

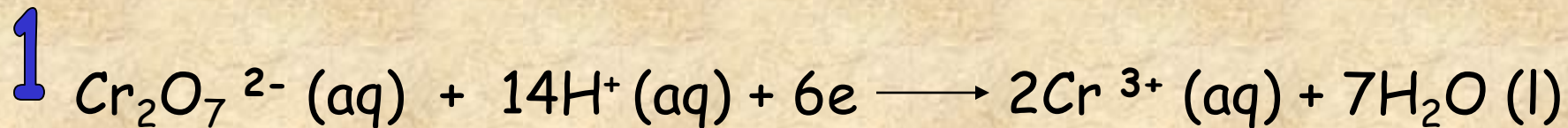
Unit 3

Redox reactions

Go to question

- 1 How many moles of I_2 are reduced by 1 mole of $Cr_2O_7^{2-}$ ions?
- 2 Which of the following is not a redox reaction?
- 3 In order to balance this ion-equation I^- to IO_3^- . You need to
- 4 The balanced redox equation for the two ion-equations below is (you will need to look a you data book, page 11)
- 5 What colour change takes place during this reaction?
- 6 25 cm^3 of 0.200 mol^{-1} potassium permanganate was titrated against a solution of Fe^{2+} ions. The concentration of Fe^{2+} ions was?
- 7 The production of Aluminium during the electrolysis of aluminium oxide can be represented by
- 8 A solution of HCl is electrolysed. What current is needed to produce 4.8 l of H_2 gas in $3\text{ min }13\text{ sec}$? 1 mole of gas occupies 24 l .





How many moles of I_2 are reduced by 1 mole of $\text{Cr}_2\text{O}_7^{2-}$ ions?

a. 4

b. 3

c. 2

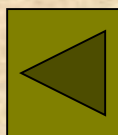
d. 1



a hint!!!!

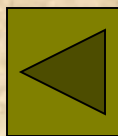
1st hint

The number of electrons on both sides of the redox equation must balance.



2nd hint

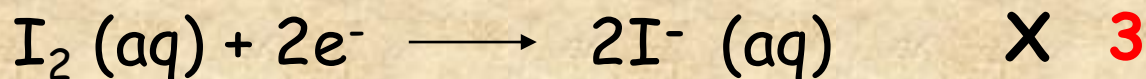
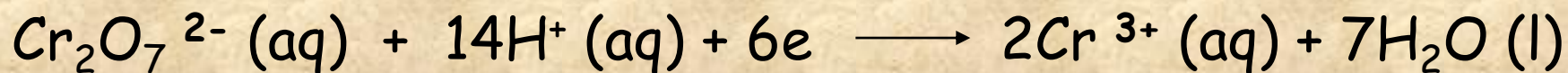
How many more moles of iodine are now needed?



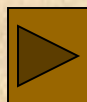
How many moles of I_2 are reduced by 1 mole of $Cr_2O_7^{2-}$ ions?

Correct because.....

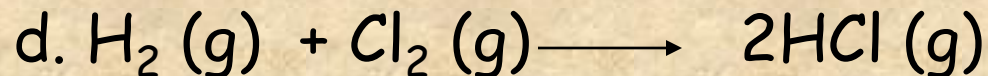
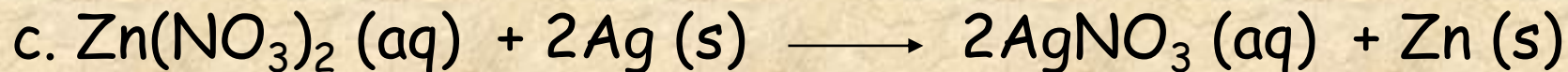
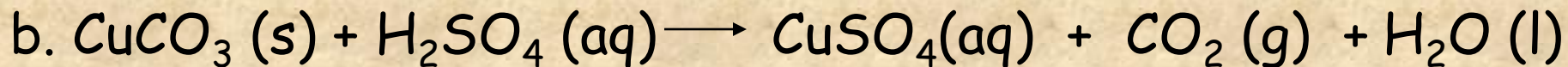
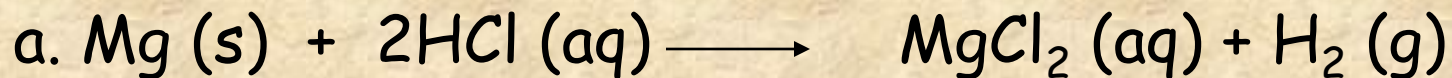
The number of electrons lost and gained must be equal.



