



# **Revision Chapter I**

## **Essay Questions**

### **Workshop C**



1

Illustrate by the balanced chemical equations how to obtain Carbon from its alloy with Iron ,

Mention the kind of the alloy

Two practical experiments were carried out :

First experiment : 4 test tubes in which the following substances were placed and left in air for a sufficient time . Iron II sulphate , Iron III sulphate , Manganese II sulphate , Manganese III sulphate

Second experiment : 4 similar test tubes containing :

Iron II sulphate , Iron III sulphate , Manganese II sulphate ,  
Manganese III sulphate , Then a little amount of iron filings and  
Diluted Sulphuric acid is added to each of them

What happens to the colour of each compound of these compounds in each case ? Explain.



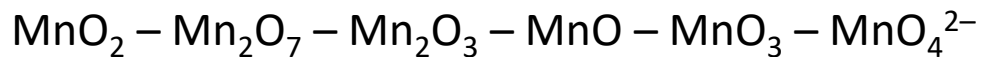
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Show by symbolic equations and mention the suitable conditions :

Adding diluted sulphuric acid to the produced solid substance from the thermal decomposition of Iron II oxalate in absence of air.

4

Manganese is a transition element its electronic configuration is  $[\text{Ar}] , 4s^2 , 3d^5$  , Arrange the following ions and compounds in an ascending order according to their magnetic momentum



5

Chromium has two different compounds with Chlorine , Chromium II Chloride aqueous solution  $\text{CrCl}_2$  has a blue colour , while Chromium III Chloride aqueous solution  $\text{CrCl}_3$  has a green colour ,  
Explain the reason for the difference in their colours from what you have studied .



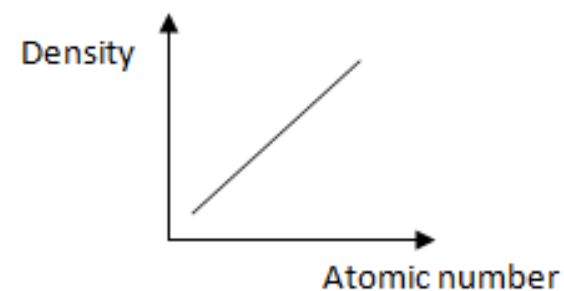
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Chromium share with iron and Aluminium in the passivity phenomena ,  
Compare between the effect of Concentrated nitric acid and the effect of  
atmospheric air on Iron metal and Chromium metal respectively .

7

In the following graph :

It represent the relation between the atomic number of the element and the density in the first transition series ,  
Explain this relation from what you have studied





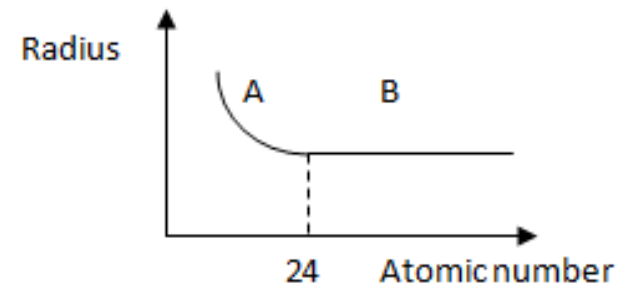
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In the following graph :

It represent the relation between the atomic number of the element and the radius in the first transition series, in 2 different two phases A and B

Explain this relation from what you have studied

How this previous relation in phase B helped in manufacture of a certain kind off alloy ? Mention this kind .

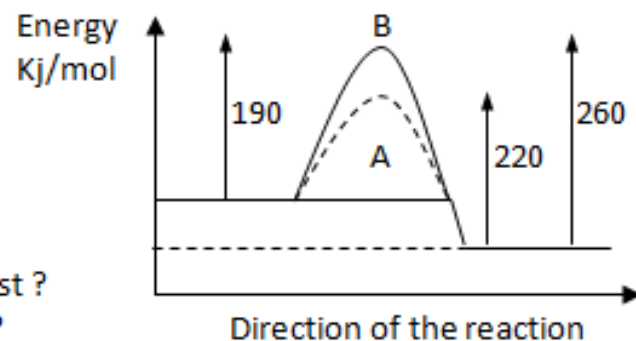


Study the opposite figure :

