

# Glues and adhesives

L18



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**This guide replaces GLU 85 - 'Glues and adhesives'**

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# L18 GLUES AND ADHESIVES

## 1 Scope of this advice

This document is intended for teachers of Key Stage 1 and 2 pupils and updates the advice given in the CLEAPSS publication GLU 85: *Glues and Adhesives*.

It reviews the different types of adhesive available, suggests the most effective type to use for joining particular materials and indicates the hazards that their use can present.

The major suppliers of materials for primary schools list a restricted range of relatively safe adhesives. Although these are perfectly adequate for the work undertaken by primary-aged pupils, teachers often need to use more specialist (and sometimes more hazardous) glues when constructing or repairing classroom equipment. This guide therefore provides information on a very wide range of adhesives, including those available through d-i-y outlets. Inclusion of these types of glue in this guide does **not** imply that pupils in primary schools should use them. An indication is given in section 4.1 of the suitability of different types of adhesive for pupil use.

## 2 Types of adhesive and their associated hazards

Adhesives are materials that hold things together by surface action. Strictly speaking, the term 'glue' is limited to adhesives of animal or plant origin. In everyday use, as in this Guide, the two terms are used interchangeably.

This document recognises three basic types of glue: solvent-based, synthetic resins and hot-melts.

### 2.1 Solvent-based adhesives

In these types the adhesive material is dissolved or dispersed in a solvent. This solvent enables the adhesive component to spread easily, bringing it into close contact with the surfaces to be joined. When the solvent evaporates, the adhesive material remains, bonding the surfaces together. There are two types of solvent: water and various organic liquids. The organic solvents that are necessary to dissolve some adhesive materials are often flammable and/or harmful. Water-based glues are sometimes referred to as 'solvent-free' in order to distinguish them from some of the more hazardous organic liquid types.

#### 2.1.1 Water-solvent types

This group includes most of the general-purpose classroom adhesives. The adhesive materials used include such naturally occurring compounds as starch, cellulose and rubber latex. More recently manufacturers have developed the use of compounds such as polyvinyl acetate (PVA) and acrylates that have improved the properties of some of these water-based adhesives.

Provided they have not dried, it is possible to wash off spills of any water-based glue. Pastes and some PVA types are even water-soluble when dry. Water-based adhesives are generally very safe and are ideal for joining large areas of card or paper since they do not give off harmful fumes. Glues that incorporate latex can cause irritation of the skin and eyes. Some people are allergic to latex and may react strongly to any contact with the material, however slight.

### 2.1.2 Organic-solvent types

Here the adhesive component is dissolved in a petroleum-based liquid. International concern about the environmental effect of such solvents (the 'greenhouse effect') has led to the phasing out of many of these adhesives. They do have useful properties, however, producing water-resistant bonds that often have sufficient flexibility to enable them to join together materials such as fabric or leather.

Care is needed in the use of solvent-based glues. The solvents used may be flammable or toxic and, in a number of cases, give rise to a harmful vapour with addictive properties. They are normally used in very small quantities so that they are unlikely to lead to significant fire risks, but the harmful and irritant properties mean that they should only be used in rooms that can be well-ventilated. Inhalation of the vapour can be addictive, with very serious consequences for the health of the individual concerned. Appendix 2 gives further information about the symptoms of addictive vapour dependency (glue sniffing or 'huffing').

A few organic-solvent adhesives weld objects together by dissolving material at the point where the joint is required. When the solvent evaporates the objects remain joined together. Naturally they can only act on the particular material for which they were designed: Perspex cement, for example, bonds Perspex components together while PVC cement works on PVC. Although they do not bond items made of other materials they can still cause problems if they spill onto clothes, since they contain dissolved material that becomes embedded in the fabric.

## 2.2 Chemically-setting adhesives

These are very useful and versatile adhesives that set as the result of a chemical reaction. Once this reaction is complete, a strong and water-resistant bond is formed, making these adhesives suitable for joining metals, ceramics, glass, rubber, plastics, wood etc. In those glues that are supplied as two separate components (resin and hardener) the two parts need to be thoroughly mixed together in the correct proportions in order to react together completely. There is *no benefit in adding extra hardener* to the mix, since the proportions needed to achieve the strongest bond have been calculated and supplied by the manufacturer. *Thorough mixing in the correct proportions* is the key to a strong bond; raising the temperature speeds up the setting process significantly.

