

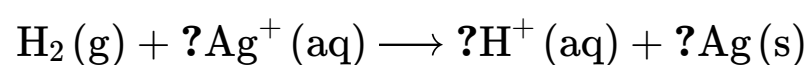


## Essential Pre-Uni Chemistry K3.1



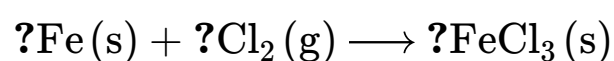
Balance the following redox equations:

### Part A (a)



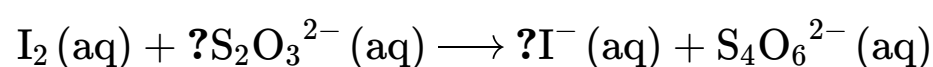
Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

### Part B (b)



Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

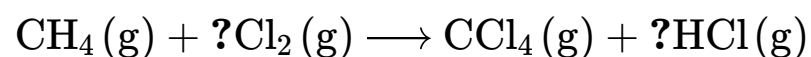
### Part C (c)



Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

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**Part D** (d)

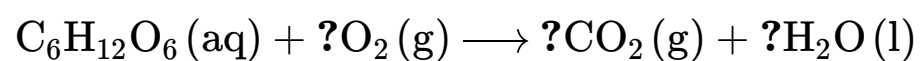


Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

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**Part E** (e)

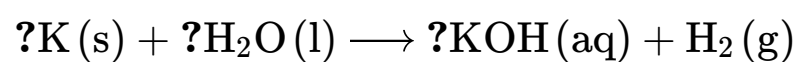


Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

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**Part F** (f)

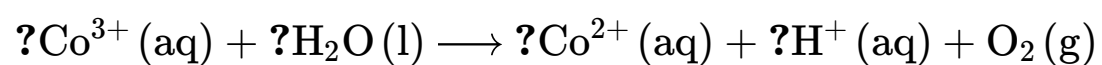


Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

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**Part G** (g)

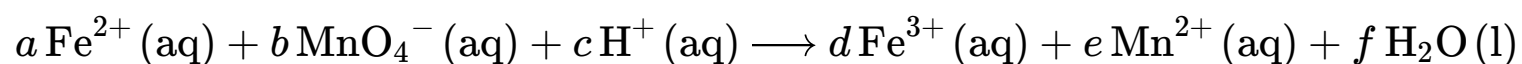


Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

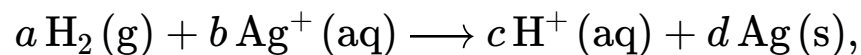
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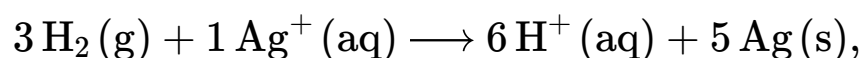
**Part H** (h)



This chemical equation is too long to fit on your screen, so please balance the equation and give your answer as a string of numbers in the order of *abcdef*. For example, if the question is



and you think the answer is

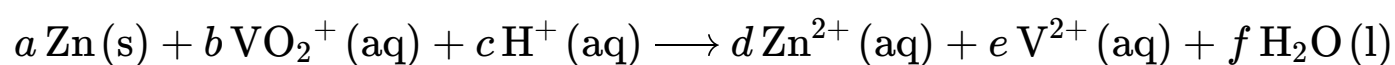


then input 3165.

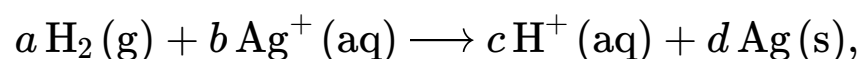
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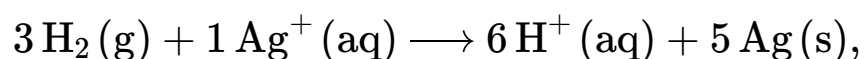
**Part I** (i)



This chemical equation is too long to fit on your screen, so please balance the equation and give your answer as a string of numbers in the order of *abcdef*. For example, if the question is



and you think the answer is

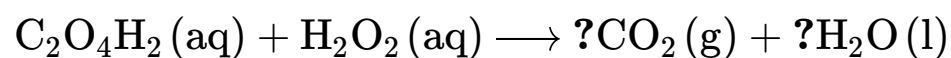


then input 3165.