It represent the activation energy before and after using a catalyst

○ Answer the following questions :

- 1 – What are the lines A and B represent
- 2 – What is the value of the activation energy without using a catalyst ?
- 3 – What is the value of the activation energy after using a catalyst ?
- 4 – Is the reaction is exothermic or endothermic ?
- 5 – Find the energy of this reaction

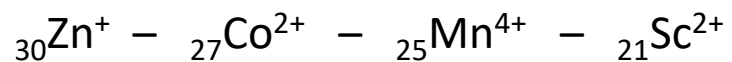


2 Transition elements Fe and Mn :

Write the chemical formula of two compounds from the previous elements in which the ion in each compound have the same number of electrons and the same number of unpaired electrons .

Scandium and Zinc belong to the first transition series , each of them has one oxidation state , Explain this

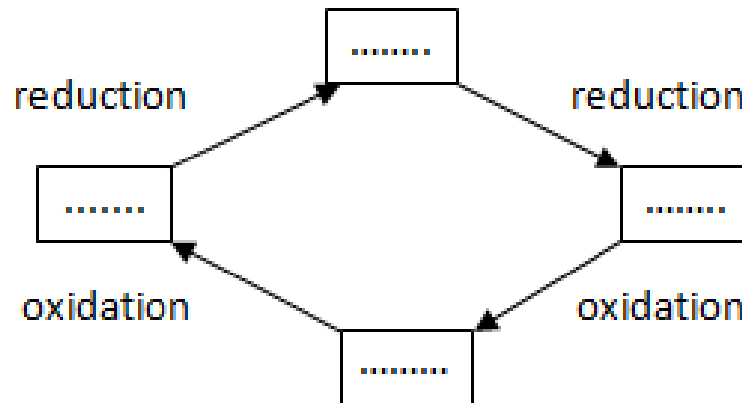
What are the ions that we can not obtain by chemical reactions in normal conditions from the following ?



Determine the number of unpaired electrons in the sublevel (d) in the following ions or compounds :



Arrange the following substances in the systemic diagram according to their ability to be oxidized or reduced



- A ) Magnetic Iron Oxide  $\text{Fe}_3\text{O}_4$
- B ) Iron Metal  $\text{Fe}$
- C ) Iron III Oxide  $\text{Fe}_2\text{O}_3$
- D ) Iron II Oxide  $\text{FeO}$

Illustrate the difference between :

Magnetic property and magnetic momentum of : -  $\text{ZnSO}_4$  –  $\text{FeSO}_4$



Illustrate the difference between :

Colouring property of : -  $\text{CuSO}_4$  –  $\text{Na}_2\text{SO}_4$

Show by balanced equations how to obtain : -  
Iron II Chloride from Iron II Oxalate

Illustrate the difference between the role of each of the following :

**A** – Iron in Fisher Tropsh Method

**B** – Manganese Dioxide in dry cell

Compare between the Oxidation state of : -  
Manganese  $_{25}\text{Mn}$  – Scandium  $_{21}\text{Sc}$

Illustrate the difference between the Transition state of : -  
Cadmium  $_{48}\text{Cd}$  – Silver  $_{47}\text{Ag}$

$X^{2+}$  ion of an element X contains 10 electron in the 3d sublevel , this element forms with two transition elements A and B two alloys.

- Element A is used as a catalyst in preparation of Ammonia
- Element B , one of its compound is used to detect glucose

Mention :

1 – The name of each element .

2 – the name and the method of preparing the alloy between B and X

Show by balanced symbolic equations what happens on :

– Passing Chlorine gas on hot iron , then Sodium Hydroxide solution is added

Show by balanced symbolic equations what happens on :  
Iron II sulphate is heated , then hot conc. Sulphuric acid is added



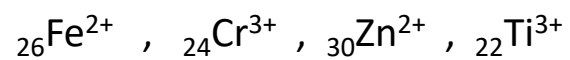
Show by balanced symbolic equations what happens on :  
Passing water vapour on red hot iron , then conc. Sulphuric acid is added

How to differentiate experimentally between : -  
– Diluted Sulphuric acid and Concentrated Sulphuric acid .