The hardeners used in these glues can be irritating to the skin, as can contact with the unset glue, whether solid or liquid. Use of disposable gloves is therefore advisable when handling these glues. Although powder resulting from sanding or abrading the fully-cured material can irritate the eyes, nose, throat and lungs, the quantities of dust produced in most school situations is likely to be very small. Woodworking dust masks could be used to prevent inhalation but are only likely to be necessary if large amounts are to be sanded or sanding machines are used.

**Cyanoacrylate adhesives ('Superglues')** are a type of resin adhesive in which a rapid reaction takes place between the adhesive and water. As a result, these glues set rapidly in contact with moist skin. For this reason they are *unsuitable for use by pupils*. However, since staff may need to use this type of adhesive, and pupils might have their own supplies, we include guidance about dealing with Superglue accidents in Appendix 1.

Some specialist adhesives, including glass-bonding glues, set by the action of ultraviolet light.

## 2.3 Glues for glue guns

These glues are supplied in the form of sticks of polymers of the compounds ethene and vinyl acetate<sup>1</sup>. Heat is applied to melt the glue, in which form it can be applied to the materials to be joined. Bonding results when the glue solidifies on cooling. The resulting joints are quite adequate for most work in primary schools, although they are not as strong as the best conventional adhesives can achieve. They cannot, of course, be used for joints that will become heated, since the glue weakens at high temperatures.

These glues have many uses in schools, from construction work with cardboard, wood and plastics, to temporarily holding together items such as wires and components. Although they are able to bond together a wide range of substances, metals present particular problems, since they conduct heat away from the liquid glue very rapidly. As a result, the glue sets before it has made proper contact with the objects to be joined. Heating the metal object(s) to around 90 °C allows the glue to remain liquid for long enough to make good contact and develop a strong bond. However, this approach is hardly practicable (or necessary) in the primary school classroom !

Obviously, there are safety concerns arising from their high operating temperatures and use of mains electricity that need to be considered (see section 2.3.1).

There are two different types of glue stick currently available, with different formulations:

- conventional (hot-melt) sticks, melting at temperatures in the range 160 to 190 °C and
- 'low temperature' (cool-melt) sticks that melt between 90 and 110 °C.

Cool-melt glue is very suitable for use with delicate heat-sensitive materials. The bonds produced using low temperature glues are not as strong as those achieved with higher temperature types, but are perfectly adequate for most primary school work. Cool-melt adhesive also sets quite quickly, making it somewhat more difficult to use than hot-melt glue.

### 2.3.1 Types of gun available

To cater for the different types of glue there are two different types of gun - hot-melt and cool-melt types. Some manufacturers supply cool-melt glue in the form of sticks with an oval cross section. This ensures that they cannot be used in hot-melt guns designed for use with sticks with a circular cross section.

In the most basic type of gun, the glue stick is simply pushed through a heated section where it melts, causing the resulting liquid to issue from a nozzle. The majority of guns now available have a trigger on the handle with which to push the glue stick into the gun. Trigger guns are preferable to basic types since they keep the operator's fingers away from the heated body of the gun and allow greater control over the flow of liquid glue to be achieved.

It is important to allow the gun to reach operating temperature before squeezing the trigger, a process that takes about five minutes. Patience is therefore necessary. Trigger-happy operators can damage the mechanism! Bonding is also improved if the gun is fully up to heat and delivers the liquid glue at its optimum temperature.

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<sup>1</sup> A polymer is the result of joining a number of similar molecules together. The relatively large molecules that result often have properties that make them commercially useful, eg, as glues, building materials etc.

### 2.3.2 Safety aspects of glue guns

Although there were problems relating to some models in the late 1980s, legislation is now in place to ensure that glue guns are electrically safe. The majority (probably all) are double insulated and, short of disassembly, pupil-resistant.

Although both hot-melt and cool-melt glues are capable of blistering the skin when molten, proper care can minimise the risks of this occurring. Hot-melt glues are obviously more hazardous than the cool-melt types, but even cool-melt glue when molten has a temperature close to that of boiling water. However, the risk of a scald from a glue gun is much less than that from water, since the rate of flow from a glue gun is relatively slow and only a few drops are likely to spill. Furthermore, the glue is a poor conductor and takes some time to transfer all of its heat to the skin. As a result, rapid cooling can prevent serious injury, so it is much less likely to result in serious burns than boiling water. Cooling must be continued for some time to ensure that the heat from the glue is properly dissipated.

