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Oxidation and Reduction

For each question, choose the most suitable option and write the letter (A, B, C or D) in the brackets provided.

Level 1

1. Sulfur dioxide is a reducing agent. Which of the following can be used to identify sulfur dioxide?

- A Acidified potassium iodide
- B Acidified potassium manganate(VII)
- C Dilute sodium hydroxide solution
- D Hydrogen peroxide

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Level 2

2. What are the oxidation states of hydrogen and oxygen in hydrogen peroxide, H_2O_2 ?

| | Oxidation State of Hydrogen | Oxidation State of Oxygen |
|---|-----------------------------|---------------------------|
| A | +1 | -1 |
| B | +1 | -2 |
| C | -1 | -1 |
| D | -1 | -2 |

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3. Which of the following is an example of a redox reaction?

- A $\text{AgNO}_3 + \text{KBr} \rightarrow \text{KNO}_3 + \text{AgBr}$
- B $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- C $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$
- D $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

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4. Determine the oxidation state of vanadium in $\text{K}_2\text{V}_2\text{O}_5$.

- A +1
- B +2
- C +4
- D +5

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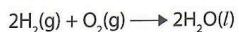
5. In which reaction are I^- ions acting as the **reducing agent**?

- A $\text{Ag}^+ + \text{I}^- \rightarrow \text{Agl}$
- B $\text{Cl}_2 + 2\text{I}^- \rightarrow \text{I}_2 + 2\text{Cl}^-$
- C $\text{I}_2 + 2\text{Na} \rightarrow 2\text{NaI}$
- D $2\text{I}^- + 2\text{H}^+ \rightarrow 2\text{HI}$

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Chemistry MCQs | O/NA Level

6. The formation of water from its elements can be represented by the following equation.



Which of the following is **true** of this redox reaction?

- A Hydrogen gains electrons to form water.
- B Oxygen loses electrons to form water.
- C The oxidation state of hydrogen increases from hydrogen gas to water.
- D The oxidation state of oxygen increases from oxygen gas to water.

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7. Which of the following reactions shows the greatest **decrease** in oxidation state of the underlined element?

- A $\text{Cl}_2 + \text{H}_2\text{O} \longrightarrow \text{HCl} + \text{HOCl}$
- B $2\text{MnO}_4^- + 8\text{H}^+ + 5\text{Fe}^{2+} \longrightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O} + 5\text{Fe}^{3+}$
- C $2\text{NaClO} \longrightarrow \text{NaClO}_2 + \text{NaCl}$
- D $\text{S} + \text{O}_2 \longrightarrow \text{SO}_2$

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8. Hydrogen peroxide is added to separate solutions of acidified potassium manganate(VII) and acidified potassium iodide.

Which of the following would be observed?

| | Acidified Potassium Manganate(VII) | Acidified Potassium Iodide |
|---|------------------------------------|----------------------------------|
| A | Colourless solution turns purple. | Colourless solution turns brown. |
| B | No change is observed. | Brown solution decolourises. |
| C | Purple solution decolourises. | Brown solution decolourises. |
| D | Purple solution decolourises. | Colourless solution turns brown. |

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9. When some iron filings are added into a solution of iron(III) chloride, the iron filings dissolved and the yellow solution turned green.

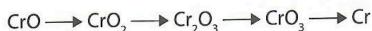
Which of the following are **true** of the reaction?

| | Equation | Oxidised Species | Reduced Species |
|---|---|------------------|------------------|
| A | $\text{Fe} + 2\text{Fe}^{3+} \longrightarrow 3\text{Fe}^{2+}$ | Fe^{2+} | Fe^{3+} |
| B | $\text{Fe} + 2\text{Cl}^- \longrightarrow \text{FeCl}_2$ | Cl^- | Fe |
| C | $\text{Fe} + 2\text{Fe}^{3+} \longrightarrow 3\text{Fe}^{2+}$ | Fe | Fe^{3+} |
| D | $\text{Fe} + \text{Cl}_2 \longrightarrow \text{FeCl}_2$ | Fe | Cl_2 |

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Level 3

10. Chromium compounds can undergo the several stages of changes in a reaction.



In how many stages was chromium **oxidised** and what is the greatest **increase** in the oxidation state of chromium?

| | Number of Stages Where Chromium was Oxidised | Greatest Increase in Oxidation State of Chromium |
|---|--|--|
| A | 1 | 2 |
| B | 2 | 3 |
| C | 2 | 6 |
| D | 3 | 2 |

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11. The following equation shows the decomposition of hydrogen peroxide.

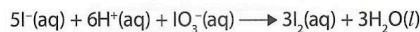


Which of the following statements about the reaction is **correct**?

- A Hydrogen is oxidised to form water.
- B Oxygen is only oxidised to form oxygen gas.
- C Oxygen is oxidised to form oxygen gas and reduced to form water.
- D The decomposition of hydrogen peroxide is not a redox reaction.

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12. Potassium iodide reacts with sodium iodate(V) according to the following ionic equation.



Which of the following statements are **true**?

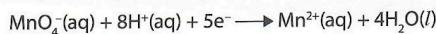
- 1 H^+ is reduced.
- 2 I^- is oxidised.
- 3 IO_3^- is the reducing agent.
- 4 The oxidation state of iodine decreases from +5 in IO_3^- to 0 in I_2 .
- 5 The pH of the solution increases after some time.

- A 1, 2 and 4 only
- B 1, 3 and 5 only
- C 2, 3 and 5 only
- D 2, 4 and 5 only

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13. Iron(II) sulfate can be oxidised by acidified potassium manganate(VII).

The half-equations involved in this reaction are as follows.



Which of the following statements is **incorrect** about the reaction?

- A The colour of acidified potassium manganate(VII) changes from colourless to purple.
- B The number of moles of electrons lost during oxidation is the same as the number of moles of electrons gained during reduction.
- C The final colour of the reaction mixture is yellow.
- D The overall ionic equation is
$$5\text{Fe}^{2+}(\text{aq}) + \text{MnO}_4^-(\text{aq}) + 8\text{H}^+(\text{aq}) \longrightarrow 5\text{Fe}^{3+}(\text{aq}) + \text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}(\text{l})$$

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14. When oxygen combines with Group 1 metals, oxides of different formulae can be formed.

Arrange the following oxides of rubidium in **ascending** order of the oxidation state of oxygen.

- A RbO_2 , Rb_2O , Rb_2O_2
- B RbO_2 , Rb_2O_2 , Rb_2O
- C Rb_2O , Rb_2O_2 , RbO_2
- D Rb_2O , RbO_2 , Rb_2O_2

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15. The following equations below represent the reactions between different Group 17 gases and their compounds.



Which of the following statements is **correct**?

- A Bromine is a stronger oxidising agent than chlorine.
- B Chlorine acts as a reducing agent when it forms $\text{KC}l$.
- C Chlorine is a stronger oxidising agent than bromine.
- D Potassium iodide cannot be oxidised by chlorine.

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