How to differentiate experimentally between : -  
– Iron II Oxide and Iron filings .

Provided with the following substances how can you obtain Iron III oxide : -  
Iron filings – Chlorine gas – Carbon Monoxide gas – Dil. Hydrochloric acid –  
Ammonium Hydroxide – Distilled water – Bunsen flame

Arrange the following in an ascending order according to their Magnetic moment : -



Compare between the abnormal properties of : - Nickel – Copper .  
( give reason for your answer )

An element ( X ) in the first transition series , the last sublevel in its atom contains a number of electrons greater by two than its period number .

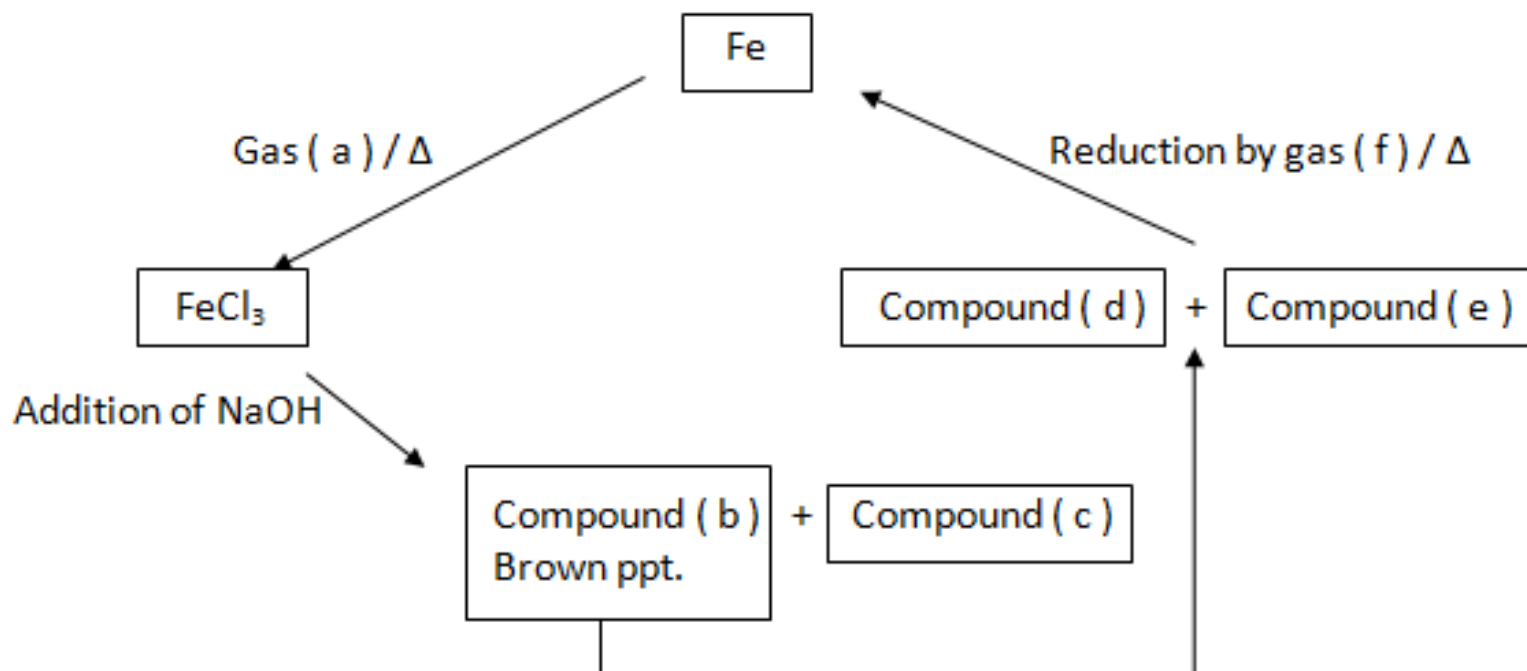
By passing chlorine gas on the red hot element ( X ) , a compound ( Y ) is formed .