#### **Action in the event of glue from a gun contacting the skin**

Plunge the affected area **immediately** under water from a cold running tap. (If a sink is not available, a bucket or ice cream carton filled with water should be kept close by whenever glue guns are to be used, but not near enough that a gun could fall into the water.)

Keep the burn in cold water for *at least* 5 minutes (longer if the person continues to experience discomfort).

If necessary, seek first-aid treatment as for any other burn.

The built-in stands provided on many glue guns are helpful in enabling the gun to be stood down between periods of use. However, most guns are so light and their electrical cables so stiff that it is difficult to ensure that the parked gun does not topple over. The use of a specially designed glue-gun stand is helpful in avoiding accidents.

Although the body of a working cool-melt gun becomes only warm to the touch, the temperature of the *nozzle* will be about 90 °C, sufficient to cause a burn if held against the skin for more than a few seconds. However, the nozzle is relatively small so the risk of receiving a significant injury from a cool-melt gun is slight. The body of a hot-melt gun, although hotter, still does not reach temperatures that cause burns, (again with the exception of the nozzle). The greatest risk is that a pupil, surprised by the temperature, might drop the gun and spill some drops of glue.

The lower risks presented by cool-melt guns make them the preferred choice for use in the primary classroom. Even so, under the *Provision and Use of Work Equipment Regulations*, equipment should be suitable for its intended use. Glue guns should therefore only be purchased from reputable educational suppliers (who know that the equipment is to be used in schools), and not from high street or d-i-y shops.

Hot glue guns should be used only under adult supervision. Clearly, the younger and/or less responsible the pupils are, the greater the supervision needed. At KS1, only adults should use glue guns, perhaps in response to a child's 'instructions'. At KS2, it is reasonable to expect that responsible pupils could use cool-melt glue guns themselves, provided they are properly supervised. However, some education authorities may have banned all pupil use of glue guns, in which case teachers must respect such directives.

### 3 Risk assessments for activities involving glues

This section summarises the properties of the different types of adhesive and the hazards that their use can present. The tables use code letters to define the level of supervision needed to allow the use of each type of adhesive, dependent on the degree of the hazard that they present. The level of supervision will vary according to the age and usual behaviour of the pupils. Materials for which close supervision of 8-year old pupils is needed may require moderate supervision when used by a group of 11-year olds and normal supervision with average 13-year olds. Supervision levels are therefore given for both Key Stage 1 and Key Stage 2 classes.

Definitions of the different levels of supervision and the corresponding code letters are given below.

- N** 'Normal supervision' - the level of general class oversight that most teachers apply for the majority of the time. It involves providing guidance to ensure that pupils stay on task and giving common-sense instructions concerning the safe use of equipment and materials.
- C** 'Close supervision'. This requires continuous oversight of an individual (as for example, in some situations in special schools) or a small group of pupils (up to 6) by an adult who understands the hazards involved in the activity being undertaken. The adult remains with the individual or group throughout the process, until the hazardous materials are removed for storage or the hazardous aspect of the activity has finished.
- M** 'Moderate supervision' lies between the two levels N and C. It implies frequent oversight of groups of pupils by someone with a good understanding of the hazards involved.
- T** 'Teacher/technician/support staff' means that only an adult would be expected to use a material or conduct an activity. Sometimes the glue has hazards that preclude its use by pupils. In other cases it has very limited (if any) use at a particular key stage, but is included for the sake of completeness.

In addition, codes are given to indicate the nature of any hazard associated with a product, as indicated in the following key.

Code	Description
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Harmful vapour released.



A particular hazard to the eyes.



Irritant.



Highly flammable. No naked flames. Use in a well-ventilated area.



If any adhesive is squirted or rubbed into the eye, flush the eye immediately with gently running water from a tap and continue to do so for ten minutes.

#### 3.1 Properties of different types of adhesive

##### 3.1.1 Water-based adhesives


Most of these, apart from weatherproof and latex types, do not form a waterproof joint. They are relatively safe for use by pupils and many types are easily washable. These are shown in Table 1.