---

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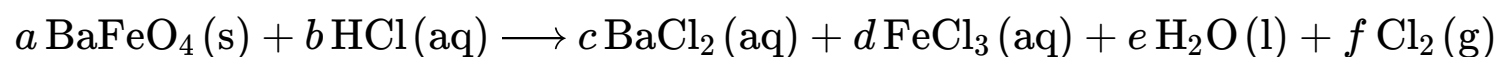
**Part J** (j)



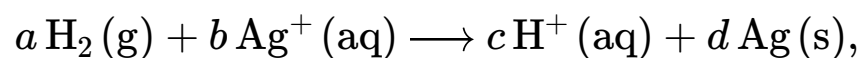
Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

---

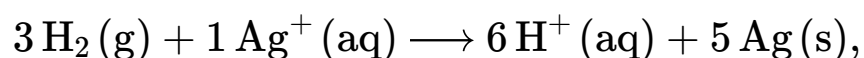
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**Part K** (k)

This chemical equation is too long to fit on your screen, so please balance the equation and give your answer as a string of numbers in the order of *abcdef*. For example, if the question is



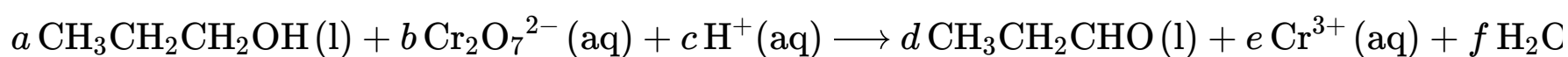
and you think the answer is



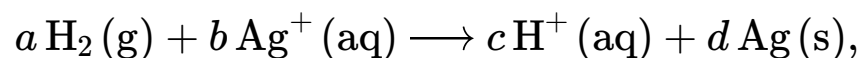
then input 3165.

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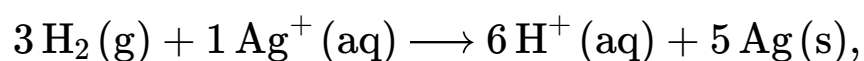
---

**Part L** (l)

This chemical equation is too long to fit on your screen, so please balance the equation and give your answer as a string of numbers in the order of *abcdef*. For example, if the question is



and you think the answer is



then input 3165.

---



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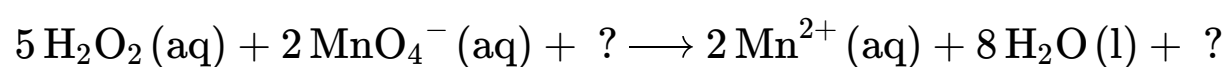
## Essential Pre-Uni Chemistry K3.2



Complete the balanced equations to show the reactions between the following pairs of substances in acidic aqueous conditions (no fractions).

### Part A    Manganate(VII) and hydrogen peroxide

Please **click on and drag** the pre-loaded species to create a balanced chemical equation.



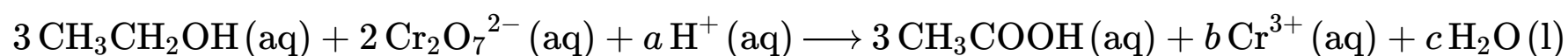
### Part B    Scandium and ethanoic acid

Please **click on and drag** the pre-loaded species to create a balanced chemical equation.

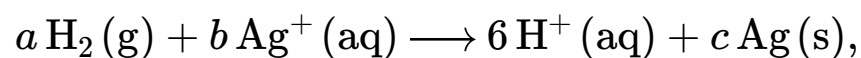


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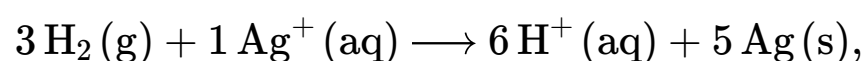
**Part C** Ethanol and boiling dichromate(VI)



This chemical equation is too long to fit on your screen, so please balance the equation and give your answer as a string of numbers in the order of  $abc$ . For example, if the question is



and you think the answer is



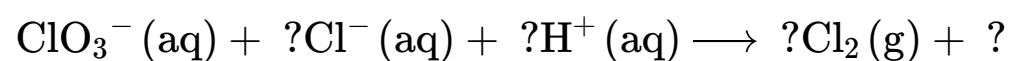
then input 315.