Then on dissolving the compound ( Y ) in water and dividing the produced solution into 4 test tubes : ( A ) , ( B ) , ( C ) and ( D )

- I : Silver nitrate solution is added to tube ( A )
- II : Phenol solution is added to tube ( B )
- III : Ammonia solution is added to tube ( C )
- IV : Ammonium thiocyanate is added to tube ( D )

Mention :

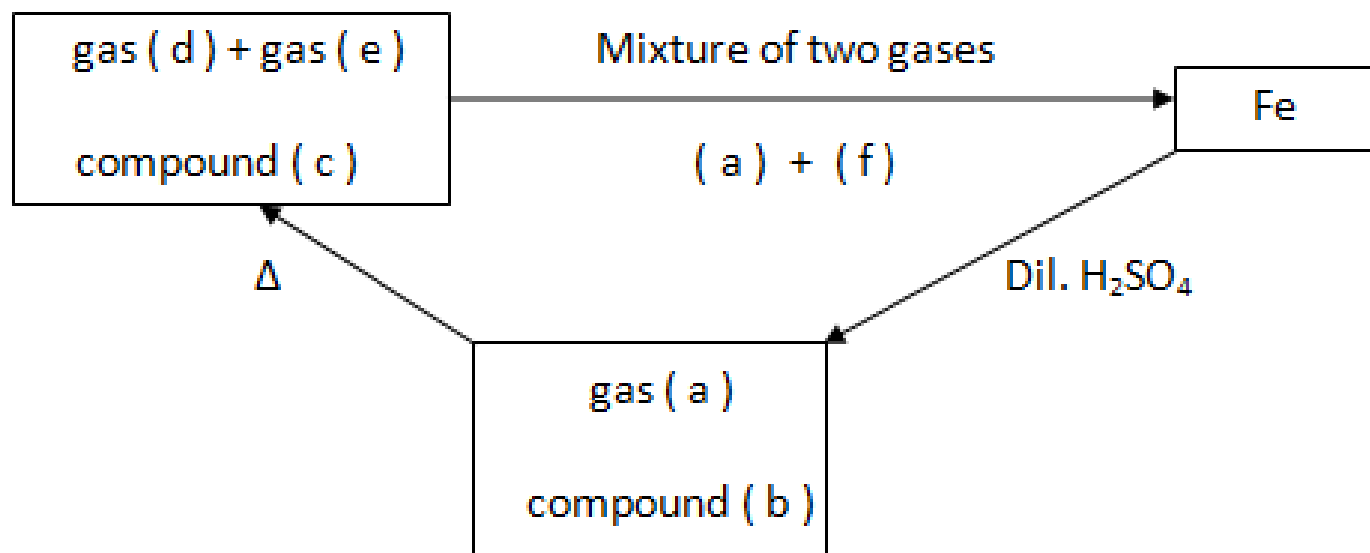
- 1 ) The colour of the formed solution or precipitate in each tube
- 2 ) The effect of the formed solution in tube C on litmus indicator



**A** – Write the names of the substances ( a ) : ( f )

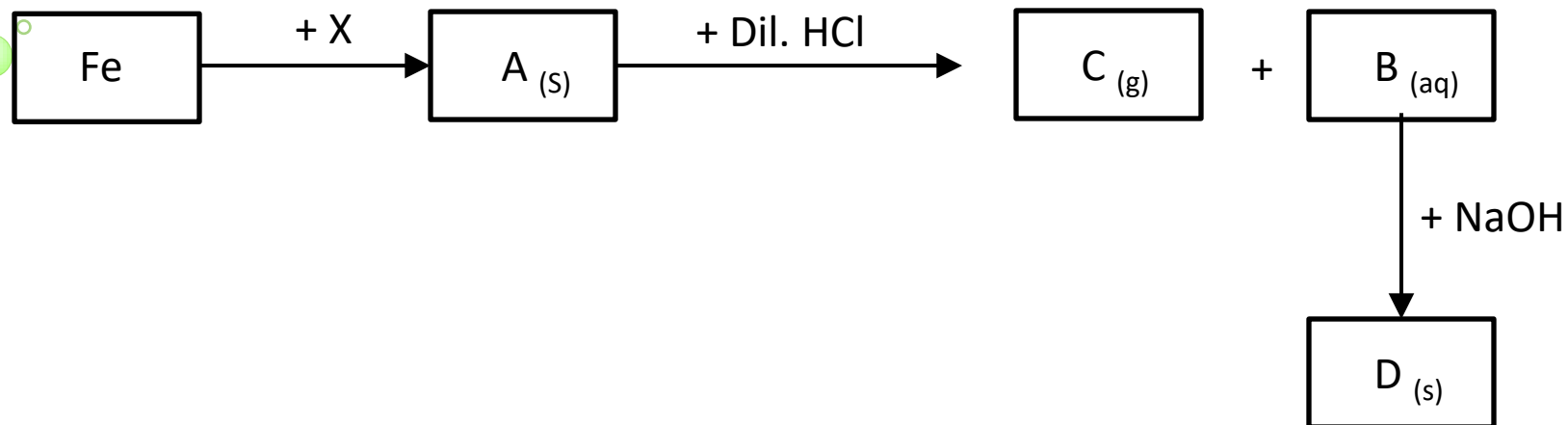
**B** – Write the balanced equations explaining these reactions in the diagram





