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## Reaction between iron and sulfur

Posted by Anonymous on Thu, 2016-04-28 22:18

Reaction between iron and sulfur: When we conduct the reaction between Fe and S, it seems to create  $\text{SO}_2$ , which is toxic, and sometimes I smell  $\text{H}_2\text{S}$ . Are we allowed to carry out this reaction in the lab? Also, could you please clarify the reaction between FeS and acid? My understanding is that it produces  $\text{H}_2\text{S}$ . Is it okay to do this reaction outside?

### Voting:



No votes yet

### Year Level:

7

8

9

10

Senior Secondary

### Laboratory Technicians:

Laboratory Technicians

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## Answer by Poonam hosany on question Reaction between iron and sulfur

Submitted by on 28 April 2016

Answer reviewed 22 February 2023

## Fe and S

The reaction between iron fillings and sulfur powder demonstrates the exothermic reaction of two elements to form the compound iron (II) sulfide (FeS). This reaction is usually used to illustrate elements, mixtures and compounds. This reaction generates sulfur dioxide gas, which is toxic and corrosive and small quantities can trigger asthma attacks. Therefore, Science ASSIST recommends that this reaction be conducted as a **teacher demonstration only** and be carried out in an operating **fume cupboard**.

The equation for this reaction is  $\text{Fe(s)} + \text{S}_{(\text{s})} \rightarrow \text{FeS(s)}$  and requires Fe and S in a 7:4 ratio by mass. The homogeneous mixture of iron fillings and sulfur powder is heated in a crucible with the lid on using a Bunsen burner. The lid prevents the sulfur vapour from escaping and possibly catching fire. If the sulfur catches fire, then sulfur dioxide gas will be evolved. At the end of the reaction, a hard black residue of iron (II) sulfide is formed at the bottom of the crucible. Iron (II) sulfide can be discarded into the general wastes container, as it is not considered hazardous.

Science ASSIST recommends the following for this reaction.

- A site-specific risk assessment should be conducted, see the Science ASSIST [Risk Assessment Template](#).
- Conduct as a teacher demonstration in an operating fume cupboard.
- Sulfur is an irritant and people handling it should avoid contact with skin, eyes and clothing.
- Suitable PPE, such as laboratory coat, closed-in shoes and safety glasses, should be worn. Latex or nitrile gloves are suitable for handling sulfur.
- Sulfur is a flammable solid and the crucible lid should be properly placed so as to prevent combustion.
- Inspect and discard any chipped or cracked crucible, as it may break during heating, resulting in spillage of hot material.

## FeS and acid

This reaction generates hydrogen sulfide gas, which is flammable and toxic and small quantities can trigger asthma attacks. Therefore, Science ASSIST recommends that this reaction be conducted as a **teacher demonstration only** and be carried out in an operating **fume cupboard**. This is preferable to conducting the activity outdoors because the fume cupboard is a controlled environment, whereas weather conditions can be unpredictable outside.

The equation for this reaction is  $\text{FeS}_{(\text{s})} + 2 \text{HCl(aq)} \rightarrow \text{H}_2\text{S(g)} + \text{FeCl}_2_{(\text{aq})}$

Science ASSIST recommends the following for this reaction.

- A site-specific risk assessment should be conducted, see the Science ASSIST [Risk Assessment Template](#).
- Conduct as a teacher demonstration in an operating fume cupboard.
- Suitable PPE, such as laboratory coat, latex or nitrile gloves, closed-in shoes and safety glasses, should be worn.
- React a small amount of iron (II) sulfide (0.1 g) with 5 mL of 0.5 M hydrochloric acid. The hydrogen sulfide gas generated during the reaction will be extracted by the fume cupboard fan.
- The reaction mixture should be left in the fume cupboard until the reaction is complete, and then added to water and the resulting liquid disposed of down the sink with dilution. Any unreacted iron (II) sulfide residue can be disposed of in the general waste.

## References

Chem-Supply. (2021). *Iron filings*, Safety Data Sheet. Search <https://shop.chemsupply.com.au/> to source the latest Safety Data Sheet via the product information page.

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Chem-Supply. (2019). *Sulfur*, Safety Data Sheet. Search <https://shop.chemsupply.com.au/> to source the latest Safety Data Sheet via the product information page.

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