Ans: **b. 3**

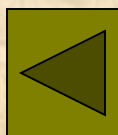


2 Which of the following is not a redox reaction.



a hint!!!!

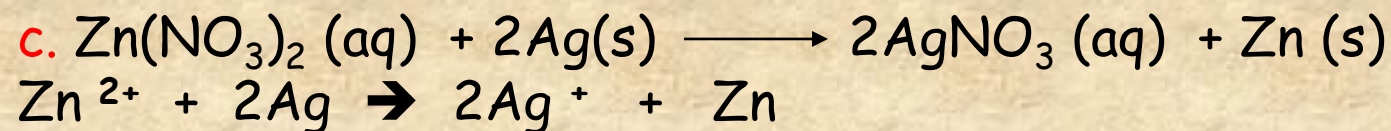
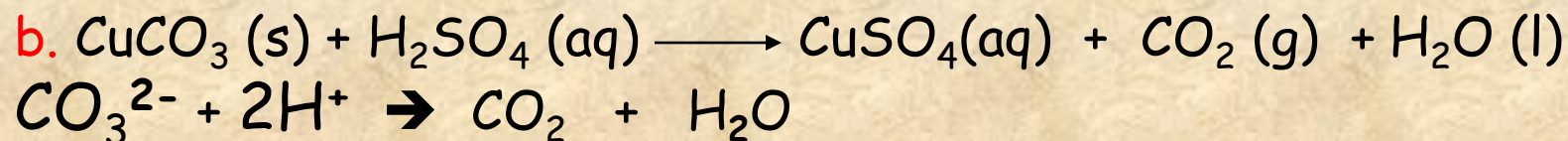
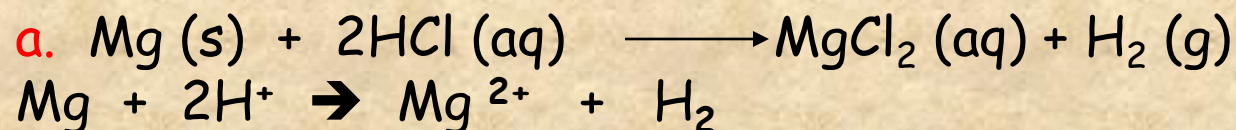
Which reaction does not involve the formation of ions.?



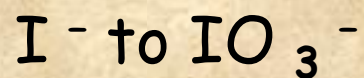
Which of the following is not a redox reaction.

Correct because.....

A redox reaction involves the transfer of electrons between reactants.



3 In order to balance this ion-equation



You need to

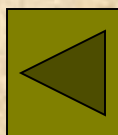
	Number H^+	Number of e^-
a.	6	3
b.	3	6
c.	3	3
d.	6	6



a hint!!!!

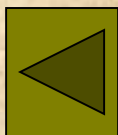
1st hint

Balance the oxygen by adding water molecules.



2nd hint

Balance the hydrogen by adding H^+ ions.



3rd hint

Balance the charges by adding electrons



In order to balance this ion-equation



Correct because.....

1st balance the O using water molecules



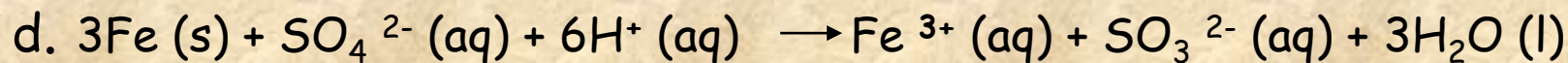
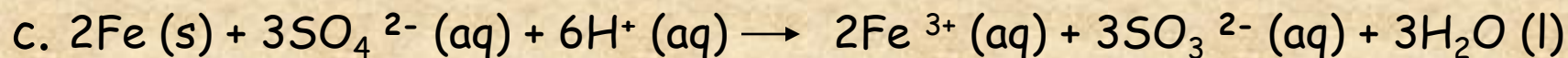
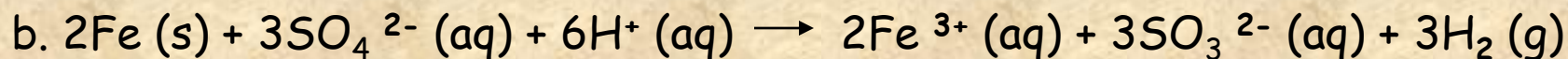
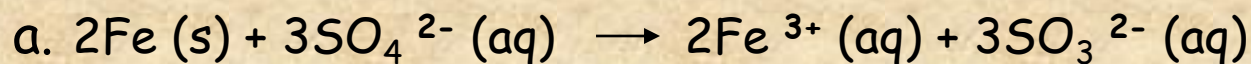
2nd balance the H using H⁺ ions.



