Duddon Saint Peter's School

Science Safety

SCIENCE / ACTIVITY **6a SCIENCE / CHEMICALS**

HAZARDS The hazards associated with the use of chemicals are inhalation, ingestion, skin irritation and entry into the eyes by toxic substances. Flammable chemicals also pose a fire and explosion hazard.

CONTROL MEASURES

PUPILS HANDLING CHEMICALS

- Consider the need for eye protection during pouring of more hazardous chemicals, chemicals spitting from a test tube, chemical contaminated fingers rubbed into eyes.
- Consider the risk of chemicals irritating the skin, use spoons for transferring solid chemicals, use droppers for transferring liquids, and consider using protective gloves.
- Consider the possibility of ingestion, inform pupils of the dangers of putting fingers near mouths, ensure hands are washed at the end of the activity.
- Wipe up any spillages at once.
- Only tip out small quantities so it is never necessary to return excess chemicals to their containers.

STAFF HANDLING CHEMICALS

- Always follow manufacturer's instructions and wear necessary protective clothing/equipment.

STORAGE OF CHEMICALS

- Keep chemicals in properly labelled containers.
- Never use old food or drinks containers to store chemicals.
- Only keep small quantities sufficient for needs.
- Keep a record of all hazardous chemicals stored.
- Lock hazardous chemicals safely away.
- If more than ½ litre of flammable liquid is kept it must be stored in a fire resistant cupboard.

IRON FILINGS

- Iron filings are used to demonstrate magnetic fields. There have been a number of incidents when iron filings have entered pupil's eyes. This can be fairly serious because the iron filings oxidise.

- It is recommended that for demonstrations of magnetic fields the iron filings are kept in clear plastic containers. Proprietary containers specifically for this purpose are available. Alternatively, other suitable containers can be used.

CHEMICALS THAT ARE SUITABLE IN PRIMARY SCHOOLS CURRICULUM

These will provide a reasonable range for most primary schools. They can be used safely by pupils provided the handling procedures outlined below are adhered to. Other substances can be used but an assessment must be made to ensure they are suitable for use by pupils.

- Alum
- Bath Salts
- Bicarbonate of soda
- Borax
- Carbonated drinks
- Chalk
- Charcoal
- Citric Acid Crystals
- Cream of Tartar
- Detergents
- Epsom Salts
- Food Colourings
- Glycerine
- Health Salts
- Lemon Juice
- Milk
- Salt
- Slaked lime
- Soap
- Sour Milk
- Steel Wool
- Sugar
- Tea (contains tannic acid)
- Vaseline
- Vegetable Oil
- Vinegar
- Vitamin C
- Washing Soda
- Water Glass (Sodium Silicate)

CHEMICALS THAT CAN BE USED, BUT WITH ADDITIONAL CAUTION

The following chemicals may be used but are poisonous, flammable, corrosive or irritant and close supervision is essential.

- Chrome Alum (Chromium Potassium Sulphate)
- Cobalt nitrate
- Copper sulphate
- Iodine
- Manganese Sulphate
- Methylated spirit
- Paints
- Paraffin
- Photography fixers, developer and stop baths
- Potash Alum (Aluminium Potassium Sulphate)
- Sodium Chloride (Salt)
- Spray fixers
- Surgical spirit
- Varnish
- White spirit
- Zinc sulphate

CHEMICALS THAT ARE UNSUITABLE IN PRIMARY SCHOOL CURRICULUM

- Bleach
- Caustic Soda
- De-rusting solutions
- Dishwasher Detergent

- Dry Cleaning Fluids
- Hydrogen Peroxide
- Insecticides
- Lavatory & Oven Cleaners
- Paint Stripper
- Pesticides
- Scale Removers
- Washing machine powders (Biological and Automatic)
- Weed Killers

SUBJECT / ACTIVITY **6b SCIENCE / ELECTRICITY**

HAZARDS Electric shock, burns and fire.