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---

**Part D** Chlorate(V) and chloride

Please **click on and drag** the pre-loaded species to create a balanced chemical equation.



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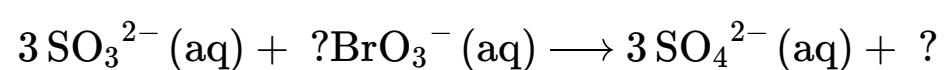
## Essential Pre-Uni Chemistry K3.3



Complete the balanced equations to show the reactions between the following pairs of substances in alkaline aqueous conditions (no fractions).

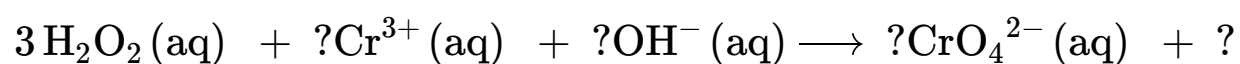
### Part A   Sulfite and bromate(V)

sulfite and bromate(V)



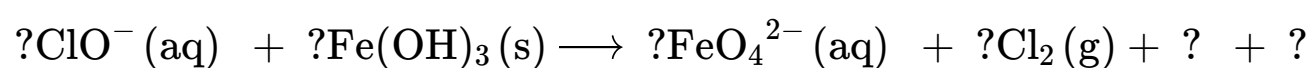
### Part B   Hydrogen peroxide and chromium(III)

hydrogen peroxide and chromium(III)



### Part C   Chlorate(I) and iron(III)

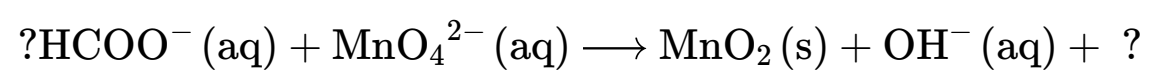
chlorate(I) and iron(III)



---

**Part D**    **Manganate(VI) and methanoate**

manganate(VI) and methanoate



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# Oxidation of Thiosulfate

A Level



An aqueous solution contains 1 mol of  $\text{S}_2\text{O}_3^{2-}$  ions and this reduces 4 mol of  $\text{Cl}_2$  molecules to  $\text{Cl}^-$  ions. What is the sulfur-containing product of this reaction?

- ☐  $\text{S}_4\text{O}_6^{2-}$
- ☐  $\text{SO}_4^{2-}$
- ☐  $\text{SO}_2$
- ☐ S
- ☐  $\text{SO}_3^{2-}$

Adapted with permission from UCLES, A-Level Chemistry, June 1989, Paper 3, Question 20

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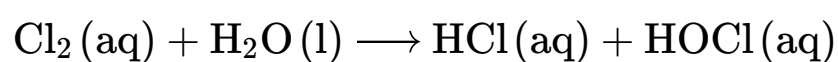
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# Essential Pre-Uni Chemistry K4.1



The following are all examples of disproportionation reactions.

## Part A   (a)



State the element that is disproportionated in the reaction.

---

State the element's oxidation state when it first appears in the chemical equation.

---

State the element's oxidation state the second time it appears in the chemical equation.

---

State the element's oxidation state the third time it appears in the chemical equation.

---

**Part B** (b)



State the element that is disproportionated in the reaction.

---

State the element's oxidation state when it first appears in the chemical equation.

---

State the element's oxidation state the second time it appears in the chemical equation.

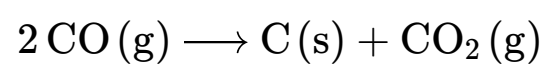
---

State the element's oxidation state the third time it appears in the chemical equation.

---

---

**Part C** (c)



State the element that is disproportionated in the reaction.