- A** – Write the names of the substances ( a ) : ( f )
- B** – Write the balanced equations explaining these reactions in the diagram
- C** – What is the name of the furnace used in converting compound ( c ) to Iron

By using the following diagram :



If the element ( X ) reacts with iron fillings at suitable conditions ,  
Conclude the chemical formulae of A , B , C and D

Iron react with Chlorine forming the compound A , and when it reacts with Hydrochloric acid it forms the compound B .

A – Illustrate that with balanced chemical equations .

B – Which of A or B is attracted more to the magnet and why ?

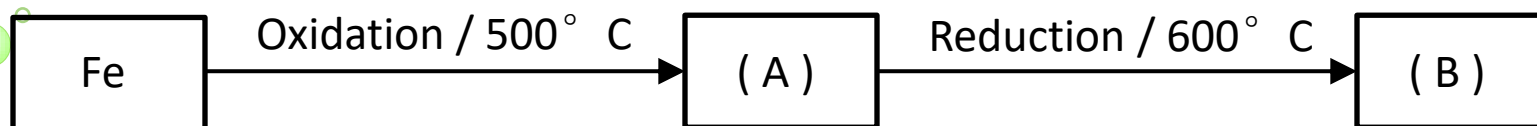
C – How can we differentiate practically between A and B ( with equations )

A main transition element from the first transition series has the maximum magnetic moment in its oxidation state +2

What is the electronic configuration of that element in its oxidation state +3 ?

Two transition elements X and Y exist in the fourth period of the periodic table and the electronic configuration for the ions of these elements in the compounds  $X_2O_3$  and  $Y_2O_3$  having three single electron in each ion. What are the name and the type of the alloy formed from mixing the two elements X and Y ? Then mention its usage .

From the following diagram :



What are the chemical formula of the two compounds ( A ) and ( B ) ?  
And on heating each of them in air , what is the chemical formula of the produced compound ?

Arrange the following steps to obtain Iron III hydroxide from iron II oxide .

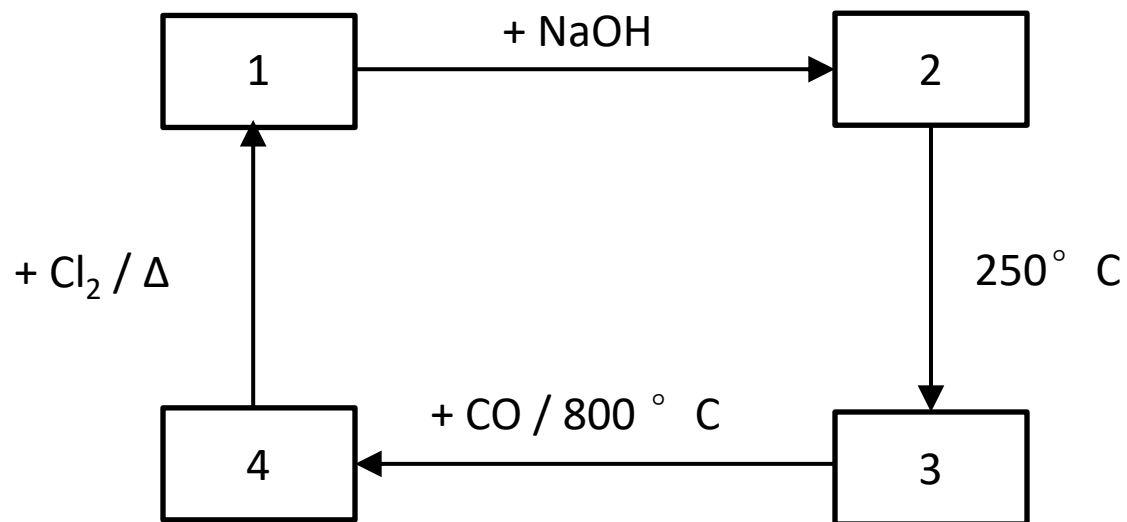
- Reacting with an alkaline solution
- Reacting with chlorine
- Reduction