CONTROL MEASURES

MAINS ELECTRICITY

- Teach the pupils the dangers and that they must never experiment with mains electricity.
- Teachers will have to decide whether they consider pupils competent to plug in and/or to switch on mains electricity. Pupils may well be doing this at home but they need to be aware of the dangers and how to do it safely and correctly.
- All mains plugs should be of the type with the insulated sleeve on the live and neutral pins. Any plugs not of this type should be changed by a competent person.
- Ensure that the socket is switched off before unplugging or plugging in electrical appliances.
- All portable electrical equipment i.e. with a mains electrical plug attached must be tested. Before use, all equipment should be inspected visually for damage to the casing or the plug, frayed leads, naked wires or exposed inner insulation i.e. blue, brown, green/yellow showing, usually at the plug grip. The cable should also be firmly attached to the equipment. Any equipment not passing this test should be removed from general use until the necessary repairs have taken place and it has been retested.
- The use of adapters is not recommended. There should be sufficient sockets to supply the portable appliances used. Where, **on occasional demand**, more outlets are required, a purpose made 3 or 4 way trail type adapter may be used as a temporary measure.
- Always use the correct fuse rating when wiring plugs.
- Keep trailing leads tidy and away from water. Avoid walkways or use the proper cable cover protectors to prevent people tripping over them.
- Extension leads should be used fully extended to avoid overheating.
- Do not accept donated equipment without checking as to its suitability. Check the school policy before you bring in any electrical equipment of your own and make sure that this is also tested.

LOW VOLTAGE OR BATTERIES

- The normal dry cell type of battery is suitable for most electrical work with pupils.
- Dispose of them when they become old as they may leak.
- Rechargeable batteries can also be used but if they are short circuited they can become very hot. Use only the recommended charger and the charging should only be carried out by a member of staff. High capacity, rechargeable batteries are not recommended.

- It is not recommended to mix rechargeable and non-rechargeable cells as this could lead to the wrong type being recharged causing a possible explosion
- Car batteries are not appropriate for use in primary school teaching activities
- Do not allow pupils to cut open batteries as the contents can be corrosive and poisonous.
- Tiny batteries, such as those used in watches, are not suitable for use in primary school teaching activities.
- Low voltage power supplies (up to 12 volts) are a suitable alternative to batteries. Although initially more expensive they do last for many years and can prove cheaper and more convenient.

SUBJECT / ACTIVITY **6c SCIENCE / GLASSWARE**

HAZARDS The main and obvious hazard is cuts from broken or sharp edged glassware.

CONTROL MEASURES

GENERAL

- Where possible use plastic containers rather than fragile glassware. However, it is important that pupils are taught to handle glassware safely.
- Do not use ordinary glass containers for heating substances or for transporting hot liquids, as this is liable to shatter. Use ovenware glass or Pyrex glass, ceramic or metal containers instead.
- When collecting material outside use plastic containers and never use glass bottles or jars.
- Chipped or broken glassware should be disposed of. The school should have a procedure for dealing with such broken glass (it should not be disposed of in the waste paper bin).
- The teacher will need to decide whether the pupils are sufficiently mature enough to clear up broken glass under supervision.
- When using mirrors, the plastic type is safer. However, glass types can be used as long as the edges are not sharp and the mirror is backed.

SUBJECT / ACTIVITY **6d SCIENCE / HEATING THINGS**

HAZARDS The hazards associated with heating things are burns to pupils and staff from contact with hot surfaces, fire and possibly the production of toxic vapours and fume.

CONTROL MEASURES

GENERAL

- All heating activities should take place under close adult supervision.
- Warm or hot water prepared by the teacher is suitable for most purposes and if transporting hot water use a kettle rather than a saucepan.
- Wear eye protection if there is a risk of spitting.
- Use spirit thermometers in preference to mercury filled ones. The 150mm Stirring type are stronger and more stable than the 300mm type.
- Beware of hot containers falling over and spilling the contents.
- When using candles stand them in sand in a metal baking tray or foil container.
- Make sure long hair is tied back and loose clothing is not worn.
- Never leave a naked flame unattended.
- If fumes are given off when heating, ventilate the room by opening the doors and windows. Never burn materials which give off harmful fumes.
- When heating things it is safer for young pupils to stand in order that they can move away quickly in case of an emergency.
- Do not use electrical items near water unless they are designed for that purpose
- Do not heat glass unless it has been made for that purpose.
- When heating liquids in test tubes pupils need to be taught to always use a test-tube holder to hold the hot test tube, to never fill to more than a fifth of the test-tube, to slope the tube and point the open end away from other pupils, to gently shake the tube to ensure even heating and not use bungs in test tubes when heating.

