



A2 5.3/B

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REDOX PREDICTIONS



Aim

The aim of this experiment is to predict whether some redox reactions will take place or not using electrode potentials, and then to test those predictions experimentally.

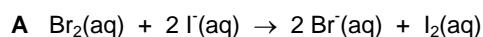
Safety

Br ₂	C ₆ H ₁₄ Zn	H ₂ SO ₄ Br ₂	KMnO ₄	KMnO ₄ C ₆ H ₁₄	KCl, KBr, KI FeCl ₃ CrCl ₃ K ₂ S ₂ O ₈ K ₃ [Fe(CN) ₆]

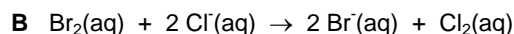
Standard electrode potentials		Eθ/V
2 S ₂ O ₈ ²⁻ (aq) + 2 e ⁻	→ SO ₄ ²⁻ (aq)	+ 2.01
MnO ₄ ⁻ (aq) + 8 H ⁺ (aq) + 5 e ⁻	→ Mn ²⁺ (aq) + 4 H ₂ O(l)	+ 1.51
Cl ₂ (g) + 2 e ⁻	→ 2 Cl ⁻ (aq)	+ 1.36
Cr ₂ O ₇ ²⁻ (aq) + 14 H ⁺ (aq) + 6 e ⁻	→ 2 Cr ³⁺ (aq) + 7 H ₂ O(l)	+ 1.33
Br ₂ (g) + 2 e ⁻	→ 2 Br ⁻ (aq)	+ 1.09
Fe ³⁺ (aq) + e ⁻	→ Fe ²⁺ (aq)	+ 0.77
I ₂ (g) + 2 e ⁻	→ 2 I ⁻ (aq)	+ 0.54
Cu ²⁺ (aq) + 2 e ⁻	→ Cu(s)	+ 0.34
Ca ²⁺ (aq) + 2 e ⁻	→ Ca(s)	- 2.87
K ⁺ (aq) + e ⁻	→ K(s)	- 2.93

Predictions

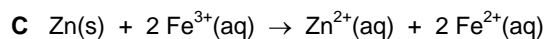
Use the electrode potentials to predict whether the following reactions are feasible. Briefly explain your reasoning in each case.



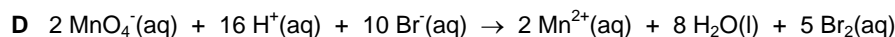
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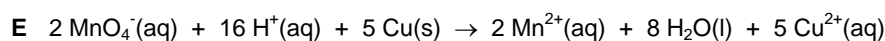
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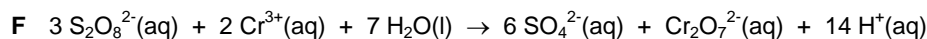
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Reaction A

- 1) Place about 3 cm³ of potassium iodide solution in a test tube and add a similar volume of bromine water slowly.
- 2) To test for iodine, add a little hexane, bung the tube and shake it.

Observations

Has the reaction happened? Was your prediction correct?

Reaction B

- 3) Place about 3 cm³ of potassium chloride solution in a test tube and add a similar volume of bromine water slowly. Bung the tube and shake it.

Observations

Has the reaction happened? Was your prediction correct?

Reaction C

- 4) Place about 3 cm³ of iron (III) chloride solution in a test tube and add a **small pinch** of zinc powder. Bung the tube and shake it.
- 5) To test for the presence of iron (II), add a few drops of potassium hexacyanoferrate (III) solution which gives a dark blue colour with iron (II).

Observations

Has the reaction happened? Was your prediction correct?

Reaction D

- 6) Place about 3 cm³ of potassium manganate (VII) solution in a test tube and add about 1 cm³ of dilute sulphuric acid.
- 7) Place about 3 cm³ of potassium bromide solution in another test tube and add the acidified potassium manganate (VII) dropwise.
- 8) To test for bromine, add a little hexane, bung the tube and shake it.

Observations

Has the reaction happened? Was your prediction correct?

Reaction E

- 9) Place about 3 cm³ of potassium manganate (VII) solution in a test tube and add about 1 cm³ of dilute sulphuric acid.
- 10) Mix the contents and add a **very** small amount of copper powder. Bung the tube and shake.

Observations

Has the reaction happened? Was your prediction correct?

Reaction F

- 11) Place about 3 cm³ of potassium peroxodisulphate (VI) solution in a test tube and add about 3 cm³ of chromium (III) chloride solution. Bung the tube and shake it.

Observations

Has the reaction happened? Was your prediction correct?