**Table 1**

Type	Examples	Uses/comments	Hazard	Supervision	
				KS1	KS2
<b>1. Natural glues</b>	<i>Gloy gum</i> <i>Gum arabic</i>	For paper, wood and cardboard. Mostly used where remoistening is easy eg, on stamps, envelopes and some parcel tape.	-	<b>N</b>	<b>N</b>
<b>2. Starch/cellulose pastes</b>					
(a) General-purpose/ education types	<i>NES Arnold Cellulose Paste;</i> <i>Cold water paste powder;</i> <i>Gloy paste;</i> <i>Galt Foundation Paste;</i> <i>Hope School Paste</i>	Very safe in use. Suitable for fixing large expanses of paper/ card. Forms a relatively weak bond.	-	<b>N</b>	<b>N</b>
(b) Wallpaper pastes	<i>Polycell Universal</i>	Virtually every domestic wallpaper paste contains fungicide. Observe good hygiene. Keep fingers out of the mouth!	Contain fungicide	<b>C</b>	<b>C</b>
<b>3. PVA, acrylate and other resins</b>					
(a) Washable types	<i>NES Arnold Easy Clean PVA;</i> <i>Bostik Solvent Free All-purpose adhesive;</i> <i>Hope PVA Washable;</i> <i>Galt Foundation PVA Washable Adhesive;</i> <i>Gloy Children's Adhesive and many others!</i>	Weaker formulations that wash out in a cool wash even when dry. Bond paper, card, fabric, wood and most plastics.	-	<b>N</b>	<b>N</b>
(b) General purpose	<i>NES Arnold School Glue;</i> <i>Galt Foundation Standard Glue;</i> <i>Handcraft PVA;</i> <i>Unibond PVA;</i>	Widely available, general-purpose glues. Most are stronger than washable types. Water-resistant when dry.	-	<b>N</b>	<b>N</b>
	<i>Galt Foundation PVA Medium;</i> <i>NES Arnold PVA Medium</i>	Stronger formulations designed for heavy-duty use or paint mixing	-	<b>N</b>	<b>N</b>
(c) Wood glues	<i>NES Arnold Wood Glue;</i> <i>Bostik PVA Wood Adhesive;</i> <i>Evostik Wood Adhesive;</i> <i>UHU Wood Adhesive</i>	Specially formulated for wood, giving strong joints. Most are <b>not</b> fully waterproof and so cannot be used for joints that are frequently wetted.	-	<b>N</b>	<b>N</b>
<b>4. Latex adhesives</b>					
(a) Flexible types	<i>Copydex;</i> <i>Evostik Fabric Adhesive;</i> <i>NES Arnold Classroom Glue;</i> <i>NES Arnold Fabric glue;</i> <i>UHU Fabric glue</i>	For paper, card and particularly fabric.	-	<b>M</b>	<b>N</b>
(b) Contact adhesives	<i>RS Contact Adhesive</i> <i>Evostik Safe 80</i>	Modern non-flammable and 'non-sniffable' types.	-	<b>M</b>	<b>N</b>


### 3.1.2 Solvent-based adhesives

 These are shown in Table 2. Many of them are HIGHLY FLAMMABLE and a few are HARMFUL as well; either hazard demands good ventilation where they are used, especially if joining large areas of materials.

**Table 2**

Type	Examples	Uses/comments	Hazard	Supervision	
				KS 1	KS 2
<b>5. Rubber-based adhesives</b>					
(a) Petroleum solvent types	<i>Cow Gum</i>	Widely used for mounting pictures/photographs. <b>Do not use near any flame.</b>		C	M
(b) General-purpose glues	<i>Bostik All-purpose Glue;</i> <i>Loctite Clear;</i> <i>UHU Multi-purpose Extra Strong;</i> <i>Evostik Multi-purpose Clear</i>	For, fabric, felt, wood, paper and some (not all) plastics etc. Use in the same way as contact types (4b or 5d) for non-porous materials. <b>Do not use near any flame.</b>		C	M
(c) Weather-proof type	<i>Bostik No 2</i>	<b>Do not use near any flame.</b>		C	M
(d) Contact adhesives	<i>Bostik Contact;</i> <i>UHU Contact;</i> <i>Evostik Impact Multi-Purpose;</i>  <i>Evostik Time Bond</i>	Allow to dry on both surfaces before assembling. An immediate full-strength bond is obtained with most types. <b>Do not use near any flame.</b>  Does allow time to adjust after assembling. <b>Do not use near any flame.</b>		C	M
<b>6. Cellulose cements</b>	<i>Balsa cement;</i> <i>Humbrol 66</i>	For model making with balsa, wood, cardboard etc. <b>Do not use near any flame.</b>		C	M
<b>7. Acrylic cement</b>	<i>Tensol;</i> <i>Perspex cement</i>	Only use in a well-ventilated area. Use only small amounts. If it is necessary to join large areas, do this out of doors.		T	T
<b>8. Polystyrene cement</b>		Not suitable for <i>expanded</i> polystyrene. <b>Do not use near any flame.</b>		C	M
<b>9. Vinyl cement</b>	<i>Evostik Hard Plastic Adhesive;</i> <i>UHU plastic adhesive;</i> <i>Bostik PVC Pipe Weld</i>	<b>Do not use near any flame.</b>		C	M