ACCEPTABLE HEAT SOURCES

- Candles/night lights
- Electric cookers and boiling rings
- Hairdryer
- Hot water (from a tap or kettle)
- Naked flame from a correctly fixed Bunsen Burners

UNACCEPTABLE HEAT SOURCES

- Hot air paint strippers
- Picnic stoves
- Portable liquid gas burners
- Spirit burner

SUBJECT / ACTIVITY **6e SCIENCE / MICRO-ORGANISMS**

HAZARDS The main hazard associated with work with micro-organisms is that of infection through inhalation, ingestion or entry through the eyes or cuts to the skin.

CONTROL MEASURES

GENERAL

- Micro-organisms studied in primary schools are limited to mould of one sort or another and yeast. It is important that only microbes, which are known not to be a hazard to humans, are used. This include bakers yeast, hay or grass infusion in rain water, mildews and rust on weeds and garden plants, milk, mouldy cheese, bread or fruit yoghurt, pond material and soil.
- All material used for growing microbes should be in enclosed containers. Pupils should not have direct contact with these microbes and should only observe them through the sealed container. The spores produced by many microbes e.g. moulds, may cause allergic reactions.
- When growing yeast, the container should not be completely sealed. Carbon dioxide is produced and therefore the container should only have a cotton wool plug fitted. This will allow the carbon dioxide to escape but prevent spores from entering or escaping.
- Wipe up spills immediately. Use a disinfectant and rubber gloves.
- Date all cultures left for long term study.
- Do not leave cultures any longer than necessary and dispose of if they start to smell.
- Never use material from dustbins or contaminated water for investigations.
- Cover all cuts and abrasions before starting work with microbes. Check that pupils are also protected.
- Teach pupils to wash hands thoroughly before and after working with micro-organisms and to never to put anything into their mouths during this work.
- Disposal of cultures should only be undertaken by teachers wearing gloves and with care opening the container so as not to disperse the spores and by adding 1% freshly prepared Milton solution. Then seal the culture in a plastic bag and place in the dustbin. Glassware can be washed up after the overnight soaking and re-used.
- **The culturing of micro-organisms on special growth medium requires special skills and hygienic techniques to prevent contamination and the risk of infection. Therefore this should not be attempted in primary schools unless the person has been trained in these skills and has the necessary knowledge to be able to do so safely.**

SUBJECT / ACTIVITY **6f SCIENCE / LIGHT AND SOUND**

HAZARDS The main hazards associated with light and sound are the sun's rays causing damage to the eye or fire if shone through convex lenses and damage to the hearing caused by exposure to loud noise.

CONTROL MEASURES

GENERAL

- Teach pupils never to look directly at the sun.
- Be aware that the focusing of the sun's rays with a convex lens can cause a fire. Lenses, especially large ones, should be stored out of direct sunlight.
- Teach pupils that when using binoculars and telescopes to take care not to look directly at the sun, even accidentally.
- Extra special care should be taken when viewing an eclipse of the sun. The sun's image should be projected on to a screen and not viewed through sunglasses, smoked glass or plastic.
- Care should be taken when pupils hold things close to their eyes.
- Warn pupils that very loud noises can permanently damage their hearing e.g. disco music, shotguns, machinery, etc.
- Students with ear or skin infections near their ears should not use headphones.
- Some equipment used with headphones is capable of producing sufficient volume to cause serious damage to ear drums. Users should be trained always to make a test with the headphones held in the hands an inch or two away from the ear so that the volume may be adjusted if necessary.
- Headphones that fit into the ears (stethoscopic headphones) should not be used during normal teaching and learning activities as the use of headphones as opposed to earphones has been proven to reduce the volume of sound reaching the ear 80db(A) for headphones at maximum settings as opposed to 100db(A) for earphones. If sound can be heard outside the headphones, the volume is usually too high.