How can you differentiate practically between :

- Diluted sulphuric acid and concentrated sulphuric acid ?



From the following diagram :



What are the symbols or chemical formula of each of ( 1 ) , ( 2 ) , ( 3 ) and ( 4 ) ?

Four iron compounds have the following properties :

- ( A ) its oxidation is difficult under normal conditions
- ( B ) decomposes thermally in absence of air forming Iron III oxide and two different oxides
- ( C ) decomposes thermally in absence of air forming Iron II oxide and two different oxides
- ( D ) produced from reaction compound ( A ) with concentrated sulphuric acid

Identify the previous 4 compounds .

Show by balanced chemical equations how can you obtain :

- Iron II chloride from Iron III chloride

Write the balanced chemical equations which represents the reaction of 1 mole only of both of Iron II oxide and Magnetic iron oxide found as a mixture with oxygen , then calculate :

- 1 – Number of oxygen moles required for that reaction .
- 2 – Magnetic moment of iron ion in the produced oxide from the previous reaction

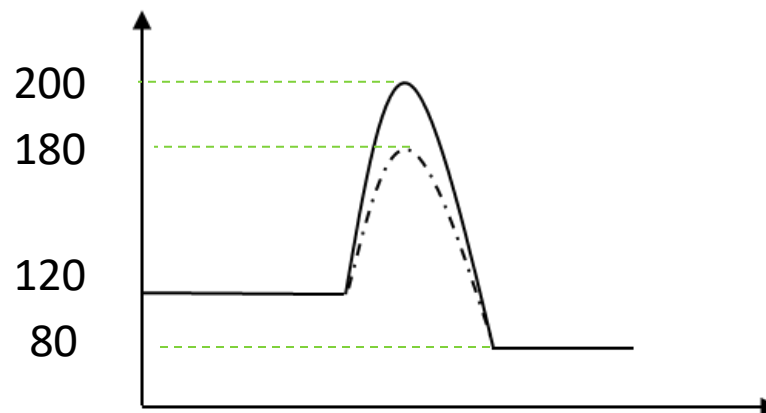
Show by balanced chemical equations how can you obtain :

- Iron II sulphide from Iron II sulphate

From the following graph ,  
Answer the following :

- 1 - Calculate the activation energy by using catalyst
- 2 - Calculate the released energy from the reaction