### 3.1.3 Chemically-setting adhesives

 These adhesives are gaining in importance relative to other types and there is a very wide range available, shown in Table 3. Several types are an irritant to the skin and should be handled with care especially by those who are prone to dermatitis. PVA resins that are listed under water-based adhesives are also synthetic resin types.

**Table 3**

Type	Examples	Uses/comments	Hazard	Supervision	
				KS 1	KS 2
<b>10. Epoxy resins</b>					
(a) General purpose	<i>Araldite</i> <i>UHU epoxy</i> <i>RS High Strength</i>	All are very strong and can fill large gaps. Setting time depends on temperature: up to 24 hours at room temperature but a few hours at 60°C.		T	C
(b) Quick-setting	<i>Araldite Rapid</i> <i>Loctite Toughbond</i> <i>RS Quick Set</i>	Set in minutes at room temperature.		T	C
(c) Fillers	<i>Loctite Fix'n Fill</i> <i>RS Putty Strip</i>	Particularly for filling large gaps.		T	C
<b>11. Cyanoacrylate types</b>	<i>Bostik Super Glue Gel</i> <i>Evostik Super Glue</i> <i>UHU Super Glue</i> <i>Loctite Super Glue Xtra</i> <i>RS Cyanoacrylate</i>	Some types are supplied in dispensers that reduce the risk of accidental skin contact.	 Can rapidly bond to skin	T	T

For first aid in the case of cyanoacrylate adhesives (**Superglues**) see Appendix 1.

<b>12. Acrylic resins</b>	<i>Bostik No 10</i> <i>Loctite Multibond 330</i>	These two-part adhesives have the advantage over epoxy types of being more tolerant of greasy surfaces. Each part is applied to one of the surfaces to be bonded.		C	M
<b>13. Anaerobic adhesives</b> These glues set when air is prevented from reaching them.					
(a) Glass-bonding types	<i>Loctite Glassbond</i>	Specifically formulated for glass-to-glass or glass-to-metal bonding.		T	T
(b) Screw-thread locking glues	<i>Loctite Lock'n Seal</i> <i>RS Screwlock</i>	Used for preventing nuts and bolts from becoming loose through vibration.		T	T
<b>14. Silicone adhesives / fillers</b>	<i>Evostick Build and Glaze</i>	Will bond glass, polypropylene and polythene.		T	M

### 3.1.4 Glue-gun adhesives

**Table 4**

Type	Examples	Uses/comments	Hazard	Supervision	
				KS 1	KS 2
<b>15 (a)</b> Hot-melt types	<i>Bostik, UHU</i>	Versatile and convenient.	High temperature when molten	T	T
<b>15 (b)</b> Cool-melt types	<i>Bostik, UHU</i>	Safer than high temperature glues, and particularly suitable for joining heat-sensitive materials such as fabrics and paper.	High temperature of molten glue	T	C

## 4 Which glue to use?

This table suggests the best glues to use with different materials. The numbers refer to the types of adhesive in the first columns of the tables in Section 3. Where codes are shown in brackets, the adhesive can be used but will not form a permanent bond.

