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Risk/benefit analysis

Teachers' notes

Objectives

- To show that in real life situations risk must be balanced against benefits.

Outline

An example of a risk/benefit balance is given for fire retardants and it is shown how it can be turned into a class exercise.

Teaching topics

This type of exercise is suitable for 14–16 year olds and could be used when teaching about industrial chemical processes such as the manufacture of chlorine, sulfuric acid, iron and steel, aluminium, polymers or fertilisers. This concept could also be applied when considering the Principles of Green Chemistry as outlined in the RSC publication Green Chemistry.[1]

Background information

The objective of risk/benefit analysis is to identify risks from the procedure/chemicals and balance then against the overall benefits of the finished products. It is a framework for determining how far it is worth controlling the production, use, storage and disposal of existing substances in order to achieve reductions in the risk to human health and the environment. Cost is a key player in the analysis and if it is relatively cheap to add an extra control to reduce the risk, then the control should be added.

Risk analysis does have its limitations and if taken to its extreme many of the everyday things that we take for granted could be banned. Also, risk analysis on its own does not take into account adjustments needed as the economic situation, technology or required resources change. Therefore more often or not a compromise has to be made. In practice risks are weighed up against benefits, until finally a decision is made. If the benefits outweigh the risks then it would seem reasonable to go ahead with production, however if the balance tips the other way then production would have to be questioned.

This type of analysis is frequently carried out in industry.

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Figure 3 An example of risk/benefit analysis
(Reproduced with permission from *Green Chlorine*, York: Chemical Industry Education Centre, 1997.)

Sources of information

A section on risk / benefit analysis is included in the teachers' notes of *Green Chlorine*, York: Chemical Industry Education Centre, 1997.

Teaching tips

This activity could be carried out after learning about some aspect of industrial chemistry. In groups the students should discuss and make a list of the risks posed by manufacturing and the benefits gained from the product. Effects on the environment, local and global economy and general issues of safety should be included. A whole class brainstorming session could be used to get started.

Once the benefits and risks have been identified the risk benefit analysis student sheet can be completed.

Resources

- Scissors
- Glue
- Student worksheet
  – Risk/benefit analysis

Timing

30 minutes

Risk/benefit analysis

- List all the benefits in the box on the left hand side of the balance.
- List all the risks in the box on the right hand side of the balance.
- Cut out the pieces of the balance.
- Stick the balance in your book, showing which way it is tipped.
- Based on your balance, do you think the product should be made?