, R and S.

| | melting point in °C | electrical conductivity of element when solid | density in g/cm$^3$ | colour of iodide of element |
|---|---|---|---|---|
| P | 98 | good | 0.97 | white |
| Q | –39 | good | 13.53 | red |
| R | 1410 | poor | 2.33 | colourless |
| S | 1535 | good | 7.87 | green |

Which elements could be transition elements?

**A** P, Q and S **B** Q and S only **C** R and S only **D** S only

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23. 0620_s16_qp_23 Q: 23

Osmium is a transition element.

Which row gives the expected properties of osmium?

| | melting point | density | compounds formed |
|---|---|---|---|
| **A** | high | high | coloured |
| **B** | high | high | white |
| **C** | high | low | white |
| **D** | low | high | coloured |



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24. 0620_w16_qp_21 Q: 24

Which statement about transition elements and their compounds is correct?

**A** All the transition elements have an oxidation state of +2 only.

**B** Aqueous solutions of the salts of transition elements are generally coloured.

**C** Transition elements change from metal to non-metal across the period.

**D** Transition elements can act as catalysts but their compounds cannot.

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| SN | Paper | Q. No. | Answer |
|---|---|---|---|
| 01 | 0620_m21_qp_22 | 28 | D |
| 02 | 0620_s21_qp_21 | 23 | D |
| 03 | 0620_s21_qp_22 | 24 | A |
| 04 | 0620_s21_qp_23 | 21 | C |
| 05 | 0620_w21_qp_22 | 23 | A |
| 06 | 0620_w21_qp_23 | 23 | D |
| 07 | 0620_m20_qp_22 | 24 | D |
| 08 | 0620_s20_qp_21 | 23 | B |
| 09 | 0620_w20_qp_22 | 28 | B |
| 10 | 0620_s19_qp_22 | 20 | C |
| 11 | 0620_w19_qp_21 | 25 | C |
| 12 | 0620_w19_qp_22 | 25 | B |
| 13 | 0620_w19_qp_23 | 25 | C |
| 14 | 0620_s18_qp_21 | 23 | A |
| 15 | 0620_s18_qp_22 | 23 | C |
| 16 | 0620_s18_qp_23 | 23 | D |
| 17 | 0620_m17_qp_22 | 25 | D |
| 18 | 0620_w17_qp_21 | 23 | B |
| 19 | 0620_w17_qp_22 | 23 | A |
| 20 | 0620_w17_qp_23 | 23 | A |
| 21 | 0620_s16_qp_21 | 23 | C |
| 22 | 0620_s16_qp_22 | 23 | D |
| 23 | 0620_s16_qp_23 | 23 | A |
| 24 | 0620_w16_qp_21 | 24 | B |