

Electrochemistry – 2016

1. 9701/11/O/N/16/3

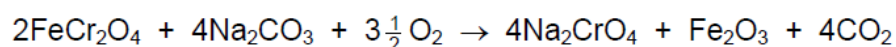
The reaction between acidified dichromate(VI) ions, $\text{Cr}_2\text{O}_7^{2-}$, and aqueous Fe^{2+} ions results in the dichromate(VI) ions being reduced to Cr^{3+} ions.

What is the correct equation for this reaction?

- A $\text{Cr}_2\text{O}_7^{2-} + \text{Fe}^{2+} + 14\text{H}^+ \rightarrow 2\text{Cr}^{3+} + \text{Fe}^{3+} + 7\text{H}_2\text{O}$
- B $\text{Cr}_2\text{O}_7^{2-} + 2\text{Fe}^{2+} + 14\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 2\text{Fe}^{3+} + 7\text{H}_2\text{O}$
- C $\text{Cr}_2\text{O}_7^{2-} + 3\text{Fe}^{2+} + 14\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 3\text{Fe}^{3+} + 7\text{H}_2\text{O}$
- D $\text{Cr}_2\text{O}_7^{2-} + 6\text{Fe}^{2+} + 14\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$

2. 9701/11/O/N/16/9

Sodium chromate(VI), Na_2CrO_4 , is manufactured by heating chromite, FeCr_2O_4 , with sodium carbonate in an oxidising atmosphere. Chromite contains $\text{Cr}_2\text{O}_4^{2-}$ ions.

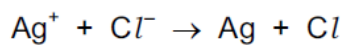


What happens in this reaction?

- A Chromium and iron are the only elements oxidised.
- B Chromium, iron and carbon are oxidised.
- C Only chromium is oxidised.
- D Only iron is oxidised.

3. 9701/12/O/N/16/31

Photochromic lenses in spectacles darken in sunlight because silver crystals are produced by the reaction shown.

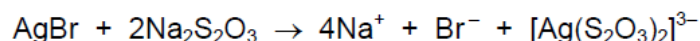


Which statements are correct for this reaction?

- 1 Both silver and chlorine atoms have an oxidation number of zero.
- 2 The oxidation number of chlorine increases.
- 3 Electrons are transferred from Cl^- ions to Ag^+ ions.

4. 9701/12/F/M/16/19

After black and white photographic film has been developed, unreacted silver bromide is removed by reaction with sodium thiosulfate.

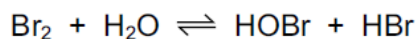


What is the function of the thiosulfate ion?

- A to make the silver ions soluble
- B to oxidise the silver ions
- C to reduce the bromine
- D to reduce the silver ions

5. 9701/11/M/J/16/33

Bromine reacts with water.

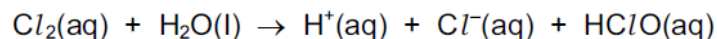


Which oxidation states of bromine are present in the equilibrium mixture?

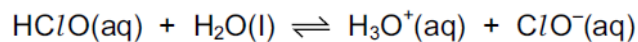
- 1 +3
- 2 0
- 3 -1

6. 9701/12/M/J/16/9

In the treatment of domestic water supplies, chlorine is added to the water to form HClO .



The HClO reacts further to give ClO^- ions.



Both HClO and ClO^- kill bacteria by oxidation.

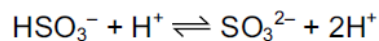
What is the change in oxidation number of chlorine when forming the ClO^- ion from aqueous chlorine?

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

7. 9701/13/M/J/16/10

Sulfur dioxide is used as a preservative in wine making.

The following equations describe the reactions that occur when sulfur dioxide dissolves in water.



Which statement about **these two reactions** is correct?

- A** HSO_3^- acts as a base.
B SO_2 acts as an oxidising agent.
C SO_3^{2-} acts as an acid.
D SO_3^{2-} acts as a reducing agent.

8. 9701/13/M/J/16/34

When KClO_3 is heated, the following reaction occurs.



Which statements are correct?

- 1 The oxidation state of Cl in KClO_3 is +5.
- 2 The oxidation state of some Cl atoms decreases by 6.
- 3 The reaction involves disproportionation.