---

State the element's oxidation state when it first appears in the chemical equation.

---

State the element's oxidation state the second time it appears in the chemical equation.

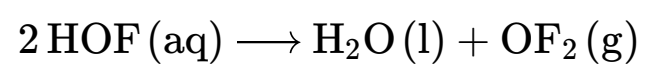
---

State the element's oxidation state the third time it appears in the chemical equation.

---

---

**Part D** (d)



State the element that is disproportionated in the reaction.

---

State the element's oxidation state when it first appears in the chemical equation.

---

State the element's oxidation state the second time it appears in the chemical equation.

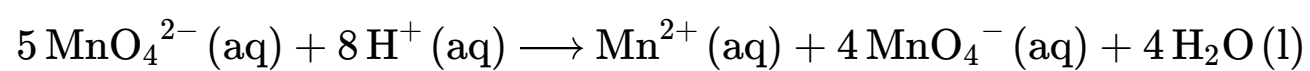
---

State the element's oxidation state the third time it appears in the chemical equation.

---

---

**Part E** (e)



State the element that is disproportionated in the reaction.

---

State the element's oxidation state when it first appears in the chemical equation.

---

State the element's oxidation state the second time it appears in the chemical equation.

---

State the element's oxidation state the third time it appears in the chemical equation.

---

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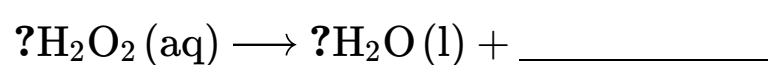


## Essential Pre-Uni Chemistry K4.2



Complete and balance the following equations that represent disproportionation reactions.

### Part A (a)



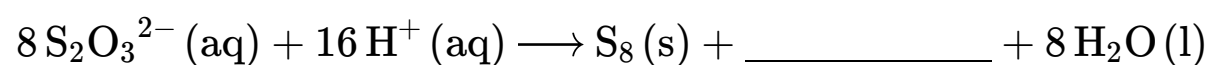
### Part B (b)



Please **click on and drag** the pre-loaded species in the equation editor to create your chemical equation.

---

### Part C (c)



Please **click on and drag** the pre-loaded species in the equation editor to create your chemical equation.

---



Physics. *You work it out.*

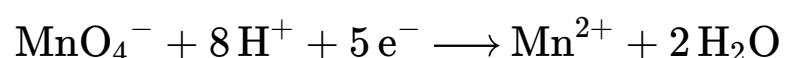
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# Iron in a Nail

A Level  
P P P

A nail of mass 1.40 g was dissolved in an excess of dilute sulfuric acid to form 100 cm<sup>3</sup> of solution. A 10 cm<sup>3</sup> sample of this solution required  $4.0 \times 10^{-4}$  mol of manganate (VII) for complete oxidation.

In acidic solution:



By assuming that, in dissolving in sulfuric acid, the iron in the nail was converted entirely into Fe<sup>2+</sup> (aq) and that manganate (VII) oxidises Fe<sup>2+</sup> to Fe<sup>3+</sup>, calculate:

## Part A   Moles of Fe<sup>2+</sup>

The number of moles of Fe<sup>2+</sup> produced from the nail.

## Part B   % of Fe

The percentage of iron in the nail.

Adapted with permission from UCLES, A-Level Chemistry, June 1992, Paper 3, Question 2

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# Sodium Nitrite

A Level  


Nitrogen can be obtained in the laboratory by warming a mixture of ammonium chloride and sodium nitrite,  $\text{NaNO}_2$ . Water is also produced and a solid is left.

## Part A   Ammonium chloride and sodium nitrite

Suggest an identity for the solid.

---

## Part B   Equation

Write a balanced equation for the reaction, including state symbols, balancing to obtain the lowest integer coefficients possible.

---

## Part C   Ammonium chloride and sodium nitrate

A similar reaction takes place when ammonium chloride is heated with sodium nitrate  $\text{NaNO}_3$  but this time the only different product is an oxide of nitrogen. Suggest a formula for this oxide, and the oxidation state of nitrogen in it.

Formula:

---

Oxidation state:

---