3rd balance the charges by adding electrons

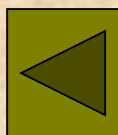
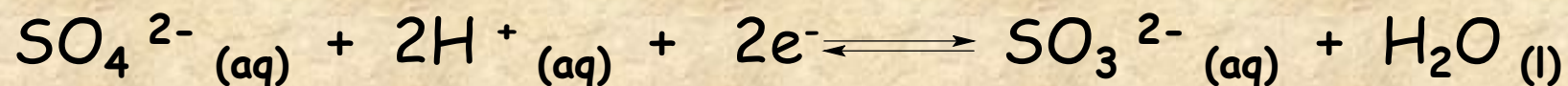


4 The balanced redox equation for the two ion-equations below is (you will need to look a your data book, page 11)

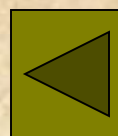


a hint!!!!

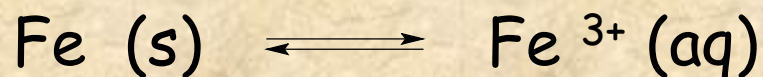
1st hint



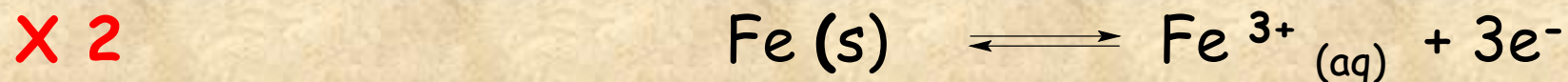
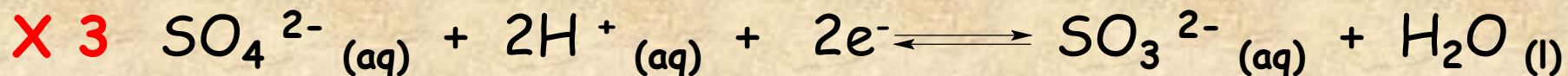
2nd hint



The balanced redox equation for the two ion-equations below is (you will need to look a your data book, page 11)



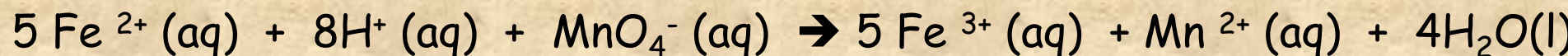
Correct because.....



Ans: C



5 What colour change takes place during this reaction?

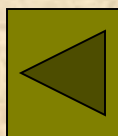


- a. Blue to colourless
- b. Colourless to purple
- c. Colourless to blue
- d. Purple to colourless

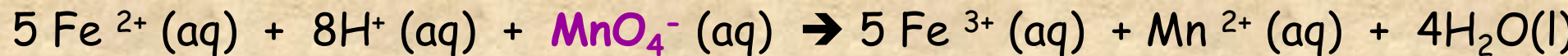


a hint!!!!

The permanganate ion is purple.



What colour change takes place during this reaction?



Correct because.....

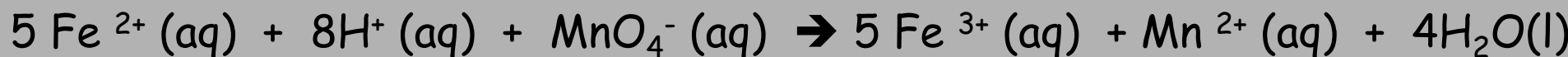
The $\text{MnO}_4^{-} (\text{aq})$ ion is purple,
while the $\text{Mn}^{2+} (\text{aq})$ ion is colourless.



6 25 cm^3 of 0.200 mol l^{-1} potassium permanganate was titrated against a solution of Fe^{2+} ions.