SUBJECT / ACTIVITY **6g SCIENCE / OUTDOOR WORK**

HAZARDS The main hazards associated with outdoor work are cuts, infections, slipping on wet grass and rocks and falling into water areas. These are more hazardous when undertaking fieldwork away from the school site.

CONTROL MEASURES

GENERAL

- Pupils must be effectively supervised whenever they are working out of doors in environmental areas (especially those containing ponds).
- On primary school sites, pond areas must have some means of restricting access, e.g. a fence and gate. Children should be accompanied to the pond area by an adult and should be taken there only in small groups of no more than six pupils at a time with one adult.
- School environmental areas need to be regularly checked for hazards such as broken glass, poisonous plants, etc.
- Pupils need to be reminded to wash their hands carefully whenever they have handled or examined animals, plants, soil, etc.
- To minimise the risk of infection, a plaster should cover cuts or abrasions.
- When collecting litter for surveys, hands needed to be protected by plastic gloves as

there is an increased risk of infections and cuts.
- Pupils need to be taught how to use garden tools safely.
- In order to protect insects or minibeasts, use a pooter or small paint brush when collecting.

FIELDWORK OFF SCHOOL SITES
- Visits should always be organised in accordance with the LEA requirements for visits and include supervision arrangements, transport, parental permission, etc.
- Environmental visits to open waters are particularly dangerous and will need careful planning and risk assessing prior to the visit taking place.
- Visits to certain sites, particular industrial visits, may be subject to minimum age requirements and specific adult rations, e.g. certain quarries.
- Depending on the site being visited, additional safety wear may be necessary, but as a minimum pupils and staff should wear sensible clothing and footwear on all environmental visits.
- Before carrying out work in crop areas, check with the farmer that they have not been recently sprayed with fertilisers or pesticides.
- Care needs to be taken to protect the welfare and safety of animals and plants (see specific guidance on this).

SUBJECT / ACTIVITY	**6h SCIENCE / PLANTS**
HAZARDS	The main hazards associated with the use of plants are that many plants are poisonous or irritants, some pupils may be particularly vulnerable for example those with allergies or asthma.
CONTROL MEASURES	

GENERAL

Most plants are safe for children to handle and investigate. However, some are poisonous or act as irritants: The lists below give examples of suitable plants and those plants that should be avoided. Pupils should be taught a few basic safety rules when they are handling plants:

- To avoid touching their eyes whilst handling plants.
- Never to taste a plant unless they are absolutely sure that it is safe.
- Ensure pupils are aware that attractive fruits and seeds are often poisonous.
- Pupils should always wash their hands after handling plants.
- Avoid using seeds dressed with pesticides.

SUITABLE PLANTS AND SEEDS IN PRIMARY SCHOOLS

- Avocado
- Begonia
- Broadbean
- Bromeliads
- Busy Lizzy
- Cacti
- Cissus Antarctica
- Coleus
- Cress
- Date
- Dwarf Bean
- Edible fruit pips
- Exacum Affine
- Fuchsia
- Geranium
- Grevillea Robusta
- Lemon
- Maize
- Mongbean
- Mother of Thousands
- Mustard
- Oats
- Orange
- Pea
- Peanut
- Philodendron
- Rhoicissus
- Rubber plant
- Runner Bean

- Succulents
- Swiss Cheese
- Tradescantia
- Umberella or Nilegrass
- Wheat

UNSUITABLE PLANTS FOR PRIMARY SCHOOLS

- Black Bryony
- Black Nightshade
- Caster Oil Seeds
- Cuckoo Pint
- Deadly nightshade
- Giant Hogweed
- Henbane
- Hemlock
- Holly
- Laburnum
- Monkshood
- Potato (green)
- Privet
- Ragwort
- Red Kidney Bean
- Rhubarb leaves
- Spindle Tree
- Tomato (except fruits)
- White bryony
- Woody Nightshade
- Yew

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