To bond → to: ↓	Acrylic	Card	Ceramic	Fabric	Glass	Fibre- glass	Metal	Paper	Poly- styrene	Poly- styrene (expanded)	Poly- thene	PVC	Wood	Wood (oily)
<b>Acrylic</b>	7	4b, 5bd	4b, 5d	4b	5d, 10	5d, 10	5d, 10	5ab	5ab, 10	12	14	5d	5d, 10	5d
<b>Card</b>	4b, 5bd	1, 2, 3, 4, 15b	3, 4	4a, 15b	5d, 12	5d, 12	5d, 12	1, 2, 3, 4, 15b	5d, 12	3, 4	(4b)	4b, 5	2, 3, 4, 15b	3c, 4b
<b>Ceramic</b>	4b, 5d	3, 4	10, 12	4	10, 12	10, 12	10, 12	3, 4a	5d, 10, 12	3c, 4b	14	4b, 5abd	3, 4b, 5c	3, 4b, 5c
<b>Fabric</b>	4b	4a, 15b	4	4	4b, 5b	4b, 5b	4b, 5b	4, 15b	4b, 5b	3, 4	(4b)	4b, 5b	4b, 5b, 15b	3c, 4b
<b>Glass</b>	5d, 10	5d, 12	10, 12	4b, 5b	13a	4b, 5d	13a, 10a	4b, 5b	4b, 5d	4b	14	4b, 5d	4b, 5d	4b, 5d
<b>Fibreglass</b>	5d, 10	5d, 12	10, 12	4b, 5b	4b, 5d	5d, 10	5d, 12	5ab	5d, 10	4b	14	4b, 5d	4b, 5d, 15a	4b, 5d
<b>Metal</b>	5d, 10	5d, 12	10, 12	4b, 5b	13a, 10a	5d, 12	13b, 11, 10	5ab	10, 12	4b, 12	14	4b, 5d	4b, 5d, 10	4b, 5d
<b>Paper</b>	5ab	1, 2, 3, 4, 15b	3, 4a	4, 15b	4b, 5b	5ab	5ab	1, 2, 3, 4	5ab	3ab	(4b)	4b, 5b	5b, 15b	5b
<b>Polystyrene (solid)</b>	5ab, 10	5d, 12, 15a	5d, 10, 12	4b, 5b	4b, 5d	5d, 10	10, 12	5ab	8	4b	14	4b, 5d	4b, 5d	4b, 5d
<b>Polystyrene (expanded)</b>	12	3, 4, 15b	3c, 4b	3, 4	4b	4b	4b, 12	3ab	4b	4b	(4b)	4b	3bc, 4b, 15b	3bc, 4b
<b>Polythene</b>	14	(4b)	14	(4b)	14	14	14	(4b)	14	(4b)	14	14	14, 15b	14
<b>PVC</b>	5d	4b, 5	4b, 5abd	4b, 5b	4b, 5d	4b, 5d	4b, 5d	4b, 5b	4b, 5d	4b	14	9	4b, 5d	4b, 5d
<b>Wood</b>	5d, 10	2, 3, 4, 15b	3, 4b, 5d, 15a	4b, 5d, 15b	4b, 5d	4b, 5d, 15a	4b, 5d, 10	5b, 15b	4b, 5d, 15a	3bc, 4b, 15b	14, 15b	4b, 5d	3c, 15a, 15b	3c, 15a, 15b
<b>Wood (oily hardwood)</b>	5d	3c, 4b, 15b	3, 4b, 5d, 15a	3c, 4b, 15b	4b, 5d, 10	4b, 5d, 15a	4b, 5d, 10	5b	4b, 5d	3bc, 4b	14	4b, 5d	3c, 15a, 14b	3c, 15a, 15b

#### 4.1 A basic provision for primary school use

For the majority of primary school situations, the following adhesives should meet most pupils' requirements.

- Cellulose paste or PVA general-purpose adhesive for paper and card work.
- PVA wood glue for strong wood joints.
- Balsa cement for quick-setting model making.
- Cool-melt glue gun and sticks.

For **teacher use** in repairing and making equipment.

- Epoxy resin glue for strong, permanent repairs, including those to metal and ceramic items.
- Hot-melt glue gun and sticks.
- Fabric and pvc glues for repairs to materials etc.

## 5 Removing spilt glues

Since most glues are liquids, it is inevitable that spills will occasionally occur. Those that fall onto hard surfaces, such as work tables and floors, cause less concern than those onto clothing and other fabrics. For this reason, pupils should wear a protective overall or apron whenever they use glues. Although waterproof PVC aprons are ideal, any old, washable garment (such as a discarded shirt) will suffice to protect the wearer's clothing. Work surfaces should likewise be covered with a layer of paper or other protective material.

In the event of a spill, prompt action is essential. Except for pastes and those PVA glues that are specifically advertised as being water soluble, modern glues are so effective that, once dry, they are extremely difficult to remove.

Whatever action is taken to remove spilt glue from fabric, it is essential to carry out a test on an inconspicuous part of the garment to check that the fabric will not be damaged by the process. This can be difficult to reconcile with the need to act before the glue dries!