What was the concentration of Fe^{2+} ions?

Titration results, 20.5 cm^3 , 20.1 cm^3 and 20.0 cm^3



a. 1.25 mol l^{-1}

b. 1.24 mol l^{-1}

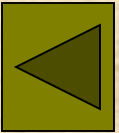
c. 0.250 mol l^{-1}

d. 1.00 mol l^{-1}



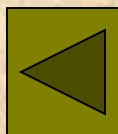
a hint!!!!

Have you used concordant titration results?

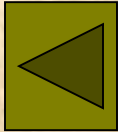


a hint!!!!

$n = V \times C$ and a 5:1 ratio of moles of Fe^{2+} to MnO_4^-



a hint!!!!



$$\frac{V_x \times C_x}{n_x}$$

=

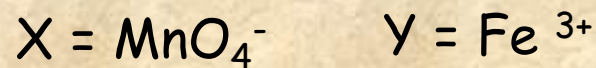
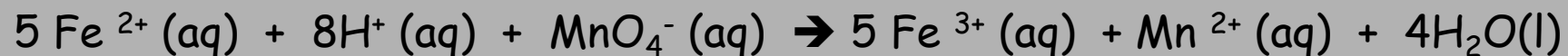
$$\frac{V_y \times C_y}{n_y}$$



25 cm³ of 0.200 mol l⁻¹ potassium permanganate was titrated against a solution of Fe²⁺ ions.



The concentration of Fe²⁺ ions was?

Titration results, ~~20.5~~ cm³, 20.1 cm³ and 20.0 cm³



$$\frac{V_x \times C_x}{n_x} = \frac{V_y \times C_y}{n_y}$$

$$\frac{25 \times 0.200}{1} = \frac{(20.1+20.0)/2 \times Y}{5}$$

 **Ans : b. 1.24 mol l⁻¹** 

7 The production of aluminium during the electrolysis of aluminium oxide can be represented by



What is the quantity of electricity needed to produce 0.2 moles of Al?

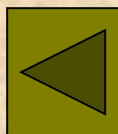
- a. 96,500 C
- b. 19300 C
- c. 57,900 C
- d. 193,000 C



a hint!!!!

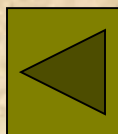
1st hint

How many moles of electrons are needed to deposit 1 mol of Al?



2nd hint

The charge on a mole of electrons is 96,500 C?



The production of aluminium during the electrolysis of aluminium oxide can be represented by



What is the quantity of electricity needed to produce 0.2 moles of Al?

Correct because.....

To produce 1 mole of aluminium, 3 moles of electrons are needed. i.e. $96,500 \text{ C} \times 3 = 289,500 \text{ C}$ needed.

1 mole Al = 289,500 C

0.2 mole Al = $289,500 \times 0.2 = 57,900\text{C}$



8 A solution of HCl is electrolysed. What current is needed to produce 4.8 litres of H₂ gas in 3 min 13 sec?
1 mole of gas occupies 24 litres .

a. 200 A

b. 50 A

c. 100 A

d. 20 A

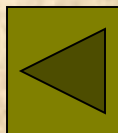


a hint!!!!

$$Q = I \times t$$

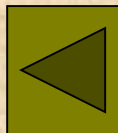
1st hint

How many moles of hydrogen does 4.8 litres represent?



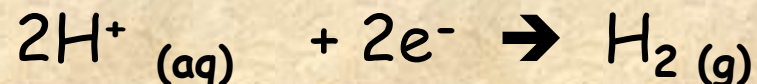
2nd hint

How many moles of electrons do you need to deposit 1 mole of hydrogen gas?



A solution of HCl is electrolysed. What current is needed to produce 4.8 l of H₂ gas in 3 min 13 sec? 1 mole of gas occupies 24 l ?

Correct because.....



So to produce a mole of hydrogen gas, 2 moles of electrons are needed.

No of moles of H₂ gas produced = 4.8/24 mol = 0.2 mol of gas produced.

1 mol of gas would need 96500 x 2 C

0.2 mol would need (96500 x 2) x 0.2 C = 38,600 C

Quantity of charge = current x time

$$Q = I \times t$$

$$\text{So } I = Q/t = 38600 / 193 = 200 \text{ A}$$