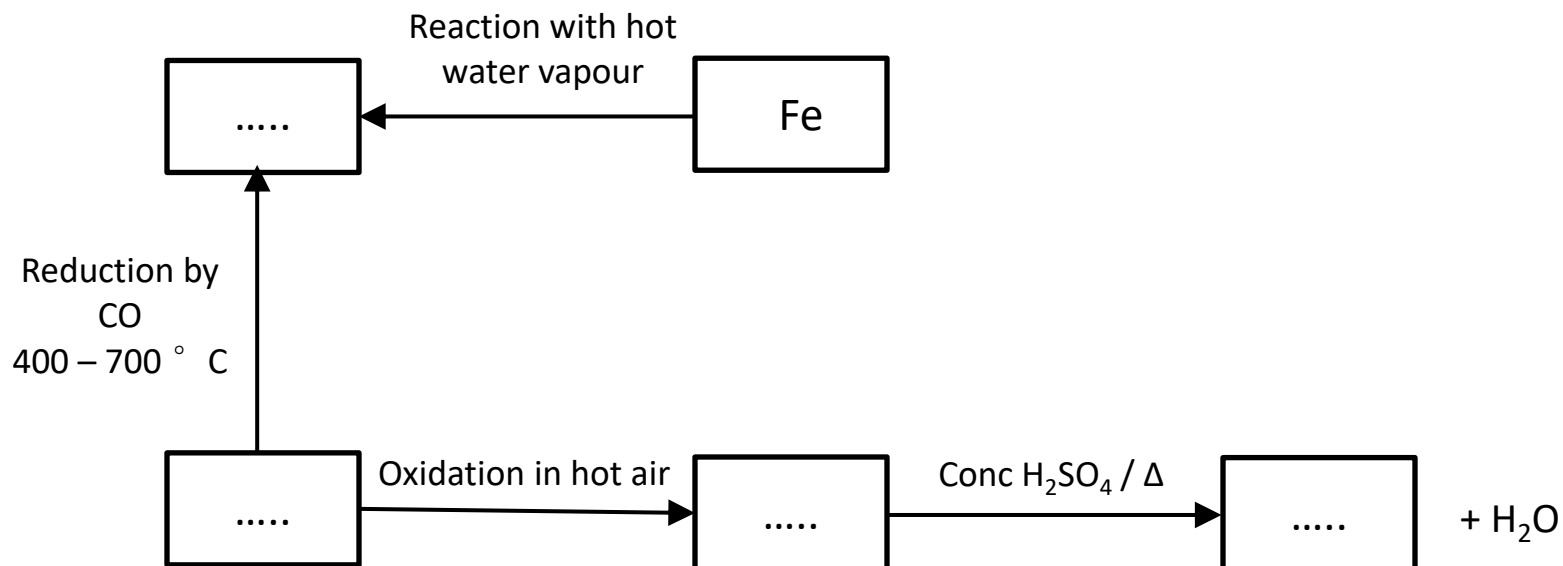
Energy KJ/mol



Reaction Direction

Explain why the magnetic moment of Chromium  $_{24}\text{Cr}$  is greater than that of Nickel  $_{28}\text{Ni}$  ?

Using the reaction conditions in the following diagram , write the chemical formulae of the following compounds in the empty spaces :





Show by balanced chemical equations how to obtain Iron III hydroxide from Iron ?

Show by balanced chemical equations how to obtain Iron II sulphate from Iron III sulphate ?

◦ Then how can you differentiate practically between them ?

On Heating one of iron compounds ( X ) a compound ( Y ) is formed with a gas evolved which turns a paper wet with acidified potassium dichromate green.

What is the chemical formula of X and Y ?

Arrange both of them according to their magnetic moment.

Show by balanced chemical equations how to obtain Magnetite from Siderite ?

Explain with equation how iron can be extracted from  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$

Show by balanced chemical equations how to obtain Iron II Sulphide from Limonite ?

( A ) is an organic salt of iron , when heated strongly in air gives compound ( B ) which is one of iron compounds

- What is the chemical formula of A and B ?

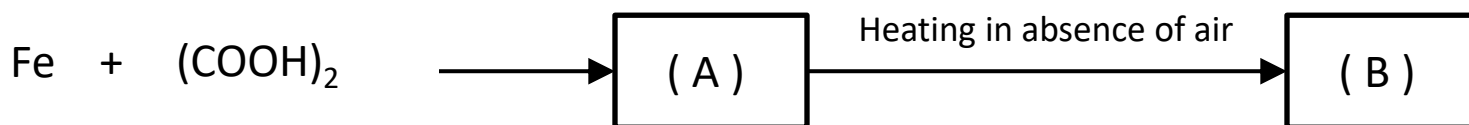
- Arrange both of them according to their magnetic moment.

If you have two alloys of ( Iron + Carbon ) , one of them is alloy ( A ) which represents a mixture of the two elements , and the other alloy ( B ) represents a compound formed of the two elements .

- 1 ) Mention the type of alloy ( A ) and ( B )
- 2 ) What is the effect of adding diluted Hydrochloric acid to the alloy ( A ) ?



From the following diagram :



How can you get a gas that makes a paper moistened with potassium dichromate change into green starting from the compound B ?