### 5.1 Removing water-based glues


Since they are often very fluid, spills of water-based adhesives, such as paste and PVA glues, are quite frequent. Fortunately, if sponged with cold water before they dry, they can be removed very easily and with few problems, provided the material is colourfast. Many of the general-purpose types will even wash out of clothing once they have dried. However, *Copydex* and some PVA and acrylate glues are water resistant (eg, 'weatherproof') once dry. Make sure to wash out any spills of these glues *immediately*; plunging into boiling water or treating with everyday solvents has virtually no effect once these glues are dry, so *be warned!*

### 5.2 Removing organic solvent-based glues

In order to remove spills of these glues it is necessary to use a solvent similar to that used in the original glue to dissolve the adhesive component. Usually the solvents used in the original formulations are not widely available, have harmful properties, and are likely to be expensive. It is therefore impractical to keep a stock of these solvents simply to deal with glue spills, and more everyday liquids must be tried.

The range of solvents commonly available to primary school teachers includes:

- methylated spirits,
- d-i-y paint cleaners,
- nail polish remover (propanone, sometimes still called acetone),
- commercial removers (such as Loctite *Detach*, Mangers *Stain remover*, Dylon *Dry cleaning fluid* etc).

 Most, if not all of such liquids have harmful properties of some sort. Since effective removal will usually require the use of quantities of the solvent, it is important to observe the manufacturer's hazard warnings, to wear suitable protective items, such as aprons and gloves and to ensure that the room is very well ventilated.

The glue-removing liquids developed by adhesive manufacturers appear to be formulated for use with their own products. If you make regular use of a particular manufacturer's adhesives, it is certainly worth keeping a small bottle to hand. However, such products do not appear to work any better than some everyday solvents on other manufacturers' glues.

As with water-based glues, it is essential to start the removal process before the glue has dried. Some of the dyes used on fabrics and the finishes on furniture may also dissolve in these solvents, so trials on an inconspicuous area will be essential. Gently pour a little of the chosen solvent onto the centre of the patch of glue and work outwards to the edge. Try applying the liquid to the underneath surface in order to penetrate the fabric. Blot the area dry and repeat the process several times until as much of the glue has been removed as possible. Of the everyday solvents available, nail polish remover is as effective as any in dealing with most of these glues. Liquid cigarette lighter fuel is very effective on some impact adhesives, but is less widely available since lighters using gas cartridges became popular. Do **not** use vehicle fuel, since this contains benzene, which is banned from schools).

### **5.3 Removing chemically-setting glues**

Many of these glues are not very runny, so the main type of spill results from accidental contact with the unhardened mixture. Since they are very powerful, solvent-free adhesives, removal is difficult. If the glue has not become embedded in the fabric it is usually best to allow the glue to set hard and then gently pull it away. However, these glues often penetrate fabric and become embedded within it. If this appears to be the case, carefully scrape as much of the glue from the fabric as possible before it dries. In our tests the only everyday solvent that appeared to have the slightest effect on the unset mix was methylated spirits, though whether this simply provided an aid to the scraping process was not clear!

### **5.4 Removing glue-gun adhesives**

Most spills of hot-melt glue fall as discrete drops. The glue does not dissolve easily in everyday solvents but, since it does not spread unless rubbed into the fabric, remains as drops on the surface. The glue should be cooled as quickly as possible (by gently pushing the fabric under water or placing in a freezer or refrigerator if possible), taking care not to press on it in any way. Once the glue has cooled and set it can often be gently prised from the fabric. Further gentle scraping may be needed to remove any traces of the glue from the ends of the fabric fibres.

## Appendix 1

### Emergency procedures for accidents involving a *Superglue*

***If Superglue sticks to the skin (or sticks skin together):***

***DO NOT TRY TO PULL THE SURFACES APART***

- Immerse the affected area in a *Superglue* skin release agent (if available) or warm soapy water.
- Peel or roll the surfaces apart using something blunt (a teaspoon or a spatula).
- Remove adhesive from the skin with soap and water.

***If Superglue sticks the eyelids together or the eyeball to the eyelid:***

***DO NOT TRY TO PULL THE SURFACES APART***

- Wash the eyelids with warm water.
- Apply a gauze patch (to keep the person from trying to pull the lids open).
- Obtain medical attention.
- In 1 to 4 days the eye will open without further action.

***If Superglue becomes stuck onto the eyeball:***

***DO NOT TRY TO PULL THE GLUE FREE***

- Keep calm and be patient!
- Obtain medical attention.
- The glue sticks to the protein of the eye but will separate of its own accord over a number of hours. While this is happening the victim may suffer double vision and periods of weeping. No action can be taken to speed up the separation.

