

Colour- Making Processes

Objectives

- To learn about one or more ways of making pigments and dyes in industry
- To use a simple written text to order pictures and diagrams into process order
- To learn about simple symbols used in industry to represent pieces of equipment
- To reinforce the skill of labelling diagrams

Curriculum links

English National Curriculum:

Science SC 3: 2f, 2g &

English 2: 5a, 5b; 3: 9b,12

Literacy: NLS Year 4 term 2 Text level 23; Year 5, term 1 Text level 22; term 2, Text level 15; Year 6 term 3, Text level 19.

Approximate time required: 30 mins per process studied.

Note: This activity is particularly useful if the class are going to visit a dyes or pigments factory. Teachers organising a visit to a local industry may wish to develop their own description cards and obtain a set of photographs to reflect the processes the children will see.

Resources needed

Per group, per process:

All of the resources need downloading and printing prior to the activity. Each set of photographs, captions and individual symbols can be laminated for further use.

- Process descriptions sheets
- Process photographs from industry (made into individual photographs)
- Photograph captions (each caption separate)
- Process Symbols sheet (made into individual cards)
- Teacher's master sheet with correctly matched photos and captions (not for pupil use!)

Summary of Process Photographs:

Red Pigment Industry	Blue Pigment Industry
Two tanks	Calcine
Light brown liquid	Mixed hopper
Tank and valve	Brick stacking
Red slurry	Ultramarine kiln
Opening the valve	Brick stacks
Filter press	Grinding bricks
Scraping pigment from filter cloth	Dewatering
Pigment paste moved to ovens	Atritor
Trays of lumpy paste in oven	Drying Trays
Ribbon mixer	Finished product
Dried pigment from ribbon mixer	
Grinder	
Fine holes in mesh of grinder	
Filling bags with pigment powder	
Bags of pigment sealed and put in boxes	

Suggested organisation

Groups of 3 or 4 children can cover one or both processes. The class could be divided in half, with half the class studying each process. Whole class discussion at points throughout the activity.

Carrying out the activity

Each group of children is given a Process description card. They read the description carefully, before looking at the photographs. They try to match photographs to stages of the process. Initially, they may not be able to match all the stages, but should try to do so by a gradual process of elimination.

Once they have ordered the photographs, they leave the photographs laid out in their chosen order and swap tables with another group to compare their responses. They should not re-order the other group's photographs.

The class then discuss the decisions they have made and any disagreements between groups about the order in which photographs have been placed, explaining their reasons.

The teacher tells the class that engineers and scientists draw diagrams of the processes in the factory, when wanting to let others know what the process looks like. The children are told that the symbol for a pipe is a straight line (which can turn through 90° when required!). Children are asked to discuss and draw some ideas of simple symbols for the following:

- mixing tank
- stirrer (in a tank).

After comparing the symbols they have drawn, the children are given the process symbol cards (made up from the Process Symbols sheets) for a tank and stirrer. Tell the children that these are the technical symbols used in industry, and ask them to compare these with their own drawings. The children are then given the remaining symbols cards to look at and discuss.

The symbol often represents the internal view of pieces of equipment, so it may be difficult for children to appreciate the meaning of some symbols. For example, a filter press is made up of lots of filter frames with filter cloth between, though the photograph the children are using may not make this clear.

Children work again in their groups to produce a process diagram, by placing symbol cards in the order in which the colour-making takes place. They should use the ordered photographs and the written description to help them. Cards can be blu-tacked onto paper, and joined by pipe symbols drawn on the paper.

Plenary

The class discuss all the groups' representations of the process.

The children can be shown the example diagrams shown overleaf at the teacher's discretion, but it must be recognised that these are not the only correct answers.

Where groups have focused on different processes, they can try and interpret each others' diagrams. If they have all focused on the same process, they can compare diagrams for similarities and differences. Any differences can be discussed in respect to their accuracy.

If the teacher wishes to discuss other aspects of the science curriculum, to reinforce aspects of work on Materials and their Properties, this could be done with the whole class at this stage. Some examples which the teacher may wish to discuss are:

- in some processes, pigments and dyes are placed in kilns (ovens) in order to change the materials permanently. (In the blue process, the new blue material is formed at this stage);
- kilns are also used as dryers, to remove/evaporate the water;
- filters and centrifuges are used to extract water;
- powders are dissolved in some processes.

Optional

Children will probably produce a process 'line', whereas in industry, the diagram is often represented on A4 (or larger) paper, or on a computer screen which forms part of the automatic process control. Children can be challenged to represent the process on an A4 piece of paper. Remind them that pipes can turn through 90° when necessary on a drawing. It does not mean the pipe turns through such angles in reality.

Children may also wish to know that colour plays an important part in process diagrams seen on computer screens. They can add colour to their own diagrams, by following the colour conventions used in industry (and by making up some of their own):

- water pipes are often coloured blue
- open valves ('taps') are green
- closed valves are red
- operating equipment (such as a stirrer) is green
- non-operating equipment is red

Recording

A record of the class or group decisions can be kept by making a display of the process photographs, with process statements from the relevant cards written beneath. In addition, group's process diagrams can be placed alongside the photographs.

Depending on the ability of the children, process diagrams can be made up of the symbol cards stuck to paper, or could be drawn and labelled on paper, using the symbol cards for guidance.

Background information

Many of the processes used in the colour industry are carried out on several floors in a building. Raw materials are moved to the top floor, using pumps, screw conveyors or pneumatics. Gravity flow is then used to move materials between different stages in a process. Quite often, reactors (or 'mixing vessels') straddle two floors, through large holes in the floor. Pipes, etc. also carry materials between floors in a similar manner.

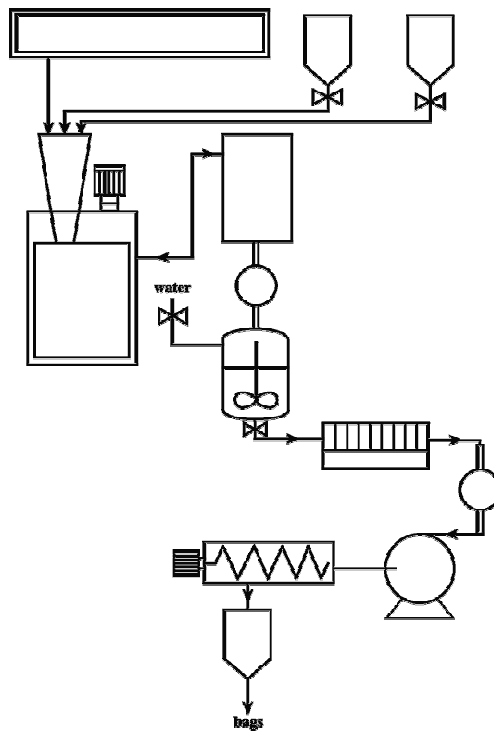
Centrifuges are machines that spin mixtures very quickly, in order to separate materials by increasing the effect of gravity. (Settling tanks serve the same purpose but take much longer to achieve a result.) Centrifuges can be used to remove liquids, such as water. The centrifuge may have filter cloths inside, as well as perforated interior surfaces, to aid this separation. A salad spinner can be used to demonstrate this process.

Extensions / links**English**

Writing instructions - practice writing instructions for common activities, such as making a cup of tea, the procedure for school lunch, preparing baked beans on toast, wrapping a parcel, making a folded paper envelope, etc. Swap them with other children who will read them and even try them out to see if they work.

Example Process Diagrams

Blue



Red