***If Superglue sticks the lips together:***

***DO NOT TRY TO PULL THE LIPS APART***

- Apply lots of warm water to the lips.
- Peel or roll the lips apart.

***If a large drop causes a burn:***

This is a rare occurrence. Treat as for any other burn once the lump of glue has detached from the skin.

**If in doubt, seek medical advice**

## Appendix 2

### Symptoms of glue sniffing (huffing)

Be on the look out for some or all of the following.

- A chemical smell on clothes.
- Drunken behaviour.
- A sudden change in behaviour.
- Wide swings of mood.
- Spots round the nose and mouth.
- Loss of appetite.
- Asking for money without explanation.
- Secretiveness about leisure-time activities.
- Frequent and persistent headaches, sore throat or runny nose.

Obviously, any one of these symptoms can have a number of possible causes and discrete enquiries will be necessary. The presence of several of the symptoms together should certainly be followed up.

### Common sources of solvents capable of being abused

Public concern has led to the development of safer, so-called solvent-free, glues. Nevertheless, the properties of some solvent-based adhesives are so useful that it is unlikely that these products will be phased out altogether. The range of substances capable of being used for addictive activities is wide and includes the following everyday items.

- Butane gas.
- Some organic aerosol propellants.
- Solvent-based adhesives. *Evostik*, the original cause of concern because of its availability in relatively large volumes is now 'safe', but *Time bond* still includes an organic solvent. Other Universal and all-purpose glues, as well as Balsa cement, are also capable of abuse.
- *Tip-Ex* (some types)
- Dry-cleaning fluids
- Paint thinners
- Petrol

### Action to take on finding a person suffering the effects of solvent abuse

- Stay calm.
- Discourage exertion and keep the person calm.
- Remove solvents and make sure there is plenty of fresh air.
- Make sure the person is lying on his/her side so that any vomit produced cannot enter the breathing passages.
- Call a doctor or an ambulance.



## **Organisations dealing with the consequences of abuse**

The following organisations can provide further advice on recognising and addressing solvent abuse.

### **Institute for the Study of Drug Dependence**

32 - 36 Loman Street

London SE1 0EE

Tel: 020 7928 1211

Fax: 020 7928 1771

E-mail: [services@isdd.co.uk](mailto:services@isdd.co.uk)

Web site: [www.isdd.co.uk](http://www.isdd.co.uk)

### **National Children's Bureau**

8 Wakeley Street

London EC1V 7QE

Tel: 020 7843 6000

Fax: 020 7278 9512

E-mail: [pghelani@ncb.org.uk](mailto:pghelani@ncb.org.uk)

Web site: [www.ncb.org.uk](http://www.ncb.org.uk)

### **Re-Solv (Society for the Prevention of Solvent and Volatile Substance Abuse)**

30A High Street

Stone ST15 8AW

Tel: 01785 817885

Fax: 01785 813205

E-mail: -

Web site: [www.re-solve.org](http://www.re-solve.org)

### **SCODA (Standing Conference on Drug Abuse)**

1 Hatton Place

Hatton Garden

London EC1N 8ND

Tel: 020 7928 9500

Fax: -

E-mail: -

Web site: -

## Appendix 3      Manufacturers of adhesives

### **Bostik Ltd**

Ulverscroft Road  
Leicester LE4 6BW

Tel:            0116 251 0015  
Fax:            0116 253 1943  
E-mail:        sjs@bostik.co.uk  
Web site:     -

### **Henkel Ltd <sup>1</sup>**

Road 5  
Winsford Industrial Estate  
Winsford CW7 3QY

Tel:            01606 593933  
Fax:            01606 592893  
E-mail:        -  
Web site:     -

### **Loctite UK**

Watchmead  
Welwyn Garden City  
AL7 1JB

Tel:            01707 358800  
Fax:            01707 821200  
E-mail:        -  
Web site:     www.loctite.com

### **UHU UK Ltd**

Grove House  
551 London Road  
Isleworth TW7 4DS

Tel:            020 8847 2227  
Fax:            020 8569 8530  
E-mail:        uhuuk@aol.com  
Web site:     -

### **Wey adhesives**

Unit 2, Miltons Yard  
Petworth Road  
Witley

Godalming GU8 5LH  
Tel:            01428 684738  
Fax:            01428 685365  
E-mail:        -  
Web site

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<sup>1</sup> Manufactures the 'Unibond' range of products.

